B.F. Sisk Dam Safety of Dams Modification Project Draft Environmental Impact Statement/ Environmental Impact Report

Public Draft

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Mid-Pacific Region
Sacramento, California

DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA
Sacramento, California

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Estimated Lead Agency Total Costs Associated with Developing and Producing this EIS/EIR is $2,000,000

U.S. Department of the Interior
Bureau of Reclamation
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California Department of
Water Resources
Sacramento, California

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Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to 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.

The mission of the California Department of Water Resources is to manage the water resources of California in cooperation with other agencies, to benefit the State's people, and to protect, restore, and enhance the natural and human environments.

B.F. Sisk Dam Safety of Dams Modification Project
Draft Environmental Impact Statement/Environmental Impact Report

Lead Agencies: U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR)

State Clearing House #

ABSTRACT

Reclamation and DWR have made available for public review and comment the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR). Investigations determined that several sections of B.F. Sisk Dam sit above liquefiable and soft soils. During a seismic event, sections of the dam could slump below the water line or allow cracking to develop through the embankment which could lead to dam failure. The Draft EIS/EIR evaluates the potential impacts of alternatives to prevent destabilization of the dam embankment, reduce safety concerns, and maintain water supply deliveries to State and Federal contractors. The alternatives evaluated in this EIS/EIR include limiting reservoir storage by restricting the maximum water height and raising the dam crest (an additional 12 feet) with stability berm and face filters.

This Draft EIS/EIR has been prepared according to requirements of the National Environmental Policy Act and the California Environmental Quality Act. Direct, indirect, and cumulative impacts resulting from the project alternatives on the environment of the region are addressed.

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Abbreviations and Acronyms

AADT	Annual Average Daily Traffic
AB	Assembly Bill
ACGIH	American Conference of Governmental Industrial Hygienists
ACHP	Advisory Council on Historic Preservation\
AD	anno domini
ADA	American with Disabilities Act
AE	appears eligible for listing in the NRHP and/or CRHR
AF	acre-feet
AN	Above Normal
APE	area of potential effects
AQMPs	air quality management plans
ARPA	Archaeological Resources Protection Act
ATF	U.S. Bureau of Alcohol, Tobacco, Firearms, and Explosives
ATSDR	Agency for Toxic Substances and Disease Registry
B	beneficial
BAAQMD	Bay Area Air Quality Management District
Basins Study	The Sacramento and San Joaquin Basins Study
BAU	business as usual
BC	before Christ
BDCP	Bay Delta Conservation Plan
BGEPA	Bald and Golden Eagle Protection Act
BiOp	Biological Opinion
BMOs	basin management objectives
BMP	best management practices
BN	Below Normal
BO	Biological Opinion
BPS	best performance standards
C	Critical
CAA	Federal Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emission Estimator Model
CalEPA	California Environmental Protection Agency
CalFire	California Department of Forestry and Fire Protection

California DTSC	California Department of Toxic Substances Control
CalRecycle	California Department of Resources Recycling and Recovery
CalSim II	California Simulation Model II
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Officers Association
CARB	California Air Resources Board
CAS	Corrective Action Study
CAT	Climate Action Team
CCAA	California Clean Air Act
CCCC	California Climate Change Center
CCIC	Central California Information Center
CCR	California Code of Regulations
CCSM	Community Climate System Model
CDDs	chlorinated dibenzo-p-dioxins
CDFW	California Department of Fish and Wildlife
CDL	commercial driver license
CDPH	California Department of Public Health
CDPR	California Department of Parks and Recreation
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFCP	California Farmland Conservancy Program
CFR	Code of Federal Regulations
cfs	cubic feet per second
CFP	California fully protected species
CGS	California Geological Survey
CGPS	continuous Global Position
CH_4	methane
CHL	California Historical Landmarks
CHRIS	California Historical Resources Information System
CMIP3	Coupled Model Intercomparison Project phase 3
CMP	corrugated metal pipe
CNEL	Community Noise Equivalent Level
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CNRA	California Natural Resources Agency

CNRM	Centre National de Recherches Meteorologiques
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
CO	carbon monoxide
Code 1S	Individual property listed in NRHP by the Keeper. Listed in the CRHR
Code 4CM	Master List - State Owned Properties – PRC Section 5024
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Ranks
CSC	California species of special concern
CSP	California State Parks
CT	Census Tract
CVHM	Central Valley Hydrologic Model
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
D	Dry
dB	decibels
dBA	A-weighted dB
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
Delta	Sacramento-San Joaquin River Delta
DM	Departmental Manual
DMC	Delta-Mendota Canal
DO	Dissolved Oxygen
DOC	Department of Conservation
DOE	Department of Energy
DOF	California Department of Finance
DOGGR	Division of Oil, Gas & Geothermal Resources
DOI	United States Department of the Interior
DOT	Department of Transportation
DPM	diesel particulate matter
DPS	Distinct Population Segment
DSOD	Division of Safety of Dams
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources

E	eligible for listing in the NRHP and/or CRHR
EC	Electrical Conductivity
EFH	Essential Fish Habitat
EI5	five ensemble-informed
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EO	Executive Order
ESA	Federal Endangered Species Act
°F	Fahrenheit
FAA	Federal Aviation Administration
FC	Candidate for Federal listing
FD	Federal Delisted Species
FDA	United States Food and Drug Administration
FE	Listed as Endangered by the Federal Government
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FESA	Federal Endangered Species Act
FHWA	Federal Highway Administration
FIRMs	Flood Insurance Rate Maps
FMMP	Farmland Mapping and Monitoring Program
FPE	Proposed for Listing as Endangered
FPT	Proposed for Listing as Threatened
FR	Federal Register
FSZ	Farmland Security Zone
FT	Listed as Threatened by the Federal Government
FTA	Federal Transit Authority
FWCA	Fish and Wildlife Coordination Act
GAMAQI	Guidance for Assessing and Mitigating Air Quality Impacts
GCMs	Global Climate Models
General Permit	State General Permit for Sormwater Discharges Associated with Construction Activity
GFDL	Geophysical Fluids Dynamics Laboratory
GHG	greenhouse gas
GP	General Plan
gpd	gallons per day
GSA	Groundwater Sustainability Agencies
GSP	Groundwater Sustainability Plans
GWPs	global warming potentials

HABS/HAER/HALS	Historic American Buildings Survey/Historic American Engineering Record/Historic American Landscapes Survey
HCP	habitat conservation plan
hp	horsepower
Hwy	Highway
Hz	hertz
I-5	Interstate 5
ID	irrigation district
IMPLAN	Impact Planning and Analysis
Important Farmland	Farmland of Statewide Importance
in/sec	inches per second
IPCC	Intergovernmental Panel on Climate Change
ITAs	Indian Trust Assets
km	kilometers
Jones Pumping Plant	C.W. “Bill” Jones Pumping Plant
kW	kilowatts
L_{dn}	day-night average level
L_{eq}	equivalent (average) noise level
L_{max}	maximum noise levels
LAFCO	Local Agency Formation Commission
lbs	pounds
LESA	Land Evaluation and Site Assessment
LND	Land Management and Development
LOS	Level of Service
LSZ	low salinity zone
LTS	less than significant
LUST	leaking underground storage tank
M&I	municipal and industrial
MAF	million acre-feet
MARTS	Merced Area Regional Transit System
MBTA	Migratory Bird Treaty Act
MCLs	maximum contaminant levels
mg/m^3	milligrams per cubic meter
msl	mean sea levels
$MMTCO_2e$	million metric tons CO_2e
$MTCO_2e$/year	metric tons carbon dioxide equivalent per year
mph	miles per hour

MUD	municipal utility district
MUTCD	Manual on Uniform Traffic Control Devices
MWD	Metropolitan Water District
N_2O	nitrous oxide
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NALs	numeric action levels
NCADAC	National Climate Assessment and Development Advisory Committee
NCAR	National Center for Atmospheric Research
NCCP	Natural Community Conservation Plan
NCP	Noise Control Plan
NDMA	N-Nitrosodimethylamine
NEPA	National Environmental Policy Act
NEV	not evaluated for listing in the NRHP and/or CRHR
NHPA	National Historic Preservation Act
NI	no impact
NIOSH	National Institute for Occupational Safety and Health
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOI	Notice of Intent
NOD	Notice of Determination
None	no feasible mitigation identified and/or required
NOP	Notice of Preparation
NOTAMs	Notices to Airmen
NPDES	National Pollutant Discharge Elimination System
NPDWR	National Primary Drinking Water Regulations
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NVS	north valley section
O_3	ozone
O&M	operation and maintenance
OEHHA	Office of Environmental Health Hazard Assessment
OHP	California Office of Historic Preservation

OHV	off-highway vehicle
OPR	Governor's Office of Planning and Research
OSHA	Occupational Safety and Health Administration
Pb	lead
PCB	polychlorinated biphenyl
PCE	Primary Constituent Element
PCM	Parallel Climate Model
PG&E	Pacific Gas and Electric
P.L.	Public Law
Porter-Cologne Act	California Porter-Cologne Water Quality Act
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
ppt	parts per trillion
PPV	peak particle velocity
PR&G	Principles, Requirements, and Guidelines
PRA	probabilistic risk analysis
PRC	Public Resources Code
Project	B.F. Sisk Dam Safety of Dams Modification Project
PV	photovoltaic
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
RCNM	Roadway Construction Noise Model
RE	recommended eligible for listing in the NRHP and/or CRHR
REAP	Rain Event Action Plan
Reclamation	United States Department of the Interior, Bureau of Reclamation
REL	reference exposure level
RMP/GP	Resource Management Plan/General Plan
RNE	recommended not eligible
ROD	Record of Decision
RV	Recreational Vehicle
RWQCB	Regional Water Quality Control Board
RWSP	Refuge Water Supply Program
S	significant
Sac Yr Type	Sacramento River Water Year Type
SB	Senate Bill
SBA	South Bay Aqueduct

SC	Candidate for State listing
SCAQMD	South Coast Air Quality Management District
SCVWD	Santa Clara Valley Water District
SCS	Soil Conservation Service
SDWA	Federal Safe Drinking Water Act
SE	Listed as Endangered by the State of California
SFHA	special flood hazard areas
SGMA	Sustainable Groundwater Management Act
SHPO	State Historic Preservation Office
SIPs	State Implementation Plans
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Air Pollution Control District
SLLPIP	San Luis Low Point Improvement Project
SMARTS	Storm Water Multiple Application and Report Tracking System
SMS	Scenery Management System
SO_2	sulfur dioxide
SO_x	sulfur oxides
SOD	Safety of Dams
SR	State Route
SR	Listed as Rare by the State of California (plants only)
SRA	State Recreation Area
ST	Listed as Threatened by the State of California
SU	significant and unavoidable
SVS	south valley section
SWAP	Statewide Agriculture Production
SWE	Snow Water Equivalent
SWP	State Water Project
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TAF	thousand acre-feet
TDS	Total Dissolved Solid
TIPU	traffic, information, and public utilities
TM	Technical Memorandum
TMDLs	Total Maximum Daily Loads
TSP	total suspended particulate matter
UBC	Uniform Building Code

UN	United Nations
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
UST	underground storage tank
VELB	Valley Elderberry Longhorn Beetle
VMT	vehicle miles traveled
VOCs	volatile organic compunds
W	Wet
WD	water district
WEAP-CV	Water Evaluation and Planning model of the Central Valley
WMAs	Water Management Agencies
WQCP	water quality control plans
WSD	water storage district
WSP	Water Shortage Policy
WTP	Water Treatment Plant
µg/L	micrograms per liter
µg/m3	micrograms per cubic meter

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Executive Summary

ES.1 Purpose of this Environmental Impact Statement/Environmental Impact Report

The United States Department of the Interior, Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR) are proposing the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) to address dam stability and safety concerns. These concerns are associated with several sections of the B.F. Sisk Dam and select foundation materials that the dam was built upon in the event of seismic activity. The Project alternatives analyzed in this joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) would help prevent destabilization of the dam embankment, reduce safety concerns, and maintain water supply deliveries to State and Federal contractors. The alternatives analyzed in this EIS/EIR include the No Action/No Project Alternative, the Reservoir Restriction Alternative, and the Crest Raise Alternative.

Reclamation, the National Environmental Policy Act (NEPA) Lead Agency, and DWR, the California Environmental Quality Act (CEQA) Lead Agency, have prepared this joint EIS/EIR to comply with NEPA and CEQA. This EIS/EIR analyzes the direct, indirect, and cumulative effects of implementing the B.F. Sisk Dam SOD Project.

ES.2 Project Background

B.F. Sisk Dam was constructed to create the off-stream San Luis Reservoir which provides supplemental storage capacity for the Central Valley Project (CVP) and State Water Project (SWP). Reclamation and DWR have conducted several geological investigations at B.F. Sisk Dam because of its location near active faults. In 2006, Reclamation completed a risk analysis of B.F. Sisk Dam that evaluated dam stability in the event of seismic activity. The analysis concluded that significant- to high-seismic activity could result in dam failure and B.F. Sisk Dam did not meet the standards of Reclamation's Public Protection Guidelines (Reclamation 2011). Reclamation initiated a Corrective Action Study (CAS) in 2006 that resulted in the evaluation of multiple potential structural modifications and operational changes at B.F. Sisk Dam that were compiled and further reviewed in a Value Planning Study (2016).

B.F. Sisk Dam is located on the west side of California's Central Valley between Los Banos and Gilroy. B.F. Sisk Dam impounds San Luis Reservoir and is part of the San Luis Joint-Use Complex or San Luis Unit, which was authorized by Congress in 1960 under the San Luis Act (Public Law [P.L.] 86-488) and is a joint effort of the Federal (Reclamation) and State (DWR) governments. The dam is a zoned, earthfill structure 382 feet high with a crest length of 18,600 feet (approximately 3.5 miles) and a crest width of 30 feet; it contains 77,656,000 cubic yards of material. At a crest elevation of 554 feet above mean sea level, the maximum base width is 2,420 feet (Reclamation 2009).

The San Luis Reservoir provides 2,027,840 acre-feet (AF) of water storage for the CVP and the SWP. The water stored in the reservoir is managed for State (55 percent) and Federal (45 percent) uses as part of the SWP and CVP, respectively. Typically, during the winter and early spring, water is lifted from O'Neill Forebay into the San Luis Reservoir for storage using the pump-turbines in the Gianelli Pumping-Generating Plant. Then later in the year when demand in the CVP and SWP increases, water is released from San Luis Reservoir through O'Neill Forebay and conveyed via the California Aqueduct (a SWP facility) or the Delta-Mendota Canal (a CVP facility) for use by municipal and agricultural water users (Reclamation 2009). As water is released back through the Gianelli Pumping-Generating Plant, the plant generates hydropower, which is used to offset the energy demand of the project operations. Water is also diverted from the west side of San Luis Reservoir at the Pacheco Pumping Plant to supply water to CVP contractors the Santa Clara Valley Water District and San Benito County Water District (Reclamation 2013). In addition to storing and supplying water, the San Luis Reservoir provides recreation opportunities under an agreement between Reclamation and DWR.

Reclamation owns the lands encompassing San Luis Reservoir, and DWR is responsible for managing facility operations. Under an agreement with Reclamation, the California Department of Parks and Recreation manages the recreation facilities and recreational use of San Luis Reservoir, which is part of the larger San Luis Reservoir State Recreation Area. Figure ES-1 presents a map of the study area for the EIS/EIR. The study area includes:

- San Luis Reservoir, Merced County;
- Sacramento-San Joaquin River Delta (Delta);
- California Aqueduct;
- Delta-Mendota Canal; and
- South-of-Delta CVP, SWP Contractors' service areas.

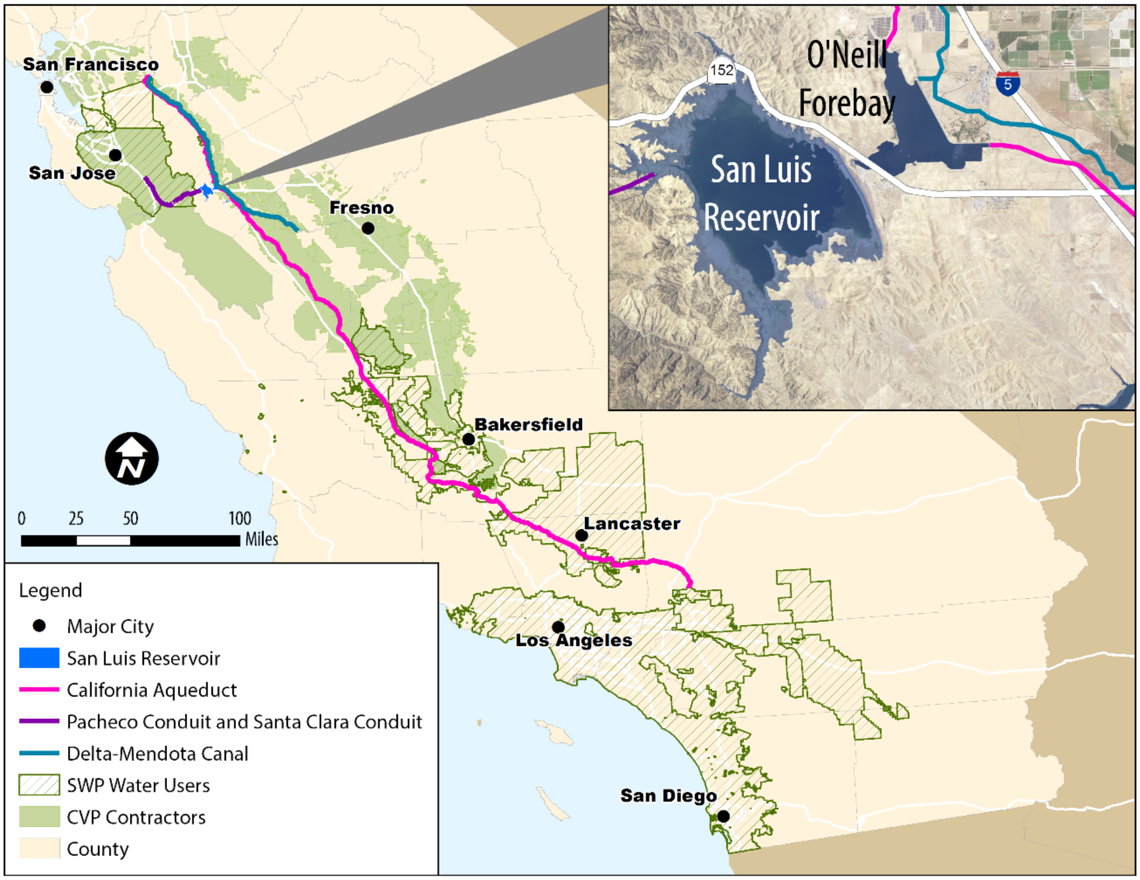

Figure ES-1. Study Area

ES.2.1 Safety of Dams Program

Reclamation's Dam Safety Program was officially implemented in 1978 with passage of the Reclamation Safety of Dams Act, P.L. 95-578. Dams must be operated and maintained in a safe manner, ensured through inspections for safety deficiencies, analyses utilizing current technologies, and corrective actions if needed based on current engineering practices. The SOD program focuses on evaluating and implementing actions to resolve safety concerns at Reclamation dams (Reclamation 2017).

ES.2.1.1 Analysis of Risk

In an effort to balance public safety and costs for modifying dams, Reclamation uses a risk-informed approach to making dam-safety decisions. The analysis of risk includes the probability of an event (e.g. severe earthquake) in any particular year, the likelihood of dam failure if the event were to occur, and the consequences of dam failure. The decisions are then based on Reclamation’s Public Protection Guidelines. Reclamation and DWR completed a probabilistic risk analysis (PRA) of B.F. Sisk Dam that included earthquake deformation analysis and soil testing. A PRA consists of a detailed study of the chain of events that would have to occur and the likelihood of their occurrence in order for the dam to fail (Reclamation 2007). Reclamation performs PRAs for all dams in the Reclamation dam safety inventory. For B.F. Sisk Dam, failure was determined to be very unlikely in any particular year; however, the consequences could be severe.

ES.3 Purpose and Need/Project Objectives

Investigations conducted under Reclamation's SOD Program determined that several sections of B.F. Sisk Dam sit above liquefiable and soft soils. During a seismic event, sections of the dam could slump below the water line or allow cracking to develop through the embankment which could lead to dam failure.

The San Luis Reservoir is an important CVP and SWP facility and a key component of California's water supply system. Therefore, proper functioning of the reservoir is critical to maintaining water distribution for Federal, State, and local uses. Reclamation and DWR have determined that actions to reduce risks from earthquakes to the public downstream of the dam are needed.

The purpose of the Proposed Action, the B.F. Sisk Dam SOD Project, is for Reclamation and DWR to:

1. Implement cost-effective measures to prevent destabilization of the dam embankment and to ensure dam stability, in the event of an earthquake;
2. Reduce safety concerns of the public downstream of the dam; and
3. Maintain water supply deliveries to State and Federal contractors through the CVP and SWP.

ES.4 Development and Screening of Preliminary Alternatives

The Lead Agencies, Reclamation and DWR, used a comprehensive process to develop initial alternatives that included review of existing material, public input, and comparison and evaluation of initial alternatives using the Federal planning criteria and the purpose and need/project objectives. The following sections describe the alternatives development and selection process as well as the screening criteria used to refine the initial range of alternatives.

ES.4.1 Alternatives Development and Screening

The development of the initial alternatives was consistent with NEPA and CEQA, which require a project proponent to consider a reasonable range of alternatives. CEQA requires that an EIR present a reasonable range of potentially feasible alternatives that would avoid or lessen a proposed project's significant environmental impacts (CEQA Guidelines Section 15126.2(a)).

To formulate the alternatives, a structured process was developed that included internal and public scoping. The first step of this process was for the Lead Agencies to determine the purpose and need/project objectives. The Lead Agencies then sought input from stakeholders and the public on the project during a scoping effort completed in 2009. Feedback received during public scoping, along with the studies completed as a part of the ongoing CAS, including the 2016 Value Planning Study, were used to identify potential measures to address the purpose and need of action. These measures were then evaluated using screening criteria developed by the Lead Agencies. Options that sufficiently met each screening criteria were carried forward for consideration as a stand-alone alternative or as a component of a combined alternative. A diagram of this process is shown below in Figure ES-2.

Figure ES-2. Alternative Development Process

The measures that remained following this first phase of screening fell into two categories – non-structural and structural measures. These options included:

- Reservoir Restriction
- Maximum Pool Timeframe Limits
- Groundwater Banking
- Use alternative water supply to offset losses from restrictions
- Early Warning System
- Berm construction
- Install filter
- Alternate dam site
- Develop flood corridor/Construct new flood spillway
- Breach/Dam Removal
- Crest Raise

The Lead Agencies developed five criteria to evaluate the measures that have been carried forward into the second phase of the screening process. Three of these criteria addressed the ability of the measure to address the purpose and need of the project: reduction in safety concerns to the downstream public and ability to maintain water supply deliveries. Two other criteria addressed the cost effectiveness of the measure, and the acceptability of the environmental impacts. Measures were scored qualitatively for each of the five screening criteria. The metrics used were:

- The measure fully addressed the screening criteria
- The measure partially met the screening criteria
- The measure did not address the screening criteria

Only those measures that scored highest moved forward as stand-alone alternatives. Some lower scoring measures remained in consideration because of their ability to help a combined alternative more fully meet the purpose and need, address cost effectiveness, or minimize adverse environmental impacts. Measures were eliminated from further consideration if they would not meet the Project's purposes and needs, would require excessive cost expenditures, or would have substantial adverse environmental effects.

ES.5 Project Description

The two action alternatives and the No Action/No Project Alternative analyzed in this EIS/EIR are summarized below.

ES.5.1 Alternative 1 - No Action/No Project Alternative

Both NEPA regulations (40 Code of Federal Regulations [CFR] 1502.14(d)) and CEQA Guidelines (Section 15126.6) require the evaluation of a No Action or No Project Alternative, which presents the reasonably foreseeable future conditions in the absence of the proposed project. The purpose of the No Action or No Project Alternative is to allow decision makers to compare the impacts of approving the project to the impacts of not approving the project. Under NEPA, the No Action Alternative also serves as the baseline to which action alternatives are compared to determine potential impacts. This differs from CEQA, where existing conditions (conditions at the time of the Notice of Preparation) serve as the baseline to determine potential impacts of the alternatives. The No Action/No Project Alternative may differ from the existing conditions if there are actions that could occur in the project area in the future, that 1) currently do not exist and 2) do not rely on approval or implementation of the proposed project.

Under the No Action/No Project Alternative, there would be no structural or operational changes to the dam. B.F. Sisk Dam would not be improved, and no new structures would be installed to protect the dam from potential seismic failure. No changes to the operation of B.F. Sisk Dam or the storage level of the reservoir would occur and the freeboard for the normal reservoir pool would remain at 10 feet. This alternative does nothing to reduce the risk of failure from overtopping due to large seismically-induced deformations of the dam. The dam would continue to be susceptible to liquefaction and strength loss, resulting in a reduction of the crest elevation caused by seismic loading and the seismic risk would remain unchanged. This alternative would not meet the purpose or objective of the Proposed Action. The No Action/No Project Alternative reflects, for most resources evaluated in this EIS/EIR, existing and expected future conditions in the project area if no action is taken.

ES.5.2 Alternative 2 - Reservoir Restriction Alternative

The Reservoir Restriction Alternative would limit the storage of the reservoir by restricting the maximum water height. If the reservoir is maintained at a lower operating level, there is a lower probability of failure given an increase in allowable dam slumping that could occur in a seismic event before overtopping and a reduction of pressure on the embankment in areas where cracking could occur. This alternative may also reduce the consequences of dam failure by eliminating or reducing the total amount of possible floodwater that could be released from the dam during a seismicity-induced failure event. The reduction in total storage capacity in San Luis Reservoir would adversely impact water supply deliveries to CVP and SWP contractors. This reduction in water supply would not meet one of the three objectives of the Proposed Action. However, the Reservoir Restriction Alternative is analyzed in this EIS/EIR as a non-structural alternative to prevent destabilization of the dam embankment, ensure dam stability, and reduce safety concerns.

Construction associated with the Reservoir Restriction Alternative would be limited to revegetation of the reservoir rim between the current maximum reservoir water surface elevation and the restricted reservoir maximum surface elevation. Hydroseeding would take place over a 1.5 year period in order to establish vegetation along the new sections of reservoir rim.

The Reservoir Restriction Alternative would consist of a 55 foot reduction in the maximum water surface elevation of San Luis Reservoir from the current elevation of 544 feet to 489 feet. This would permanently reduce the maximum storage capacity of the reservoir from 2,027,840 AF to 1,383,000 AF.

ES.5.3 Alternative 3 - Crest Raise Alternative

The Crest Raise Alternative would reduce safety concerns for the downstream public by reducing the likelihood of overtopping if slumping were to occur during a seismic event by increasing dam height. This alternative would also address dam failure due to earthquake-induced cracking. This measure maintains water supply deliveries to State and Federal contractors through the CVP and SWP because it allows the reservoir to operate at its current maximum storage elevation. The cost of the Crest Raise Alternative is likely to be high given the major construction action required. The construction actions required by the Crest Raise Alternative would also generate adverse environmental impacts. The Crest Raise Alternative is currently the Preferred Alternative (as described in more detail in Section 26.3).

As part of this alternative, the dam crest would be raised by adding additional embankment material (see Figure ES-3) in conjunction with the addition of stability berms and downstream crack filters. The foundation that the dam is built on can be divided into sections: the right abutment, the left abutment, the north valley section (NVS), and the south valley section (SVS) (See Figures ES-3 and ES-4). Construction of foundation shear keys at slopewash and north valley sections, and a filter around the existing spillway conduit are also included in this alternative. In addition to these modifications, development of a foundation shear key at the SVS is under consideration as an optional additional feature of this alternative.

The Crest Raise Alternative would raise the dam crest up to an additional 12 feet to a new crest elevation of 566 feet along the majority of the embankment, tapering at a 2 percent slope to the existing crest elevation at the abutments. Any work that would reduce the reservoir embankment strength would be timed seasonally and would occur during periods of the year when the reservoir is drawn down to lower elevations. This work would also be scheduled for completion each year prior to the refill of San Luis Reservoir back above safe levels to protect embankment stability. This could result in delays to refill if the construction schedule is delayed, but the division of specific modification actions scheduled to occur in one drawdown season would be structured to minimize this risk. Implementation of the optional SVS shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, during the period that the berm foundation would be excavated. This reduction in surface elevation would reduce storage capacity in the reservoir and could limit CVP and SWP deliveries during this construction period.

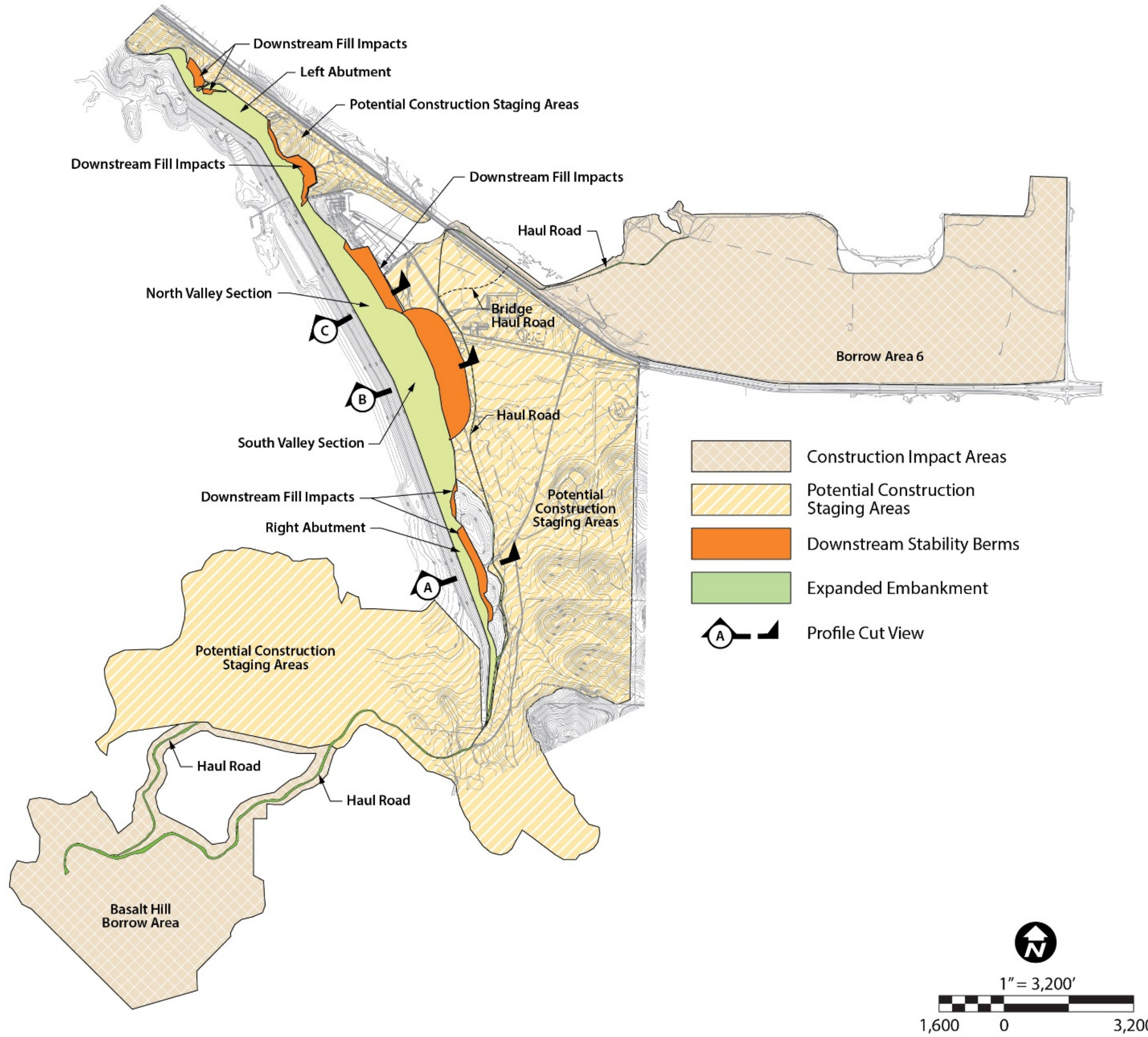

Figure ES-3. Crest Raise Alternative

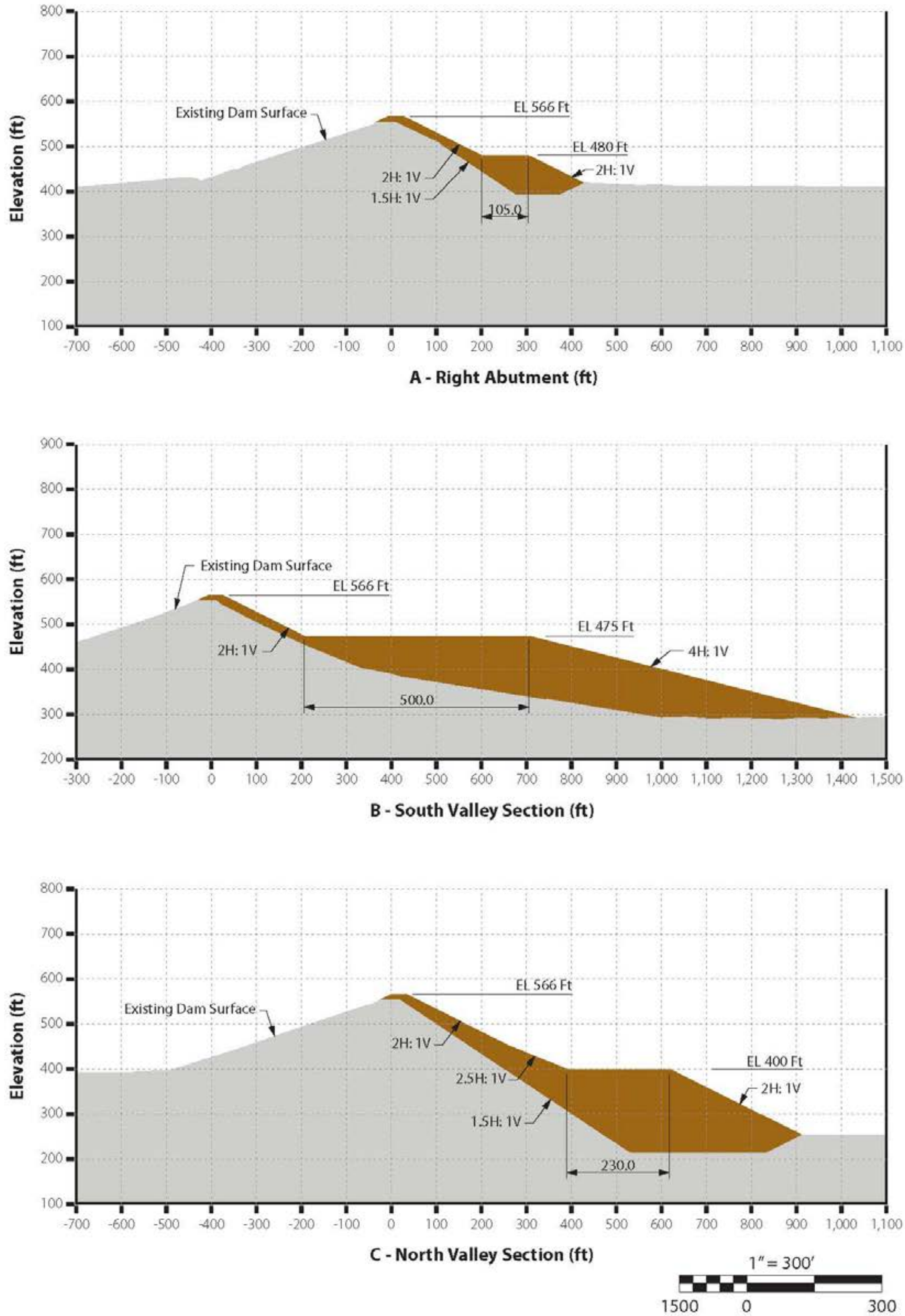

Figure ES-4. Crest Raise Profiles

ES.6 Study Area

The study area for this EIS/EIR (Figure ES-1) includes the Delta, San Luis Reservoir and its related water infrastructure, the California Aqueduct, the Delta-Mendota Canal, and South-of-Delta CVP and SWP Contractors' service areas.

The study area for the Reservoir Restriction Alternative would include San Luis Reservoir and all south-of-Delta CVP and SWP contractors' service areas, given the potential for changes in water supply deliveries to these contractors with a restricted San Luis Reservoir. CVP and SWP water rights have defined places of use. Figure ES-1 illustrates the respective places of use south of the Delta.

The Crest Raise Alternative study area would include San Luis Reservoir, where construction of the crest raise would occur. The Crest Raise Alterative would also include all south-of-Delta CVP and SWP contractors' service areas due to the temporary water supply impacts as a result of construction activities.

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Chapter 1 Introduction

The United States Department of the Interior, Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR) are proposing the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) to address dam stability and safety concerns. These concerns are associated with several sections of the B.F. Sisk Dam and select foundation materials that the dam was built upon in the event of seismic activity. The Project alternatives analyzed in this joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) would help prevent destabilization of the dam embankment, reduce safety concerns, and maintain water supply deliveries to State and Federal contractors.

Reclamation, the National Environmental Policy Act (NEPA) Lead Agency, and DWR, the California Environmental Quality Act (CEQA) Lead Agency, have prepared this joint EIS/EIR to comply with NEPA and CEQA. This EIS/EIR analyzes the direct, indirect, and cumulative effects of implementing the B.F. Sisk Dam SOD Project.

1.1 Federal Planning Process

This EIS/EIR is evaluating alternatives that were developed as a part of a planning study consistent with the *Department of Interior Agency Specific Procedures for implementing the Council on Environmental Quality's Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies (PR&G)* (United States Department of the Interior 2015), Reclamation directives and standards, local agency guidance, applicable environmental laws, executive orders, and policies, which are described in Chapter 28, Consultation, Coordination, and Compliance.

1.2 Project Background

B.F. Sisk Dam was constructed to create the off-stream San Luis Reservoir which provides supplemental storage capacity for the Central Valley Project (CVP) and State Water Project (SWP). Reclamation and DWR have conducted several geological investigations at B.F. Sisk Dam because of its location near active faults. In 2006, Reclamation completed a risk analysis of B.F. Sisk Dam that evaluated dam stability in the event of seismic activity. The analysis concluded that significant- to high-seismic activity could result in dam failure and B.F. Sisk Dam did not meet the standards of Reclamation's Public

Protection Guidelines (Reclamation 2011). Reclamation initiated a Corrective Action Study in 2006 that resulted in the evaluation of multiple potential structural modifications and operational changes at B.F. Sisk Dam that were compiled and further reviewed in a Value Planning Study (2016).

B.F. Sisk Dam is located on the west side of California's Central Valley between Los Banos and Gilroy. B.F. Sisk Dam impounds San Luis Reservoir and is part of the San Luis Joint-Use Complex or San Luis Unit, which was authorized by Congress in 1960 under the San Luis Act (Public Law 86-488) and is a joint effort of the Federal (Reclamation) and State (DWR) governments. The dam is a zoned, earthfill structure 382 feet high with a crest length of 18,600 feet (approximately 3.5 miles) and a crest width of 30 feet; it contains 77,656,000 cubic yards of material. At a crest elevation of 554 feet above mean sea level, the maximum base width is 2,420 feet (Reclamation 2009).

The San Luis Reservoir provides 2,027,840 acre-feet (AF) of water storage for the CVP and the SWP. The water stored in the reservoir is managed for State (55 percent) and Federal (45 percent) uses as part of the SWP and CVP, respectively. Typically, during the winter and early spring, water is lifted from O'Neill Forebay into the San Luis Reservoir for storage using the pump-turbines in the Gianelli Pumping-Generating Plant. Then later in the year when demand in the CVP and SWP increases, water is released from San Luis Reservoir through O'Neill Forebay and conveyed via the California Aqueduct (a SWP facility) or the Delta-Mendota Canal (a CVP facility) for use by municipal and agricultural water users (Reclamation 2009). As water is released back through the Gianelli Pumping-Generating Plant, the plant generates hydropower, which is used to offset the energy demand of the project operations. Water is also diverted from the west side of San Luis Reservoir at the Pacheco Pumping Plant to supply water to CVP contractors the Santa Clara Valley Water District and San Benito County Water District (Reclamation 2013). In addition to storing and supplying water, the San Luis Reservoir provides recreation opportunities under an agreement between Reclamation and DWR.

Reclamation owns the lands encompassing San Luis Reservoir, and DWR is responsible for managing facility operations. Under an agreement with Reclamation, the California Department of Parks and Recreation manages the recreation facilities and recreational use of San Luis Reservoir, which is part of the larger San Luis Reservoir State Recreation Area. Figure 1-1 presents a map of the study area for the EIS/EIR.

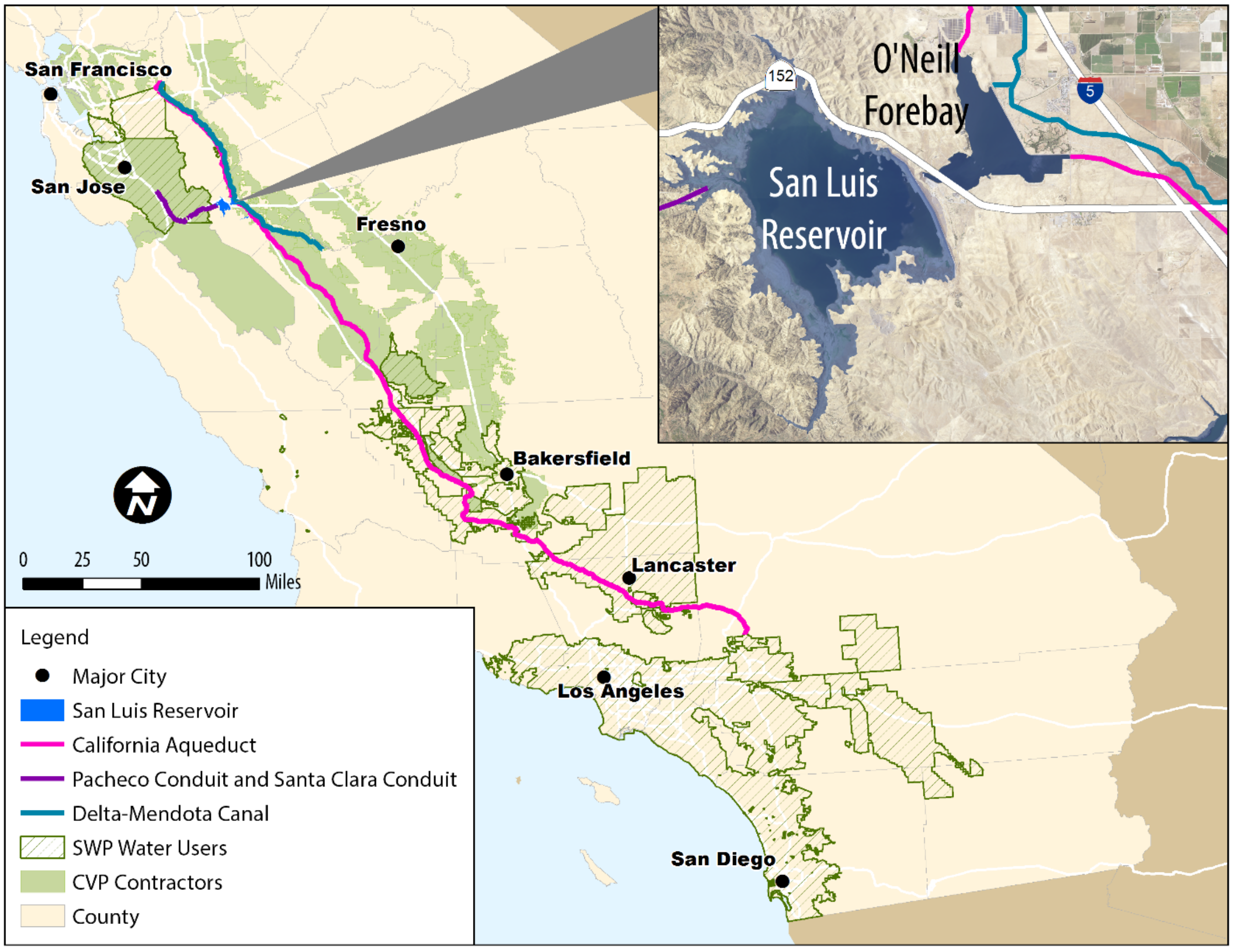

Figure 1-1. Study Area

1.2.1 Safety of Dams Program

Reclamation's Dam Safety Program was officially implemented in 1978 with passage of the Reclamation Safety of Dams Act, Public Law 95-578. Dams must be operated and maintained in a safe manner, ensured through inspections for safety deficiencies, analyses utilizing current technologies, and corrective actions if needed based on current engineering practices. The SOD program focuses on evaluating and implementing actions to resolve safety concerns at Reclamation dams (Reclamation 2017).

1.2.1.1 Analysis of Risk

In an effort to balance public safety and costs for modifying dams, Reclamation uses a risk-informed approach to making dam-safety decisions. The analysis of risk includes the probability of an event (e.g. severe earthquake) in any particular year, the likelihood of dam failure if the event were to occur, and the consequences of dam failure. The decisions are then based on Reclamation’s Public Protection Guidelines. Reclamation and DWR completed a probabilistic risk analysis (PRA) of B.F. Sisk Dam that included earthquake deformation analysis and soil testing. A PRA consists of a detailed study of the chain of events that would have to occur and the likelihood of their occurrence in order for the dam to fail (Reclamation 2007). Reclamation performs PRAs for all dams in the Reclamation dam safety inventory. For B.F. Sisk Dam, failure was determined to be very unlikely in any particular year; however, the consequences could be severe.

1.3 Purpose and Need/Project Objectives

Investigations conducted under Reclamation's SOD Program determined that several sections of B.F. Sisk Dam sit above liquefiable and soft soils. During a seismic event, sections of the dam could slump below the water line or allow cracking to develop through the embankment which could lead to dam failure.

The San Luis Reservoir is an important CVP and SWP facility and a key component of California's water supply system. Therefore, proper functioning of the reservoir is critical to maintaining water distribution for Federal, State, and local uses. Reclamation and DWR have determined that actions to reduce risks from earthquakes to the public downstream of the dam are needed.

The purpose of the Proposed Action, the B.F. Sisk Dam SOD Project, is for Reclamation and DWR to:

1. Implement cost-effective measures to prevent destabilization of the dam embankment and to ensure dam stability, in the event of an earthquake;
2. Reduce safety concerns of the public downstream of the dam; and
3. Maintain water supply deliveries to State and Federal contractors through the CVP and SWP.

1.4 Responsibilities of Lead and Cooperating Agencies

Reclamation and DWR are the NEPA/CEQA Lead Agencies in preparing this B.F. Sisk Dam SOD Project EIS/EIR. As the Lead Agencies, Reclamation and DWR will be responsible for finalizing the alternatives and selecting a reasonable range of alternatives for analysis in this EIS/EIR, completing the Draft and Final EIS/EIR documents, completing the Record of Decision/Notice of Determination (ROD/NOD) selecting an alternative for implementation, implementing the selected alternative, and ensuring all environmental commitments have been completed.

1.5 Study Area

The study area for this EIS/EIR (Figure 1-1) includes the Sacramento-San Joaquin River Delta (Delta), San Luis Reservoir and its related water infrastructure, the California Aqueduct, the Delta-Mendota Canal, and South-of-Delta CVP and SWP contractors' service areas.

The study area for the Reservoir Restriction Alternative would include San Luis Reservoir and all south-of-Delta CVP and SWP contractors' service areas, given the potential for changes in water supply deliveries to these contractors with a restricted San Luis Reservoir. CVP and SWP water rights have defined places of use. Figure 1-1 illustrates the respective places of use south of the Delta.

The Crest Raise Alternative study area would include San Luis Reservoir, where construction of the crest raise would occur. The Crest Raise Alterative would also include all south-of-Delta CVP and SWP contractors' service areas due to the temporary water supply impacts as a result of construction activities.

1.6 Summary of Public Scoping

Public scoping is required by NEPA and CEQA for actions or projects that would have significant environmental impacts (EISs or EIRs). The purpose of public scoping is to obtain feedback from agencies, the public, and other interested parties on significant issues associated with a project. This information helps guide an agency's environmental review of a project.

A public scoping meeting was held on September 23, 2009, at the Four Rivers Sector Office in Gustine, allowing the public the opportunity to provide input regarding the preparation of the B.F. Sisk Dam SOD Project EIS/EIR (Reclamation 2009). Key areas of concern raised during the public scoping process are listed below.

- Water quality impacts during and after project construction.
- Flooding due to a major earthquake.
- Loss of access to recreational areas and potential interference of daily park operations.
- Construction and operational impacts to project area wildlife.
- Change in dam storage capacity.

1.7 Decisions to be Made

Reclamation and DWR decision makers will use this EIS/EIR to help decide on the preferred alternative/proposed project to prevent destabilization of the dam embankment, reduce safety concerns, and maintain water supply deliveries, taking into account all of the environmental impacts of each of the alternatives. Possible outcomes include:

- Take no action;
- Approve the Reservoir Restriction Alternative;
- Approve the Crest Raise Alternative

1.8 Uses of this Document

This EIS/EIR will serve as an informational document for decision makers, public agencies, non-government organizations, and the general public regarding the potential direct and indirect environmental consequences of implementing any of the alternatives, including the No Action Alternative. This EIS/EIR will also support the permits, approvals, and other compliance, coordination, and consultation efforts required for the B.F. Sisk Dam SOD Project.

Consistent with 40 Code of Federal Regulations (CFR) Part 46.425, the Final EIS/EIR will identify a preferred alternative (also known as the proposed project for CEQA) for implementation (or alternatives, if more than one exists). The preferred alternative will be identified in the Final EIS/EIR based on the information presented in this Draft EIS/EIR, in light of any potential revisions made in response to comments received on this Draft EIS/EIR. After the Final EIS/EIR is published, Reclamation and DWR will prepare a ROD/NOD to implement a selected alternative. Agencies with regulatory authority issuing permits or other types of approvals for the B.F. Sisk Dam SOD Project may adopt this EIS/EIR, consistent with their own policies and regulations, or use information included as the basis for their own environmental compliance.

Table 1-1 indicates the permits or approvals anticipated for the construction and operation of the B.F. Sisk Dam SOD Project Alternatives. This EIS/EIR has been developed to cover the environmental review and consultation requirements required by Federal, State, or local laws, regulations, or policies listed in Table 1-1, as required by CEQA Guidelines Section 15124(d)(1)(C). This coverage will allow the agencies responsible for implementing these permits or approval to rely on this EIS/EIR during the permitting process.

Table 1-1. Permits Required for B.F. Sisk Dam SOD Project Implementation

Permit or Approval	Applying Agency	Approving Agency(s)
Federal Endangered Species Act Section 7 Concurrence Letter	Reclamation	USFWS
Clean Water Act Section 401 Certification	Reclamation/DWR	CVRWQCB
Clean Water Act Section 404 Permit	Reclamation	USACE
California Endangered Species Act Compliance	Reclamation/DWR	CDFW
California Fish and Game Code section 1602 Lake and Streambed Alteration Agreement	Reclamation/DWR	CDFW
NHPA Section 106 Compliance	Reclamation	SHPO and/or ACHP
NPDES Permit for General Construction	Reclamation/DWR	CVRWQCB
NPDES/WDR Individual Permit for Discharge	Reclamation/DWR	CVRWQCB
Clean Air Act Fugitive Dust Control Plan & Indirect Source Review Air Impact Assessment	Reclamation/DWR	SJAPCD

Key: ACHP = Advisory Council on Historic Preservation; CDFW = California Department of Fish and Wildlife; CVRWQCB = Central Valley Regional Water Quality Control Board; SHPO = State Historic Preservation Officer; SJAPCD = San Joaquin Air Pollution Control District; USACE = United States Army Corps of Engineers; USFWS = United States Fish and Wildlife Service

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Chapter 2
Project Description

This section summarizes the alternatives development process for the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) and describes the alternatives analyzed in this Environmental Impact Statement/Environmental Impact Report (EIS/EIR).

2.1 Alternatives Development and Screening Process

The Lead Agencies, the United States Department of the Interior, Bureau of Reclamation (Reclamation) and the California Department of Water Resources (DWR), used a comprehensive process to develop initial alternatives that included review of existing material, public input, and comparison and evaluation of initial alternatives using the Federal planning criteria and the purpose and need/project objectives.

Both National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) require EISs and EIRs, respectively, to identify a reasonable range of alternatives. To formulate the alternatives, a structured process was developed that included internal and public scoping. The first step of this process was for the Lead Agencies to determine the purpose and need/project objectives. The Lead Agencies then sought input from stakeholders and the general public on the project during a scoping effort completed in 2009. Feedback received during public scoping, along with the studies completed as a part of the ongoing Corrective Action Study, including the 2016 Value Planning Study, were used to identify potential measures to address the purpose and need of action. These measures were then evaluated using screening criteria developed by the Lead Agencies. Measures that sufficiently met each screening criteria were carried forward for consideration as a stand-alone alternative or as a component of a combined alternative. A diagram of this process is shown below in Figure 2-1.

Figure 2-1. Alternative Development Process

2.1.1 Public Involvement

Reclamation and DWR held a public scoping meeting in September 2009 regarding the preparation of an EIS/EIR for the modification of B.F. Sisk Dam to mitigate potential safety concerns. During the scoping meeting and throughout the public scoping comment period, Reclamation and DWR accepted comments to help determine the range of alternatives, the environmental effects, and the mitigation measures to be considered in the EIS/EIR. The feedback provided during this public scoping process was summarized in a Public Scoping Report (Reclamation 2009) and was considered throughout the alternatives development process.

2.1.2 Initial Options Formulation

Initial options represent individual components that, when combined, will achieve the purpose of the action. The description of the initial options defines the starting point for the development of comprehensive alternatives that reduce risks from earthquakes to the public downstream.

2.1.2.1 Formulating Initial Options

Reclamation and DWR developed a set of measures for meeting the purpose and objectives of the Proposed Action based on a variety of selection criteria. The selection criteria consist of effectiveness, cost, constructability, and environmental considerations. The action alternatives were developed through the SOD process and represent a range of feasible measures to reduce the risks to public safety due to seismic activity at B.F. Sisk Dam. The measures were then coalesced into a range of reasonable alternatives that would feasibly attain most of the basic objectives of the project, and avoid or substantially lessen any of the significant effects of the project.

In October 2016, Reclamation issued a Final Value Planning Report that documented the evaluation of project alternatives completed by Reclamation and DWR. This alternative evaluation identified potential measures using the studies completed as a part of the ongoing Corrective Action Study and then screened these measures to identify options that warranted further evaluation.

2.1.2.2 Screening Initial Options

The Lead Agencies determined the initial list of measures should be screened before combining the measures into alternatives. The agencies wanted to carry forward measures that had potential to contribute to the purpose and need project objectives. The screening of measures was completed in two steps. The first step reviewed the screening of preliminary measures completed in the Value Planning Study to verify whether they should also be eliminated from further consideration. The second phase of screening relied on a set of screening criteria developed in part based on NEPA and CEQA guidance:

- NEPA requires that agencies shall "rigorously explore and objectively evaluate all the reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated" (40 Code of Federal Regulations [CFR] Part 1502.14(a)). The Department of the Interior NEPA procedures (43 CFR Part 46.420(b)) define reasonable alternatives as "alternatives that are technically and economically practical or feasible and meet the purpose and need of the proposed action."

- CEQA Guidelines section §15126.6(a) states, "An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project…" An EIR need not consider every conceivable alternative to a project or alternatives that are infeasible. State CEQA Guidelines section 15364 defines feasible as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."

Both NEPA and CEQA include provisions that measures meet (or meet most of) the purpose and need/basic project objectives, and be potentially feasible. Some measures do not fully meet the purpose and need/project objectives, but may be carried forward for additional analysis because they have potential to minimize some types of environmental effects or help create a reasonable range of alternatives for consideration by decision-makers. The Lead Agencies determined that they would screen the measures based on:

- The ability to meet key elements of the purpose and need/basic project objectives which include reducing safety risks for the downstream public, and maintaining water supply deliveries
- The feasibility of the measure to be developed in a cost-effective manner
- The environmental impacts of the measure are acceptable
- Measures need to meet these criteria to move forward for further evaluation. Each alternative was scored on a rating scale of high (3), medium (2), or low (1) for each criteria. If a measure did not address the safety concerns for the downstream public, it was automatically given a low score for the purpose and need screening criteria.

2.1.3 Alternatives Formulation

The Lead Agencies screened the measures by applying the screening criteria discussed in Section 2.1.2.2 to each measure based on available information and best professional judgment. The measures that were moved forward for more detailed analysis in this EIS/EIR are those that best met the NEPA purpose and need and CEQA basic project objectives, minimized negative effects, were feasible, and represented a range of reasonable alternatives. These measures were then evaluated utilizing a set of screening methodology and developed by the Lead Agencies to carry forward into this EIS/EIR as either stand alone or combined alternatives.

The Lead Agencies reviewed the preliminary screening of measures completed in the Value Planning Study and determined that the measures eliminated from further consideration in that study would not on their own, or in combination with other measures, contribute to meeting the purpose and need/project objectives of this B.F. Sisk Dam SOD Project EIS/EIR. As a result, these measures were screened from further consideration. The measures that remained following this first phase of screening fell into two categories – non-structural and structural. These measures included:

- Reservoir Restriction
- Maximum Pool Timeframe Limits
- Groundwater Banking
- Use alternative water supply to offset losses from restrictions
- Early Warning System
- Berm construction
- Install filter
- Alternate dam site
- Develop flood corridor/Construct new flood spillway
- Breach/Dam Removal
- Crest Raise

2.1.4 Alternatives Evaluation Process

The next step in alternatives development included evaluating the alternatives to select a reasonable range of alternatives that would contribute to meeting the purpose of the project.

2.1.4.1 Alternatives Evaluation Criteria

The Lead Agencies developed five criteria to evaluate the measures that have been carried forward into the second phase of the screening process. Three of these criteria addressed the ability of the measure to address the purpose and need of the project: reduction in safety concerns to the downstream public and ability to maintain water supply deliveries. Two other criteria addressed the cost effectiveness of the measure, and the acceptability of the environmental impacts. Measures were scored qualitatively for each of the five screening criteria. The metrics used were:

- The measure fully addressed the screening criteria
- The measure partially met the screening criteria
- The measure did not address the screening criteria

Only those measures that scored highest moved forward as stand-alone alternatives. Some lower scoring measures remained in consideration because of their ability to help a combined alternative more fully meet the purpose and need, address cost effectiveness, or minimize adverse environmental impacts.

2.1.4.2 Evaluation Results

Measures were eliminated from further consideration if they would not meet the Project's purposes and needs, would require excessive cost expenditures, or would have substantial adverse environmental effects. Table 2-1 shows the options that were considered but were eliminated from further consideration, and the reasons that the options were not retained.

The Reservoir Restriction Alternative and the Crest Raise Alternative, when combined with downstream berms and the installation of filters, sufficiently met all screening criteria and are the alternatives analyzed in this EIS/EIR.

Table 2-1. Initial Options Eliminated from Further Consideration

Option	Reasons that Option was Not Retained
Maximum Pool Timeframe Limits	Given that this measure does not fully address the dam failure and public safety components of the purpose and need, combining it with a measure that addresses water supply as a combined alternative would not result in a complete alternative and combining it with other measures that address the dam failure and public safety components would not improve the performance of those measures.
Groundwater Banking	The review of potential new groundwater banking sites determined that development of a new facility would require extensive geologic and environmental investigation, land acquisition, delivery infrastructure and new well development which could reduce any cost advantage.
Alternative Water Supply	Given that this measure does not fully address the dam failure component of the purpose and need and would have a high cost and large environmental impact to maintain water supply deliveries, this measure will not be carried forward for consideration in the EIS/EIR.
Early Warning System	This measure would not fully address downstream public safety concerns because there are associated issues with the reliability of early warning system technology surviving damage and failure during earthquake events.
Breach/Dam Removal	The cost of the Breach/Dam Removal Measure is likely to be high given the major construction action required to remove a substantial portion of the dam embankment. The construction actions required by the Breach/Dam Removal Measure would also generate adverse environmental impacts.
Downstream Stability Berm	The cost of the Stability Berm Measure is likely to be high given the major construction action required. The construction actions required by the Stability Berm Measure would also generate adverse environmental impacts. While this measure does not fully address the purpose and need, it has been included in the Crest Raise Alternative, which improves its ability to address dam failure and downstream flood risk as a combined alternative.
Install Filter	The Install Filter Measure does not address dam failure that may result from slumping. It does not fully address the vulnerability of water supply deliveries should dam failure occur. The cost of the Install Filter Measure is likely to be high given the major construction action required. The construction actions required by the Install Filter Measure would also generate adverse environmental impacts. While this measure does not fully address the purpose and need, it has been included in the Crest Raise Alternative, which improves its ability to address dam failure and downstream flood risk as a combined alternative.

Option	Reasons that Option was Not Retained
Alternate Off-Stream Dam Site	Given that this measure does not fully address the dam failure component of the purpose and need and would have a high cost and large environmental impact, this measure will not be carried forward for consideration in the EIS/EIR.
New Spillway and Downstream Flood Control Conveyance	Given that this measure does not fully address the dam failure component of the purpose and need and would have a high cost and large environmental impact, this measure will not be carried forward for consideration in the EIS/EIR.

2.2 Project Alternatives

The following sections describe the alternatives that are evaluated in this EIS/EIR, including the No Action/No Project Alternative and two action alternatives.

2.2.1 Alternative 1 – No Action/No Project Alternative

Both NEPA regulations (40 CFR 1502.14(d)) and CEQA Guidelines (Section 15126.6) require the evaluation of a No Action or No Project Alternative, which presents the reasonably foreseeable future conditions in the absence of the proposed project. The purpose of the No Action or No Project Alternative is to allow decision makers to compare the impacts of approving the project to the impacts of not approving the project. Under NEPA, the No Action Alternative also serves as the baseline to which action alternatives are compared to determine potential impacts. This differs from CEQA, where existing conditions (conditions at the time of the Notice of Preparation) serve as the baseline to determine potential impacts of the alternatives. The No Action/No Project Alternative may differ from existing conditions if there are actions that could occur in the project area in the future, that 1) currently do not exist and 2) do not rely on approval or implementation of the proposed project.

Under the No Action/No Project Alternative, there would be no structural or operational changes to the dam. B.F. Sisk Dam would not be improved, and no new structures would be installed to protect the dam from potential seismic failure. No changes to the operation of B.F. Sisk Dam or the storage level of the reservoir would occur and the freeboard for the normal reservoir pool would remain at 10 feet. This alternative does nothing to reduce the risk of failure from overtopping due to large seismically-induced deformations of the dam. The dam would continue to be susceptible to liquefaction and strength loss, resulting in a reduction of the crest elevation caused by seismic loading and the seismic risk would remain unchanged. This alternative would not meet the purpose or objective of the Proposed Action. The No Action/No Project Alternative reflects, for most resources evaluated in this EIS/EIR, existing and expected future conditions in the project area if no action is taken. Differences between existing conditions and anticipated future without project conditions are detailed in the specific resource chapters where they were identified[1].

2.2.2 Alternative 2 – Reservoir Restriction Alternative

The Reservoir Restriction Alternative would limit the storage of the reservoir by restricting the maximum water height. If the reservoir is maintained at a lower operating level, there is a lower probability of failure given an increase in allowable dam slumping that could occur in a seismic event before overtopping and a reduction of pressure on the embankment in areas where cracking could occur. This alternative may also reduce the consequences of dam failure by eliminating or reducing the total amount of possible floodwater that could be released from the dam during a seismicity-induced failure event. The reduction in total storage capacity in San Luis Reservoir would adversely impact water supply deliveries to CVP and SWP contractors. This reduction in water supply would not meet one of the three objectives of the Proposed Action. However, the Reservoir Restriction Alternative is analyzed in this EIS/EIR as a non-structural alternative to prevent destabilization of the dam embankment, ensure dam stability, and reduce safety concerns.

The Reservoir Restriction Alternative would consist of a 55 foot reduction in the maximum water surface elevation of San Luis Reservoir from the current elevation of 544 feet to 489 feet. This elevation was developed using results from the CalSim II model (see Appendix B, Modeling Technical Report). This would permanently reduce the maximum capacity of the reservoir from 2,027,840 acre-feet (AF) to 1,383,000 AF.

Construction associated with the Reservoir Restriction Alternative would include actions to revegetate the reservoir rim between the current maximum reservoir water surface elevation and the restricted reservoir maximum surface elevation. A temporary access road would be constructed to allow hydroseeding equipment access to the reservoir rim. The access road would then be removed after the hydroseeding actions are completed.

Equipment used to construct the alternative would include:

- 2 Water trucks
- 2 Bulldozers
- 2 Graders
- 1 Scrapers
- 4 Hydroseed trucks

It would take approximately 1.5 years to construct temporary access road, seed the exposed reservoir slopes, and then remove the access road. Construction of the Reservoir Restriction Alternative would occur from 6 a.m. to 6 p.m., five

[1] Resources identified with existing conditions anticipated to differ from future without project conditions in the area of analysis are: Chapter 6, Groundwater.

days a week, 12 months a year, and will also avoid Federal holidays. The construction duration is based on a maximum of 20 total anticipated workers on site.

2.2.3 Alternative 3 – Crest Raise Alternative

The Crest Raise Alternative would reduce safety concerns for the downstream public by reducing the likelihood of overtopping if slumping were to occur during a seismic event by increasing dam height. This alternative would also address dam failure due to earthquake-induced cracking. This measure maintains water supply deliveries to State and Federal contractors through the CVP and SWP because it allows the reservoir to operate at its current maximum storage elevation. The cost of the Crest Raise Alternative is likely to be high given the major construction action required. The construction actions required by the Crest Raise Alternative would also generate adverse environmental impacts. The Crest Raise Alternative is currently the Preferred Alternative (as described in more detail in Section 26.3).

As part of this alternative, the dam crest would be raised by adding additional embankment material (see Figure 2-2) in conjunction with the addition of stability berms and downstream crack filters. Construction of foundation shear keys at slopewash and north valley sections, and a filter around the existing spillway conduit are also included in this alternative. In addition to these modifications, development of a foundation shear key at the south valley section (SVS) is under consideration as an optional additional feature of this alternative.

2.2.3.1 Project Facilities

This section outlines the physical modifications that would be developed under this alternative.

2.2.3.1.1 B.F. Sisk Dam

B.F. Sisk Dam is a zoned earthfill structure with a maximum structural height of 382 feet, a crest length of 18,600 feet, a crest width of 30 feet, and a crest elevation of 554 feet. The dam embankment was constructed of five materials in seven zones (See Figure 2-3), with the central zone (Zone 1) consisting primarily of low-plasticity clays. The downstream face of the dam is covered by a 2-foot-thick cobble blanket, and the upstream face is covered by a 3-foot-thick layer of riprap. Both thickness measurements are normal to the dam slope. A saddle dike, known as the East Dike, is present along the north rim of the reservoir, approximately 1,300 feet from the dam.

The foundation that the dam is built on can be divided into sections: the right abutment, the left abutment, the north valley section (NVS), and the SVS (See Figures 2-2 and 2-4). The north and south valley sections are the alluvial channels of San Luis Creek and Cottonwood Creek that B.F. Sisk Dam impounds and consist of deposits of sands and gravels with clayey or silty fines. The abutments are primarily founded on bedrock (sandstone, shale, and conglomerate), which is covered by clayey slopewash in some locations. In addition, the East Dike is also partially founded on slopewash.

Studies completed have identified the potential for significant deformation (crest settlement) of the dam in the sections built on the alluvium and clayey slopewash during a seismic event (Reclamation 2013). This deformation potential would be addressed with the removal of the alluvium and clayey slopewash and placement of downstream stability berms keyed into bedrock along with the placement of additional embankment materials on the downstream slope of the dam to increase the crest elevation 12 feet and increase the distance between the water surface and the dam crest (freeboard) to prevent reservoir overtopping and failure in the event of dam deformation (Reclamation 2013).

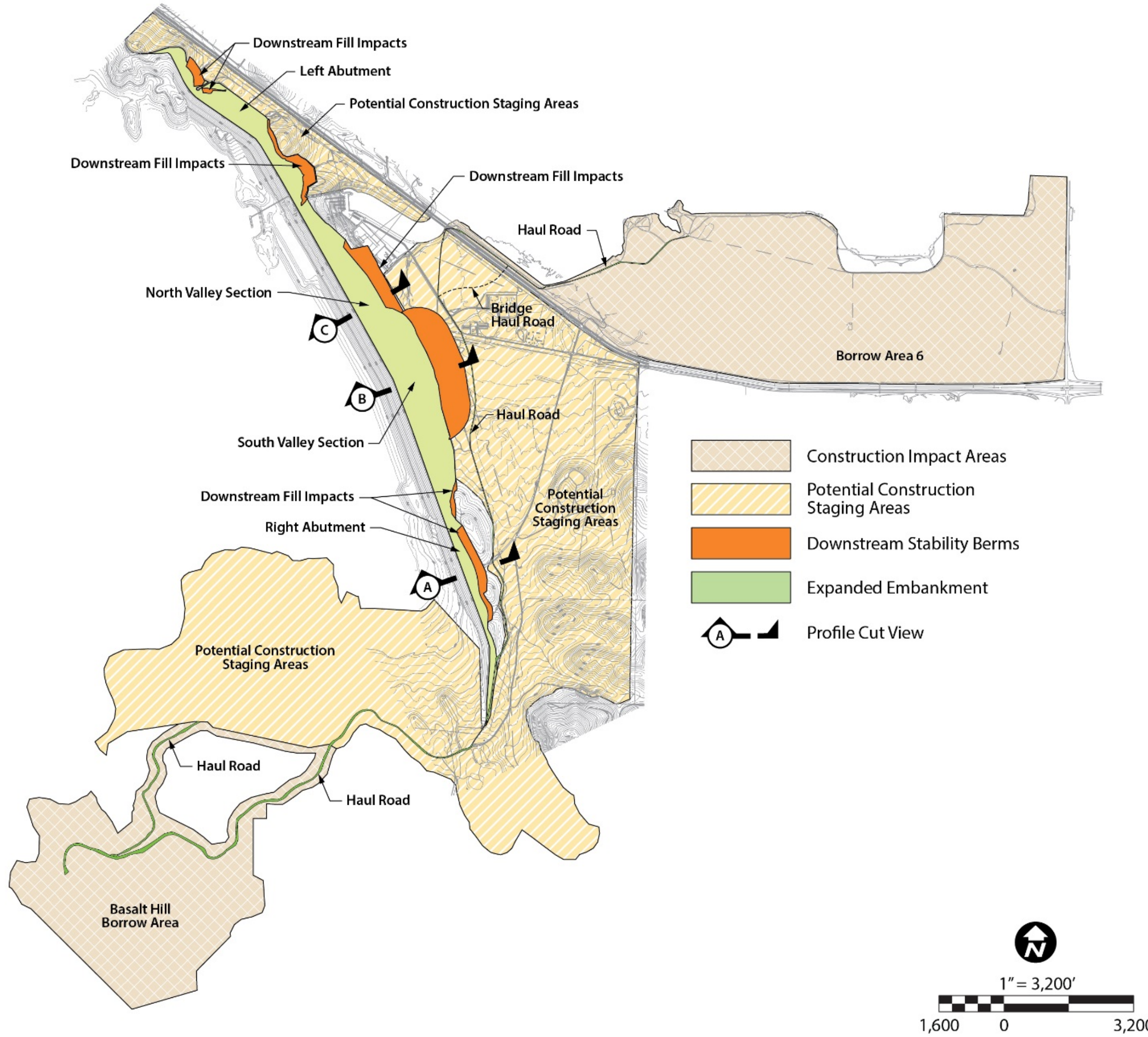

Figure 2-2. Construction and Staging Areas

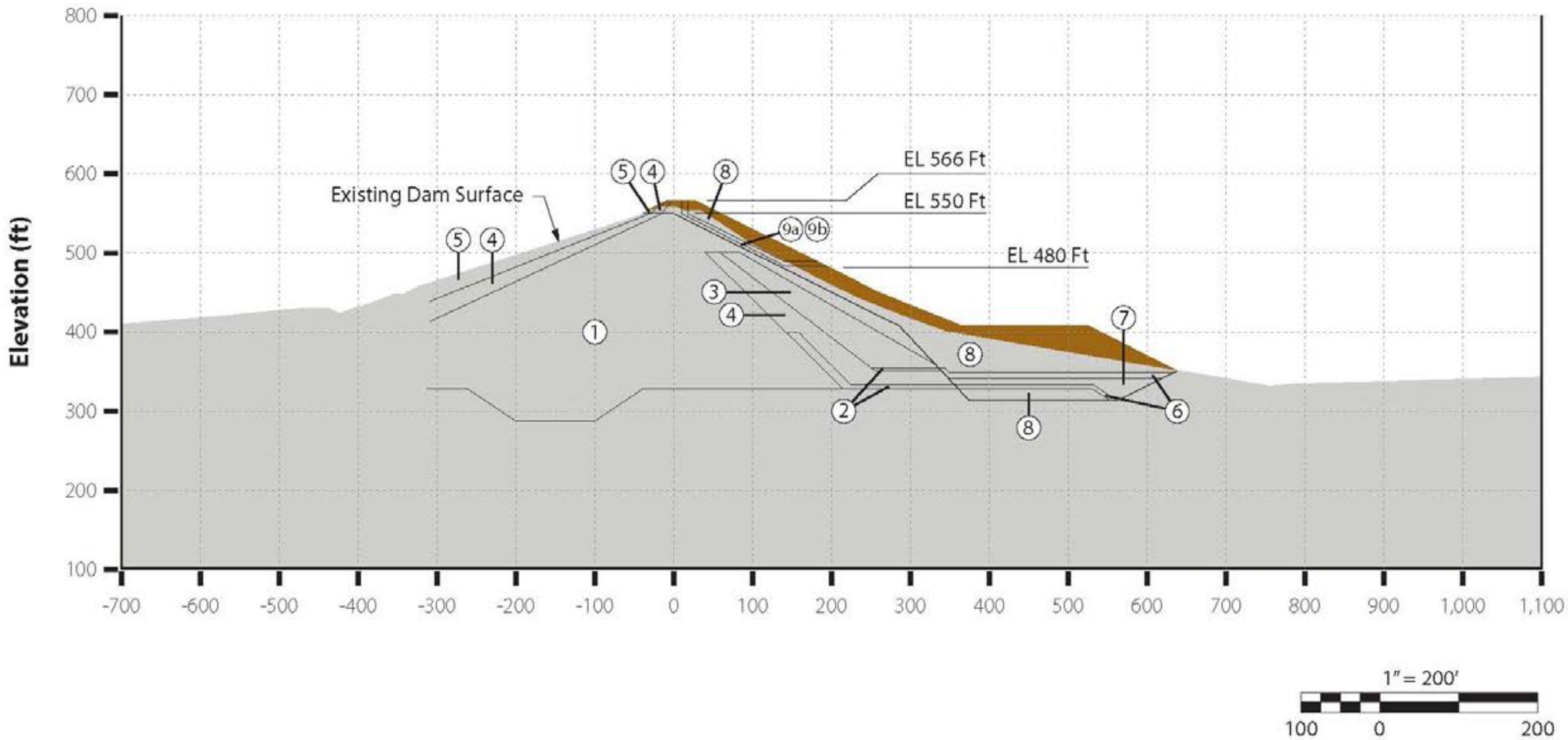

Figure 2-3. Typical Cross-Section View and Embankment Materials

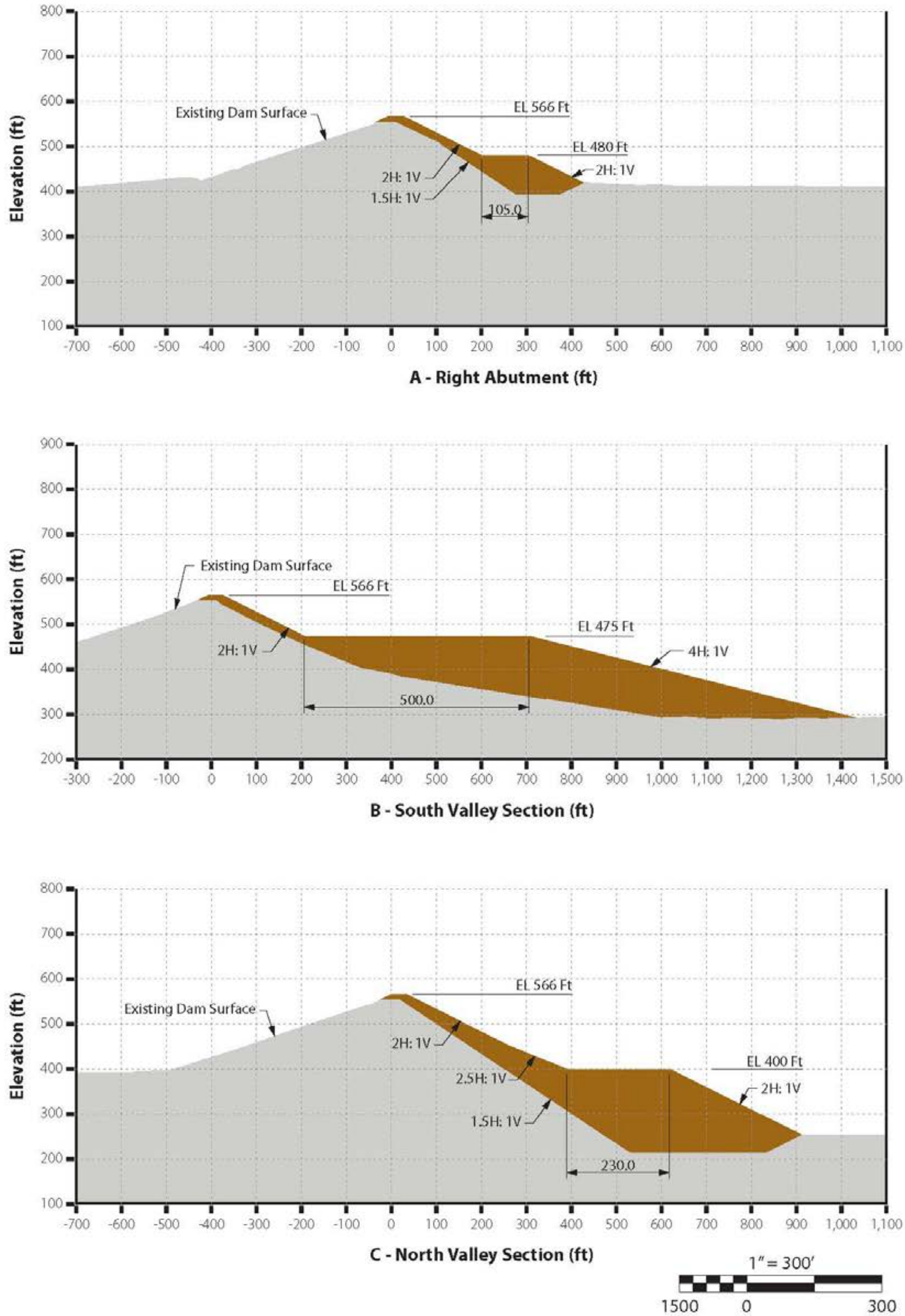

Figure 2-4. Crest Raise Profiles

In addition to dam crest deformation, seismic shaking can cause cracks in the dam embankment susceptible to scour erosion that can lead to dam failure. Downstream crack filters restrict the migration of soil materials through these cracks mitigating the potential for post seismic cracks to induce internal erosion within the dam embankment. The seismic crack induced erosion risk would be addressed by installing downstream filters along the upper portion of the embankment across the entire length of the dam.

Evaluation of the seismic shaking potential at B.F. Sisk Dam has identified the potential need for additional modification to the foundation soils beneath the SVS berm. The development of a foundation shear key is being evaluated as an optional modification in the Crest Raise Alternative. A foundation shear key is developed by removing the weak overburden foundation soils found beneath the berm footprint and replacing them with material with a higher shear strength.

The Crest Raise Alternative would raise the dam crest up to an additional 12 feet to a new crest elevation of 566 feet along the majority of the embankment, tapering at a 2 percent slope to the existing crest elevation at the abutments. Any work that would reduce the reservoir embankment strength, such as foundation or embankment excavation, would be timed seasonally and would occur during periods of the year when the reservoir is drawn down to lower elevations. This work would also be scheduled for completion each year prior to the refill of San Luis Reservoir back above safe levels to protect embankment stability. This could result in delays to refill if the construction schedule is delayed, but the division of specific modification actions scheduled to occur in one drawdown season would be structured to minimize this risk. Implementation of the optional SVS shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, during the period that the berm foundation would be excavated. This reduction in surface elevation would reduce storage capacity in the reservoir and could limit CVP and SWP deliveries during this construction period.

2.2.3.2 Construction Methods

The shear keys and downstream stability berms would be constructed by first excavating the existing liquefiable and soft foundation soils down to bedrock up to a depth of 80 feet in the NVS alluvium and up to a depth of 50 feet in the sections of the abutments developed on the clayey slopewash. The maximum depth of excavation would be approximately 160 feet in the south valley section, if the shear key option is implemented. During these shear key excavations, dewatering and unwatering measures would be employed to remove ground water from the excavation and maintain a dry excavation. The rock blanket or slope protection would also be removed to the top elevation of the embankment and stockpiled downstream of the toe. Next, the existing toe drain would be removed by excavation. These two operations would expose the existing blanket drain and surrounding filter materials in the downstream face of the dam. Above the blanket drain, the existing Zone 3 shell would be exposed.

After completion of the excavations, the existing filters/drains located at the downstream toe would be re-established and a new toe drain seepage collection system would be installed, similar to the one currently in place. Stronger material would then be placed as backfill and compacted. Placement of shell material (Zone 8) and the rock blanket would continue up the downstream side of the embankment until it reaches an elevation of 480 feet, as shown in Figure 2-3. At 480 feet, construction of the two-stage downstream crack filter begins and the filter material along with shell material (Zone 8) continues up to the new dam crest elevation. Above an elevation of 550 feet, the raised crest is developed by simultaneously placing riprap and bedding (Zones 5 and 4), core (Zone 1), a two-stage chimney filter (Zones 9A and 9B) and the downstream shell (Zone 8), as shown in Figure 2-3. Materials used would be stockpiled downstream of the toe and in Borrow Area 6. After fill placement is completed, road base and paving of the dam crest complete the overlay raise.

The dam raise action will elevate the B.F. Sisk Dam embankment to elevation 566 across the “middle” 6,500 feet of the dam alignment with transitions back to the existing crest elevation at the abutments. Optimization of the face filter configuration may result in raising the dam crest to elevation 566 across most of the embankment length. The overlay raise would be constructed by initially excavating approximately 8 feet from the top of the dam. This excavation would remove portions of existing Zones 1, 4, and 5. Removing this portion of the dam exposes an approximately 40 to 50-foot-wide surface of the existing low-plasticity clay core (Zone 1) material and provides a working surface for connecting the new zones of the dam overlay to the existing embankment. The 2-foot thick rock blanket on the downstream slope of the dam would be removed in all areas to be covered by the overlay. For sections of the embankment not also receiving a stability berm, no further excavation would be needed.

Fill materials for the new enlarged dam embankment would be sourced from two borrow sites - Basalt Hill and Borrow Area 6 (See Figure 2-2). The Basalt Hill Borrow area was used to support construction of the original B.F. Sisk Dam and will again be used to supply rock materials including gravel, riprap and cobble slope protection. These materials would be produced on site by blasting and crushing source material present at Basalt Hill. Borrow Area 6 would supply material for the expansion of the Zone 1 core along with the materials for downstream berms. The only fill materials that would be imported from offsite are the filter sands needed for Zones 6 and 9a.

The preferred method to transport materials to and from the construction site and Borrow Area 6 would be either a conveyor belt system or low-profile trucks passing below State Route (SR) 152 under the existing bridge that crosses O’Neill Forebay. A temporary platform or roadbed would be developed below the bridge by placing clean riprap and rockfill-sized cobbles and boulders in the water between the second bridge column and the south abutment (approximately 60 feet) and topped with clean gravel to construct a clean (no fine materials) roadway underneath the bridge. This temporary construction road would be used to allow for transportation of materials without impacting traffic on SR 152. The riprap and rockfill-sized cobbles and boulders would be removed and the area would be returned to pre-construction conditions upon completion of the work.

As an alternative to the preferred route below the SR 152 bridge over O'Neill Forebay, construction material could be transported to and from the construction site and Borrow Area 6 through a tunnel under SR 152. Under this configuration a tunnel would be bored under SR 152 to allow for installation of 15 foot high by 30 foot wide concrete box culverts. The culverts would allow for conveyor system equipment to be installed through the culverts and allow the transportation of materials without impacting traffic. The location of this tunnel corresponds to the potential route of another routing option to develop either a temporary construction bridge over SR 152 or use of an at grade road crossing with signalized traffic control.

The last routing option for any materials developed in the construction site that require temporary stockpiling in Borrow Area 6 would utilize Gonzaga Road and the Santa Nella Boulevard underpass to access Borrow Area 6. Haul and access roads would be constructed consistent with the 2009 Reclamation Safety and Health Standards, as amended. New roads would be cleared and existing roads would be improved and would be either paved or treated to prevent dust. Roads would be approximately 30 feet wide with approximately 100 feet of clearance.

Other material imports to the site would include pipe for new toe drains that will be installed beneath new berms, asphalt pavement for road replacement at the top of the new dam crest, and steel and other materials needed for construction of new transmission towers adjacent to Gianelli Pumping-Generating Plant. Offsite material disposal at area landfills and regional hazardous waste landfills will include steel and other materials from the removed transmission towers, and asbestos wrapped corrugated metal pipe (CMP) where existing toe drains are removed.

Construction actions that would impact dam strength like embankment and foundation excavation would be scheduled for completion during times in the water year that San Luis Reservoir is typically drawn down to lower levels to avoid any adverse impact on storage capacity and water supply. This would be accomplished by not initiating any excavation actions until the reservoir is drawn below safe levels and scheduling completion of shear key backfilling operations prior to the annual reservoir refill cycle bringing storage levels above safe levels. Development of the optional SVS shear key foundation modification would however require significant foundation excavation at the downstream toe of the embankment that would limit storage capacity in San Luis Reservoir for two seasons to reduce risk of slope instability during construction. Temporary in-reservoir construction roads would be constructed on the upstream side of the embankment when the reservoir is lowered during normal operations and then removed prior to reservoir filling the following year.

2.2.3.3 Equipment, Materials, Spoils and Safety

Equipment in the staging areas would include trailers, equipment to be used, and stockpiled materials. Construction staging and stockpile areas would include:

- Area south of Gianelli Pumping Plant off of Basalt Road, for the staging of construction equipment, fill materials transported from the borrow sites, embankment materials excavated and stored for later use and materials transported from offsite. The area proposed for use consists of approximately 1,000 acres.

- Area north of Gianelli Pumping Plant off of Gonzaga Road for the staging of construction equipment, fill materials transported from the borrow sites, embankment materials excavated and stored for later use and materials transported form offsite. The area proposed for use consists of approximately 120 acres.

The access route to the two main staging areas would be SR 152 to Basalt Road. Temporary traffic signals would be installed at the current left turn crossing on SR 152 at Basalt Road and at the access road to Romero Visitor Center for the duration of the project. Most of the traffic to the site would come from the east. Construction related traffic would likely begin one to two months after Notice to Proceed. Up to 59 large deliveries or waste material transports to local landfills and regional hazardous waste landfills, offsite per day could be expected, along with the regular commuting of construction personnel.

Aside from areas dedicated to excavation, construction staging and transportation, all remaining available space at the areas next to B.F. Sisk Dam would be needed for stockpiling materials. These areas around the dam would be used as a staging area for the full duration of construction. These areas would be returned to pre-construction condition after the project is completed.

Equipment used to construct the alternative would include:

- 3 Excavators
- 4 Bulldozers
- 5 Cranes/Lifts
- 5 Compactors
- 2 Graders
- 2 Scrapers
- 5 Loaders (2 small, 3 large)

- 9 Dump trucks
- 5 Water trucks

The total acreage of disturbed ground is estimated to be about 3,905 acres. This includes the crest of the dam, the entire downstream slope of the dam, borrow areas, haul routes, site access, and potential construction use areas.

2.2.3.4 Construction Schedule

Recreational activities would be suspended for safety reasons during the entire construction schedule at Basalt Use Area located on the south reservoir rim of San Luis Reservoir and Medeiros Use Area located to the south of O'Neill Forebay. The closed Basalt Campground would be utilized as a temporary camping area for construction workers. Recreational use for boating on the reservoir would be supported through the use of the boat launch at Dinosaur Point, limited to areas away from B.F. Sisk Dam for the full construction schedule.

Construction is expected to last approximately 8 to 10 years. With the addition of the SVS shear key option, construction is expected to last approximately 10 to 12 years. Both with and without the SVS shear key option, construction duration is based on 46 anticipated workers on site during the day shift and 30 workers on site during the night shift. Work would be performed 24 hours per day, seven days per week, 12 months per year. The 24 hour work day would consist of two 10 hour work shifts, with a half hour for lunch each shift, plus a 3 hour maintenance period. Blasting operations at Basalt Hill would be limited to the hours between 6:00 a.m. to 6:00 p.m. It is assumed for the purpose of this EIS/EIR, that construction would start in 2020.

This 8 to 12 year construction schedule is based on the assumption of no funding constraints and is used to analyze the impacts in this EIS/EIR. However, with potential funding constraints, the construction schedule could extend up to 20 years. Impacts under an extended 20 year schedule would result in impacts equal to or potentially smaller in a single year of construction that cumulatively over the full 20 year schedule would be the same in total magnitude as the unconstrained schedule. An extended schedule would not change the impact determination of any of the resources analyzed in this EIS/EIR.

2.2.3.5 Operation of the Crest Raise

Following completion of construction of the Crest Raise Alternative, operation of San Luis Reservoir will continue consistent with the existing configuration with no change in storage capacity at the reservoir.

2.3 Environmental Commitments

The Lead Agencies have several standard procedures and management practices that they incorporate into projects to avoid adverse effects to the environment. These procedures also include the acquisition of regulatory permits from resource agencies. All the procedures and practices are incorporated into each action alternative, unless otherwise noted below, and are analyzed in this EIS/EIR.

2.3.1 Water Quality Environmental Commitments

In compliance with the Clean Water Act, projects involving construction activities (e.g., clearing, grading, or excavation) involving land disturbance greater than one acre must file a Notice of Intent (NOI) with the applicable Regional Water Quality Board to indicate their intent to comply with the State General Permit for Stormwater Discharges Associated with Construction Activity (General Permit). The State General Permit specifies Best Management Practices (BMPs), to achieve compliance as well as numeric action levels in order to achieve Federal standards to minimize sediment and pollutant loadings. The General Permit requires preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) as well as a Rain Event Action Plan (REAP) prior to construction. The SWPPP and REAP are intended to help identify the sources of sediment and other pollutants and assess the effectiveness of BMPs in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges. Common SWPPP objectives include the following (U.S. Environmental Protection Agency 2007):

1. *Stabilize the site as soon as possible.* Get your site to final grade and either permanently or temporarily stabilize all bare soil areas as soon as possible

2. *Protect slopes and channels.* Convey concentrated stormwater runoff around the top of slopes and stabilize slopes as soon as possible. This can be accomplished using pipe slope drains or earthen berms that will convey runoff around the exposed slope.

3. *Reduce impervious surfaces and promote infiltration.* Reducing impervious surfaces will ultimately reduce the amount of runoff leaving your site. Also, divert runoff from rooftops and other impervious surfaces to vegetated areas when possible to promote infiltration.

4. *Control the perimeter of your site*. Divert stormwater coming on to your site by conveying it safely around, through, or under your site. Avoid allowing run-on to contact disturbed areas of the construction site

5. *Protect receiving waters adjacent to your site*. Erosion and sediment controls are used around the entire site, but operators should consider additional controls on areas that are adjacent to receiving waters or other environmentally sensitive areas.

6. *Follow pollution prevention measures.* Provide proper containers for waste and garbage at your site. Store hazardous materials and chemicals so that they are not exposed to stormwater.

7. *Minimize the area and duration of exposed soils.* Clearing only land that will be under construction in the near future, a practice known as construction phasing, can reduce off-site sediment loads.

2.3.2 Air Quality Environmental Commitments

The following dust control measures will be implemented during construction of the Crest Raise Alternative to avoid impacts on air quality. These measures are identified in the San Joaquin Valley Air Pollution Control District's (SJVAPCD) Regulation VIII and are referenced in the Guide for Assessing and Mitigating Air Quality Impacts (SJVAPCD 2015).

1. Apply water to unpaved surfaces and areas.
2. Use non-toxic chemical or organic dust suppressants on unpaved roads and traffic areas.
3. Limited or reduce vehicle speed on unpaved roads and traffic areas. (Assumed for this EIS/EIR analysis, 15 miles per hour would be the maximum vehicle speed.)
4. Maintain areas in a stabilized condition by restricting vehicle access.
5. Install wind barriers.
6. Keep bulk materials sufficiently wet when handling.
7. Store and handle materials in a three-sided structure.
8. When storing bulk materials, apply water to the surface or cover the storage pile with a tarp.
9. Do not overload trucks. Overloaded trucks are likely to spill bulk materials.
10. Cover haul trucks with a tarp or other suitable cover. Or, wet the top of the load enough to limit visible dust emissions.
11. Clean the interior of cargo compartments on emptied haul trucks prior to leaving a site.
12. Prevent trackout by installing a trackout control device.
13. Clean up trackout at least once a day. If along a busy road or highway, clean up trackout immediately.
14. Monitor dust-generating activities and implement appropriate measures for maximum dust control.

2.3.3 Terrestrial Resources Environmental Commitments

The final project design shall avoid and minimize the fill of wetlands and other waters to the greatest practicable extent. Where jurisdictional wetlands and other waters cannot be avoided, to offset temporary and permanent impacts that would occur as a result of the project, restoration and compensatory mitigation shall be provided as described below.

A wetland mitigation and monitoring plan shall be developed by a qualified biologist in coordination with CDFW, United States Army Corps of Engineers (USACE), and/or Regional Water Quality Control Board (RWQCB) that details mitigation and monitoring obligations for temporary and permanent impacts to wetlands and other waters as a result of construction activities; and other CDFW jurisdictional areas. The plan shall quantify the total acreage affected; describe mitigation ratios for impacted habitat (described below); annual success criteria; mitigation sites; monitoring and reporting requirements; and site specific plans to compensate for wetland losses resulting from the project.

Prior to construction, the aquatic structure of wetland and riparian areas to be disturbed will be photo-documented, and measurements of width, length, and depth will be recorded. Reclamation will recontour and revegetate disturbed portions of jurisdictional areas in areas temporarily affected by construction prior to demobilization by the contractor at the end of project construction. Creek banks will be recontoured to a more stable condition if necessary. Revegetation will include a palette of species native to the watershed area according to a revegetation plan to be developed by Reclamation and submitted to the USACE, CDFW, and RWQCB for approval. Following removal, woody trees would be replanted at a minimum 1:1 ratio, or as determined and agreed upon by the appropriate wetland permitting agencies. Interim vegetation or other measures will be implemented as necessary to control erosion in disturbed areas prior to final revegetation.

Wetland and other waters impacts in the construction area shall be compensated at a ratio of 1:1 or at a ratio agreed upon by the wetland permitting agencies. Compensatory mitigation shall be conducted by creating or restoring wetland and aquatic habitat at an agency-approved location on nearby lands or through purchasing mitigation credits at a USACE and/or CDFW-approved mitigation bank (depending on the resource). If mitigation is conducted on- or off-site, a five-year wetland mitigation and monitoring program for onsite and offsite mitigation shall be developed. Appropriate performance standards may include, but are not limited to: a 75 percent survival rate of restoration plantings; absence of invasive plant species; and a viable, self-sustaining creek or wetland system at the end of five years.

A weed control plan for the project to limit the spread of noxious or invasive weeds shall also be developed. This plan would be consistent with current Integrated Pest Management Plans that are already in practice on lands surrounding the reservoir. Noxious or invasive weeds include those rated as "high" in invasiveness by the California Invasive Plant Council. The plan will include a baseline survey to identify the location and extent of invasive weeds in the project area prior to ground-disturbing activity, a plan to destroy existing invasive weeds in the construction area prior to initiation of ground-disturbing activity, weed-containment measures while the project is in progress, and monitoring and control of weeds following completion of construction.

Reclamation shall make every effort to avoid removing or damaging native blue oak woodland tree species. If any tree species need to be removed, Reclamation will make every effort to conduct any tree and shrub removal activities outside of the migratory bird and raptor breeding season (March 1 through August 31). For construction activities that will occur between March 1 and August 31 of any given year, Reclamation shall conduct preconstruction surveys in suitable nesting habitat within 500 feet of the project site for nesting birds. Surveys shall be conducted by a qualified biologist.

If nesting raptors are detected, the applicant will consult with a qualified biologist to develop suitable measures to avoid impacting breeding effort. If active nests for non-raptor breeding birds are found during the survey, Reclamation shall implement appropriate measures to ensure that the species will not be adversely affected, which will include establishing a 150-foot no-work buffer zone around the active nest, until a qualified biologist determines that juveniles have fledged the nest(s).

2.4 Summary of Environmental Impacts

A summary of the environmental impacts identified for each alternative (including beneficial effects) are presented in Tables 2-2 and 2-3. The purpose of Table 2-2 is to consolidate and disclose the significance determinations made pursuant to CEQA throughout the EIS/EIR. The impacts listed in Table 2-2 are NEPA impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 2-3 summarizes impacts for resources that were analyzed only under NEPA and do not include findings of significance.

Table 2-2. Potential Impacts Summary

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
4. Water Quality				
Substantially degrade existing water quality conditions.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Change south-of-Delta CVP and SWP exports and Delta outflow.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Temporary violation of existing water quality standards or waste discharge requirements as a result of construction activities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Violation of existing water quality standards or waste discharge requirements as a result of operations.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	NI	None	NI
5. Water Supply				
Construction could result in temporary interruptions in CVP water supply.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	None	SU
Construction could result in temporary interruptions in SWP water supply.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	None	SU
Change deliveries to south-of-Delta CVP contractors.	Alternative 1- No Action/No Project	S	--	SU
	Alternative 2 - Reservoir Restriction	S	None	SU
	Alternative 3 - Crest Raise	NI	None	NI

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Change deliveries to south-of-Delta SWP contractors.	Alternative 1 - No Action/No Project	S	--	SU
	Alternative 2 - Reservoir Restriction	S	None	SU
	Alternative 3 - Crest Raise	NI	None	NI
6. Groundwater				
Decreased south-of-Delta CVP water supply allocations could result in increased groundwater use that would cause changes to groundwater levels.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Increased groundwater pumping in lieu of south-of-Delta CVP surface water would decrease groundwater, increasing the potential for subsidence.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Increased groundwater pumping in lieu of south-of-Delta CVP surface water could substantially alter groundwater levels and/or flow patterns. Substantial reductions in groundwater levels for a long period of time could induce the movement or migration of reduced quality groundwater into previously unaffected areas.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Decreased south-of-Delta SWP water supply allocations could result in increased groundwater use that would cause changes to groundwater levels.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Increased groundwater pumping in lieu of south-of-Delta SWP surface water would decrease groundwater, increasing the potential for subsidence.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Increased groundwater pumping in lieu of south-of-Delta SWP surface water could substantially alter groundwater levels and/or flow patterns. Substantial reductions in groundwater levels for a long period of time could induce the movement or migration of reduced quality groundwater into previously unaffected areas.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Reductions in reservoir storage capacity could reduce reservoir seepage rates that could decrease groundwater levels in the surrounding groundwater aquifer.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	NI	None	NI
7. Air Quality				
Construction of the alternative could cause temporary and short-term construction-related emissions of criteria pollutants or precursors that would exceed the SJVAPCD's significance thresholds or the general conformity *de minimis* thresholds.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	AQ-1, AQ-2, and AQ-3	LTS
Operational activities associated with the alternative could cause long-term operation-related emissions of criteria pollutants or precursors that would exceed the SJVPCD's significance thresholds.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Construction associated with the alternative could cause temporary and short-term construction-related emissions of TACs that would exceed the SJVAPCD's significance thresholds.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction associated with the alternative could create objectionable odors affecting a substantial number of people.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
8. Greenhouse Gases				
Construction and operation associated with the alternative could generate GHG emissions, either directly or indirectly, that could cause a significant impact on the environment.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	GHG-1	LTS
Construction and operation associated with the alternative could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	GHG-1	LTS
9. Flood Protection				
Construction and operations of new facilities could result in the placement of structures in the 100-year flood hazard area which could impede or redirect flood flows.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction could result in the increased exposure of people or structures to an unacceptable risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Operation could result in the unaddressed exposure of people or structures to an unacceptable risk of loss, injury or death involving flooding, including flooding because of increases in the potential for the failure of a levee or dam.	Alternative 1 - No Action/No Project	S	--	SU
	Alternative 2 - Reservoir Restriction	B	None	B
	Alternative 3 - Crest Raise	B	None	B
Construction and operation could result in the alteration of the existing drainage pattern and/or the creation of runoff water that would exceed the capacity of the existing or planned stormwater drainage system.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
10. Visual				
Have a substantial adverse effect on a scenic vista (areas with Scenic Attractiveness Class A or Class B classifications are considered scenic vistas).	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Substantially degrade the existing visual character or quality of the site and its surroundings.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	VIS-1	LTS
Substantially damage scenic resources within a State scenic highway corridor.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Operational changes at the San Luis Reservoir could affect visual resources.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
11. Noise				
Construction activities could expose sensitive receptors to noise levels in excess of standards established in the local general plan or noise ordinance.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	NOISE-1: Noise Control Plan; NOISE-2: Blasting Plan; NOISE-3: Noise Monitoring Program	SU
Construction activities could expose sensitive receptors to excessive groundborne vibration or groundborne noise.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities and operation could result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Construction activities could cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	NOISE-1: Noise Control Plan; NOISE-2: Blasting Plan; NOISE-3: Noise Monitoring Program	SU
Operational sources located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport could expose people residing or working in the project area to excessive noise levels.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
12. Traffic and Transportation				
Construction activities would cause a temporary increase in traffic and could result in substantial degradation of roadway LOS in the area of analysis.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could increase traffic hazards due to a design feature or incompatible use.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	TR-1: Develop a Temporary Traffic Control Plan	LTS
	Alternative 3 - Crest Raise	S	TR-1: Develop a Temporary Traffic Control Plan	LTS

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities could cause reductions in capacity, availability, or performance of public transit and non-motorized transportation, or conflict with any programs regarding public transit, bicycle, or pedestrian facilities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could result in inadequate emergency access.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	TR-1: Develop a Temporary Traffic Control Plan	LTS
	Alternative 3 - Crest Raise	S	TR-1: Develop a Temporary Traffic Control Plan	LTS
Operations and maintenance activities could cause increases in traffic and could result in substantial degradation of roadway LOS in the area of analysis.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations and maintenance activities could increase traffic hazards due to a design feature or incompatible use.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations and maintenance activities could cause substantial reductions in capacity, availability or performance of public transit and non-motorized transportation, or conflict with any programs regarding public transit, bicycle, or pedestrian facilities	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations and maintenance activities could result in inadequate emergency access.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
13. Hazards and Hazardous Materials				
During construction activities, the transport, use or disposal of hazardous materials could increase the risk of exposure from hazardous materials to the public and construction workers.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
During construction activities, there is potential to encounter contaminated soil and/or groundwater, which could result in an accidental release of hazardous materials and pose a threat to the public and the environment.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	HAZ-1: Work with regulating agencies to review existing monitoring data and prepare remediation plan as warranted	LTS
Construction activities at San Luis Reservoir could conflict with seaplane maneuvers on San Luis Reservoir and operations at the San Luis Reservoir Seaplane Base, resulting in safety hazards for pilots and people working and residing in the area.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	HAZ-2: Coordination with seaplane base personnel HAZ-3: Issuance of NOTAM	LTS
Operational changes from implementation of the Project could limit the area available for Seaplane landing resulting in safety hazards for pilots and the public.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
During construction activities use of Basalt Road and SR 152 for site access could temporarily interfere with an emergency response plan or emergency evacuation plan for the State Responsibility Area.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	TR-1: Traffic Control and Safety Plan	LTS
	Alternative 3 - Crest Raise	S	TR-1: Traffic Control and Safety Plan	LTS

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Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
The use of mechanical equipment during construction could increase the risk of wildfire within the vicinity of the project area.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	HAZ-4: Use of spark arrestors during construction.	LTS
	Alternative 3 - Crest Raise	S	HAZ-4: Use of spark arrestors during construction.	LTS
14. Fisheries Resources				
Construction activities around the San Luis Reservoir could destroy or adversely affect aquatic habitats for special-status fish species.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Construction activities could interfere with the movement of any native resident or migratory fish species.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Construction activities could conflict with the provisions of an approved local, regional, or State conservation plans.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations could destroy or adversely affect aquatic habitats for special-status fish species.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations could interfere with the movement of any native resident or migratory fish species in San Luis Reservoir.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations could conflict with the provisions of an approved local, regional, or State conservation plans.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI

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Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
15. Terrestrial Resources				
Construction activities could destroy or adversely affect special-status natural communities including wetland and riparian vegetation communities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	TERR-16: Jurisdictional wetlands or waters, and streambeds and streambank mitigation	LTS
Construction activities could kill, harm, or disturb terrestrial wildlife, including special-status species, or their habitats.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	TERR-15	LTS
	Alternative 3 - Crest Raise	S	TERR-1 through TERR-5 and TERR-11 through TERR-15: Species-specific mitigation measures	LTS
Construction activities could disturb nesting migratory birds, including raptors.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	TERR-15	LTS
	Alternative 3 - Crest Raise	S	TERR-6 through TERR-10: Species-specific mitigation measures	LTS
Construction activities could destroy or adversely affect special-status plant species.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	TERR-1: Species-specific mitigation measures	LTS
Construction activities could adversely affect wildlife corridors.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities could result in conflicts with local policies or ordinances protecting biological resources.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	TERR-1 through TERR-15: Species-specific mitigation measures TERR-16: Jurisdictional wetlands or waters, and streambeds and streambank mitigation	LTS
Construction activities could reduce foraging habitat for golden eagles and California condors at the San Luis Reservoir.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	TERR-8: Species-specific mitigation measures	LTS
Operations could result in long term impacts to terrestrial resources.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
17. Land Use				
Construction activities associated with the alternative could affect land use around San Luis Reservoir by physically dividing a community.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction of the alternative could affect land use by conflicting with an applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Operation of the alternative could result in changes to land use by conflicting with an applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	NI	None	NI
Operation of the alternative could result in changes to land use that would conflict with an applicable habitat conservation plan or community conservation plan.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
18. Agricultural Resources				
Construction activities could affect agricultural resources around San Luis Reservoir.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could affect agricultural resources in the south-of-Delta CVP and SWP service area.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Operation of the alternative could affect agricultural resources around San Luis Reservoir by converting Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural use.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operation of the alternative could result in changes to agricultural resources as a result of any changes to south-of-Delta CVP and SWP water supply deliveries.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	NI	None	NI
19. Recreation				
Recreational use on trails would be substantially reduced as a result of project construction.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Project construction could result in temporary closure to recreation facilities, resulting in a substantial loss of recreation opportunities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	REC-1	LTS
Project construction could displace visitors and substantially contribute to overcrowded conditions at other local and regional recreation sites.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Operational changes to water levels in recreational water bodies could affect recreational uses.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
22. Public Utilities, Services, and Power				
Construction activities could affect the provision of governmental services or facilities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could create the need for new stormwater facilities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could generate solid waste in need of disposal, which could exceed the capacity of landfills.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could use and/or depletion of local or regional energy supplies.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could result in wasteful, inefficient, or unnecessary consumption of energy.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

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Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Long-term operations could result in wasteful, inefficient, or unnecessary consumption of energy	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	NI	None	NI
Operations could result in increases in stormwater runoff and the need for new stormwater drainage facilities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
23. Cultural Resources				
Project implementation could lead to adverse effects/significant impacts to historic properties and/or historical resources	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	Avoidance, minimization of impacts, and/or mitigation measures—determined through completion of the Section 106 process—will be required prior to implementation of this alternative.	LTS
	Alternative 3 - Crest Raise	S	Avoidance, minimization of impacts, and/or mitigation measures—determined through completion of the Section 106 process—will be required prior to implementation of this alternative.	LTS
24. Population and Housing				
Construction could temporarily induce population growth in the area of analysis, and potentially require new housing to accommodate this growth.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction could displace people or houses, and potentially require construction of replacement housing.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operation could induce substantial population growth or housing in the area of analysis.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations could displace a number of people or houses, and potentially require construction of replacement housing.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
25. Geology, Seismicity, and Soils				
Construction activities could expose people or structures to adverse effects related to the rupture of a known earthquake fault.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities on unstable soils could result in the risk of loss, injury, or death as a result of liquefaction or landslides.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could take place on expansive soils creating a substantial risk to life or property.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could result in the loss of availability of a known mineral resource of regional or local importance.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Maintenance activities during operations could expose people or structures to adverse effects related to the rupture of a known earthquake fault.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	B	None	B
	Alternative 3 - Crest Raise	B	None	B

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Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Operations could result in long term impacts to geology, soils, or mineral resources.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Seismic related ground failure could impact operation of alternative facilities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	B	None	B
	Alternative 3 - Crest Raise	B	None	B

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Table 2-3. Impacts for NEPA – only Resources

Potential Impact	Alternative	Effect Determination
16. Regional Economics		
Construction and operation and maintenance expenditures could increase employment, income, and output in the regional economy.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Under the Reservoir Restriction Alternative: Increase of 452 jobs, $14.1 million in labor income and $28.6 million in revenue
	Alternative 3 - Crest Raise	Under the Crest Raise Alternative: Increase of 4,923 jobs, $185.0 million in labor income and $1,015 million in revenue Under the Crest Raise Alternative with shear key option: Increase of 5,700 jobs, $211.6 million in labor income and $1,382.5 million in revenue
Changes in recreation opportunities could affect economic activity in Merced County related to San Luis Reservoir.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Adverse Impact
	Alternative 3 - Crest Raise	Adverse Impact (Temporary)
Changes in water supply to CVP M&I water contractors in the Bay Area Region could affect the regional economy.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Adverse Impact
	Alternative 3 - Crest Raise	Adverse Impact (Temporary)
Changes in water supply to CVP agricultural water users in the San Joaquin Valley could affect the regional economy.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Adverse Impact
	Alternative 3 - Crest Raise	Adverse Impact (Temporary)

Potential Impact	Alternative	Effect Determination
Changes in water supply to SWP M&I water contractors in the Bay Area Region and Southern California Region could affect the regional economy.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Adverse Impact
	Alternative 3 - Crest Raise	Adverse Impact (Temporary)
20. Environmental Justice		
Expose a minority and/or low-income population to adverse or disproportionately high effects or hazards from project construction.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Adverse and Disproportionate Effect Would Not Occur
	Alternative 3 - Crest Raise	Potential Adverse Effect (minority populations) but not Disproportionate

Chapter 3
Affected Environment/Environmental Consequence Overview

This chapter presents an overview of the impacts analysis for the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project), including the organization of the impact analysis for the environmental resources affected by the project.

3.1 Introduction

Chapters 4 through 25 present an assessment of the environmental impacts associated with each of the project alternatives currently being considered for the B.F. Sisk Dam SOD Project, including the No Action/No Project Alternative, as described in Chapter 2, Project Description. Each resource area describes the affected environment or environmental setting for the region of the Project potentially affected by the project alternatives, should they be implemented. They present the analyses of the impacts that would result from the No Action/No Project Alternative or implementation of the proposed alternatives. These chapters also present mitigation measures to reduce or eliminate the impacts, as well as a description of potential cumulative effects associated with implementation of the B.F. Sisk Dam SOD Project and other nearby projects. The following chapters, by resource area, are as follows:

4. Water Quality
5. Surface Water Supply
6. Groundwater Resources
7. Air Quality
8. Greenhouse Gas Emissions
9. Flood Protection
10. Visual Resources
11. Noise and Vibration
12. Traffic and Transportation
13. Hazards and Hazardous Materials
14. Fisheries Resources
15. Terrestrial Resources
16. Regional Economics
17. Land Use
18. Agricultural Resources
19. Recreation
20. Environmental Justice
21. Indian Trust Assets
22. Public Utilities, Services, and Power
23. Cultural Resources
24. Population and Housing
25. Geology, Seismicity, and Soils

Because this document addresses both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), the terms used in this document reflect both NEPA and CEQA. Table 3-1 presents a list of NEPA terms that are synonymous with CEQA terms and are used throughout this document.

Table 3-1. NEPA and CEQA Terms

NEPA	CEQA
Proposed Action	Proposed Project
No-Action Alternative	No-Project Alternative
Environmentally Preferred Alternative	Environmentally Superior Alternative
Purpose and Need	Project Objectives
Affected Environment	Environmental Setting
Environmental Consequences	Environmental Impacts
Environmental Commitments/Mitigation Measures	Mitigation Measures
Environmental Impact Statement (EIS)	Environmental Impact Report (EIR)

Each of the environmental resources addressed in the following chapters are discussed using a common organization, as follows:

3.1.1 Affected Environment/Environmental Setting

The Affected Environment/Environmental Setting subsection discusses the affected environment within a defined geographic area (i.e., Area of Analysis) relative to the B.F. Sisk Dam SOD Project, and includes an overview of pertinent environmental regulations (i.e., Regulatory Setting) and a description of the existing conditions (i.e., Environmental Setting).

3.1.1.1 Area of Analysis

This document defines and describes an area of analysis for each resource area. In some cases, the area of analysis consists of facility construction areas, or nearby areas that would be affected directly by the effects of construction, such as for the analysis of noise impacts. More often, the area of analysis includes a broader scope. For example, Chapter 7, Air Quality, describes an area of analysis that encompasses the San Joaquin Valley Air Basin. In a few cases, the area of analysis is even more geographically broad, such as for regional economics.

3.1.1.2 Regulatory Framework

Each resource area is evaluated within the existing framework of Federal, State, and local laws, regulations, policies, and plans. The laws and regulations that are relevant and applicable to the affected environment, area of analysis, and analysis of impacts are listed in each chapter and described in Chapter 28, Consultation, Coordination, and Compliance.

3.1.1.3 Environmental Setting

The analysis of impacts requires a basis for comparison of conditions during project construction and post-project. NEPA basis of comparison is the No Action Alternative. Under CEQA, the basis of comparison is conditions at the time of the Notice of Preparation. As discussed in Chapter 2, Project Description, the No Action/No Project Alternative is similar to conditions at the time of the Notice of Preparation; therefore, the basis of comparison for NEPA and CEQA are generally the same for this document. The impact analysis for each resource considered both the NEPA and CEQA basis of comparison together and, in cases where these baselines differ, further discussion is provided.

3.1.2 Environmental Consequences/Environmental Impacts

The Environmental Consequences/Environmental Impacts subsection presents the analysis of impacts associated with implementation of each alternative. The subsection begins with an explanation of the assessment method(s) used to identify and address potential impacts and then presents the basis and criteria for determining whether the potential impacts are significant (under CEQA), and whether mitigation of the impact is warranted. Impacts are determined relative to existing conditions (for CEQA) and the No Action/No Project Alternative (for NEPA). However, the No Action/No Project Alternative would be very similar to existing conditions because substantive changes in the area of analysis are not expected. Therefore, the analysis compares the impacts of the action alternatives only to the impacts of the No Action/No Project Alternative.

The analysis presented herein discloses and compares the environmental impacts associated with each of the alternatives, identifies those impacts that are considered significant under the CEQA analysis, and provides recommended mitigation measures where appropriate. The analysis completed in this EIS/EIR utilizes a 20 year timeframe to evaluate long-term operations related impacts with the exception of the analysis completed in Chapter 12, Traffic and Transportation. The analysis in Chapter 12, Traffic and Transportation, utilizes a 25 year timeframe for long-term impacts consistent with the Merced County analysis guidelines.

3.1.2.1 Methodology

The methods used to evaluate impacts are described for each resource area. In general the Lead Agencies identified the impacts that would result from implementation of each of the alternatives within the context of the environmental baseline and regulatory framework. The Lead Agencies used a variety of data sources, models, design documents, interviews, and various other types of research and analysis to predict the impacts. The Lead Agencies then determined the magnitude or significance of the impacts based on CEQA significance criteria, where required.

3.1.2.2 Significance Criteria

For each resource area, this chapter presents specific significance criteria that the Lead Agencies used to assess the significance level of the impacts under CEQA. Pursuant to NEPA, significance is used to determine whether an EIS or some other level of documentation is required, and once the decision to prepare an EIS is made, the magnitude of the impact is evaluated and no further judgment of significance is required. Therefore, any determinations of significance are for CEQA purposes only.

3.1.2.3 Impact Discussion

The impacts of each alternative are discussed in Chapters 4 through 25 by resource area and alternative. Each resource area section is structured so that an *italicized* impact statement introduces potential changes that could occur from implementation of each alternative. A discussion of how the resource area would be affected by the impact then follows this initial statement. The impact discussion is concluded with a bold CEQA significance determination that indicates if there is no impact to a resource area or if the impact to a resource area is beneficial, less than significant, or significant.

3.1.2.4 Mitigation Measures

For those impacts that would be significant, the Lead Agencies identified feasible mitigation measures, if they exist, to reduce the level of the impact. The discussion of mitigation measures presented in this chapter includes an assessment of which, if any, significant impacts would remain after mitigation.

Although existing adverse conditions associated with the No Action/No Project Alternative identified in this EIS/EIR would continue, it is not necessary or appropriate to formulate mitigation measures or ascribe mitigation responsibility for these impacts. In accordance with the intent and requirements of CEQA (Guidelines Section 15126.6), delineating the nature and significance of impacts associated with the No Action/No Project Alternative serves to provide a basis for comparing the impacts of approving the proposed project with the impacts of not approving the proposed project. In particular, the evaluation of alternatives, including the “no project” alternative, serves to determine whether the significant impacts of the alternatives can be avoided or substantially lessened. The analysis presented for the No Action/No Project Alternative in this EIS/EIR has determined that some existing adverse conditions would continue for reasons not attributable to the Proposed Action or alternatives; this provides information to be considered by decision-makers in evaluating the impacts that are attributable to the Proposed Action.

3.1.2.5 Basis of Determination

The Lead Agencies have used their best efforts to identify and disclose as much relevant information as possible in the EIS/EIR based on the review of reasonably available information at the time of the issuance of the Notice of Intent. Under CEQA, the Lead Agency is not required to conduct every test or perform all research, studies, or experimentation at the commenter’s request

(Pub. Resources Code, section 21091(d)(2)(B), CEQA Guidelines sec. 15151 and 15204). The Lead Agencies implemented various processes to ensure that only high quality and objective science will contribute to the decision making process.

One of the goals of scientific analysis is to develop new information and to increase the certainty of conclusions (i.e. reduce scientific uncertainty). This cannot, however, remove all scientific uncertainty from a decision. No amount of investigating, hypothesis testing, modeling, or peer reviewing will ensure perfect knowledge about how the project area of analysis' ecosystem would respond to future large changes/actions. Scientific uncertainty is inherent in any analysis of present and future conditions.

It is important to understand what is meant by the term scientific “uncertainty” because it has a very different meaning than the meaning more commonly used by the public outside the realm of science; this difference in word usage often leads to serious misunderstandings when science results are communicated. Science and engineering use the word “uncertainty” to define how well something is known, not whether it is known. Because nothing measured, estimated, modeled, or predicted can be known with perfect accuracy and certainty, scientists seek to describe the statistical variability of a number, a range of possibilities, and/or the relative level of confidence in a conclusion. By defining uncertainty, scientists seek to clarify the strength and accuracy of a conclusion. This definition of scientific uncertainty should not be confused with the more common definition of uncertainty (outside the realm of science and engineering), which typically conveys that something is completely unknown, that a result is unreliable, or that the state of knowledge is confused.

In some cases, scientific uncertainty is quantifiable and is often described as the estimated amount an observed, calculated, or modeled value may differ from the true value. For example, a study may show that we have 98 percent confidence that the true value will fall within a defined range of values. This defined range of values is referred to as the 98 percent confidence interval. In other cases how well something is known cannot be quantified and uncertainty is often described in relative terms, such as predicting how an ecosystem may respond to a potential action. Based on the available information and analyses, scientists convey the likelihood of these predictions with descriptions such as “highly likely,” “probable,” or other caveats intended to disclose the level of certainty in a conclusion.

In order to provide a sound foundation for a determination on which alternative to implement for the B.F. Sisk Dam SOD Project, multiple strategies were used to weigh the validity of hypotheses, reach scientific conclusions, and decrease scientific uncertainty around those conclusions. These strategies included: (1) developing new studies, that test multiple hypotheses, in order to fill critical information gaps; (2) developing numerical models (when gathering empirical data is not possible) to predict the probable ecosystem response; (3) repeating investigations on critical topics to ensure past results are reproducible; (4) obtaining independent expert opinions on important topics; and (5) drawing conclusions based on the weight of evidence and multiple lines of evidence.

Using multiple lines of evidence refers to a process when conclusions are not drawn from a single study but from two or more studies that have different approaches. Considering several diverse lines of evidence decreases scientific uncertainty and strengthens overarching conclusions.

In some situations, where studies present conflicting results, the "weight of evidence" for a conclusion considers the quantity of evidence supporting that conclusion as well as when and how studies were done; generally weight is given to more recent studies and studies done with more scientific rigor (e.g. peer review). When there is a significant amount of conflicting information, a conclusion is often expressed with a higher degree of uncertainty.

3.1.3 Comparative Analysis of Alternatives

The Comparative Analysis of Alternatives subsection is based on the conclusions of the analysis described above and focuses on how certain impacts associated with the subject environmental topic are greater, less, or the same between the individual alternatives.

3.1.4 Mitigation Measures

The Mitigation Measures subsection provides recommended mitigation measures based on the results and conclusions of the impacts analysis.

3.1.5 Cumulative Effects

Chapter 27, Cumulative Effects, addresses the impacts of the project in conjunction with past, present, and probable future projects (under CEQA), or reasonably foreseeable future projects (under NEPA), in or near the area. In general, the environmental impacts of the project may be individually minor, but collectively significant when considered in conjunction with other projects or other environmental effects of the project. Of particular note relative to CEQA is whether the project's contribution to such impacts is cumulatively considerable. The cumulative effects analysis presented in each resource chapter does not include an evaluation of the No Action/No Project Alternative. The No Action/No Project Alternative represents both the existing and future without project condition and is similar to the cumulative condition against which each action alternatives' cumulative effect is measured. The evaluation of the No Action/No Project Alternative's potential effect is presented in the environmental consequences section of each resource area chapter. Chapter 27, Cumulative Effects, provides a more detailed explanation of how cumulative effects are addressed in this EIS/EIR, and describes the other projects, which in conjunction with the proposed B.F. Sisk Dam SOD Project, form the basis of the cumulative projects' analysis.

Chapter 4
Water Quality

This section presents existing water quality conditions in the area of analysis and potential impacts to water quality from the implementation of the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) Environmental Impact Statement/Environmental Impact Report (EIS/EIR) alternatives.

4.1 Affected Environment/Environmental Setting

This section provides an overview of the area of analysis, the regulatory setting associated with water quality standards, identifies designated beneficial uses, outlines the constituents of concern, and provides a description on a regional level of water bodies with the potential to be affected by the action alternatives.

4.1.1 Area of Analysis

The water quality area of analysis includes the water bodies that could be affected by development of the project alternatives. These water bodies include the San Luis Reservoir in Merced County, the Sacramento-San Joaquin River Delta (Delta), Central Valley Project (CVP) San Felipe Division facilities, California Aqueduct, and Delta-Mendota Canal. Water quality effects from the alternatives also have the potential to affect customers located in south-of-Delta CVP and State Water Project (SWP) contractors' service areas. The south-of-Delta CVP and SWP contractors' service areas cover Alameda, Contra Costa, Fresno, Imperial, Kern, Kings, Los Angeles, Madera, Merced, Orange, Riverside, San Benito, San Bernardino, San Diego, San Joaquin, San Luis Obispo, Santa Barbara, Santa Clara, Stanislaus, Tulare, and Ventura counties. Figure 4-1 shows the water quality area of analysis.

4.1.2 Regulatory Setting

The following section describes the applicable water quality laws, rules, regulations and policies.

4.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Federal Safe Drinking Water Act
- Federal Clean Water Act
- Executive Order 11990, Protection of Wetlands

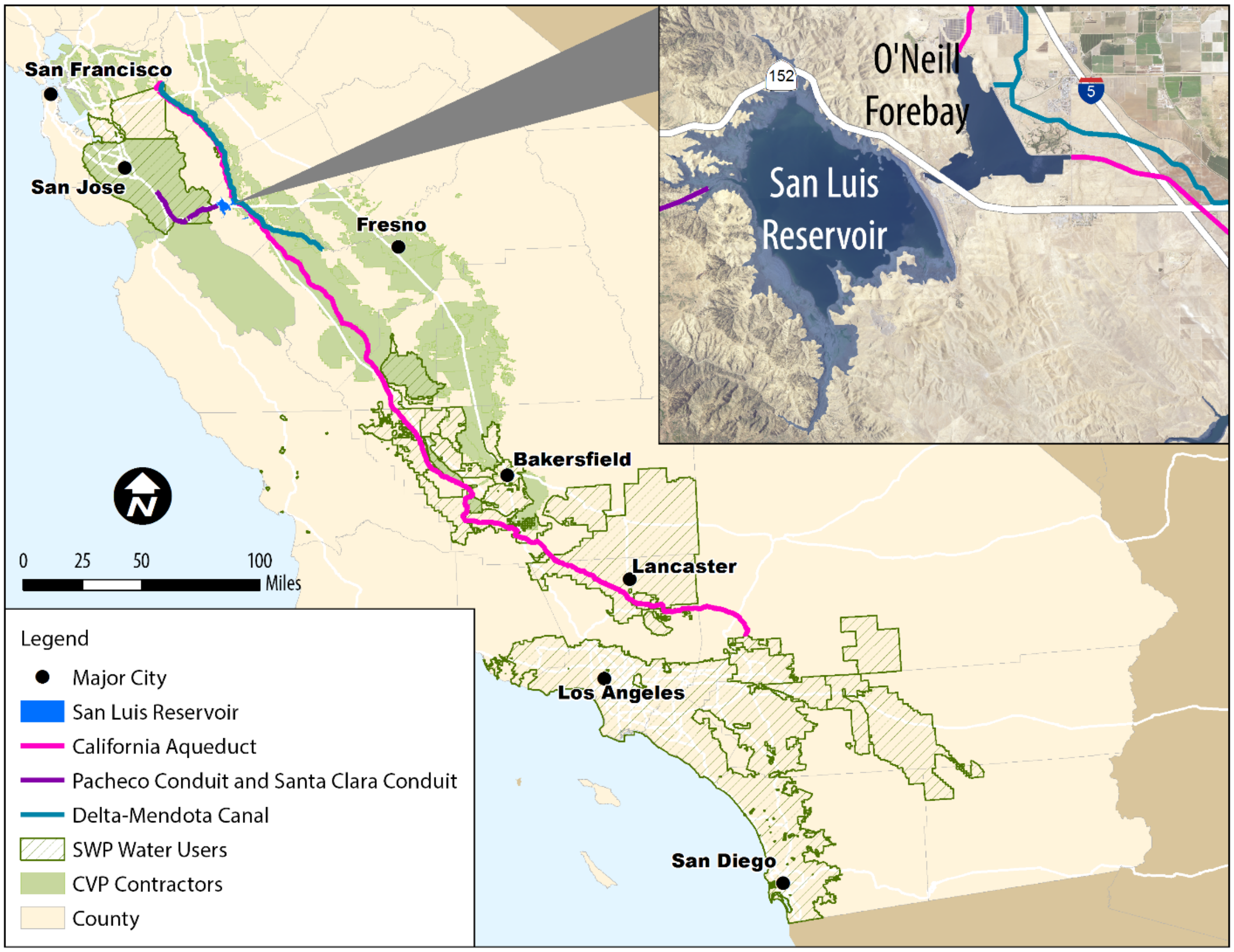


Figure 4-1. Area of Analysis for Water Quality

4.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Porter-Cologne Water Quality Control Act
- Regional Water Quality Control Plans
- California Department of Water Resources Non-Project Water Acceptance Criteria

4.1.2.3 Regional/Local

The following regional/local regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Merced County General Plan

4.1.3 Beneficial Uses

Application of water quality objectives (i.e. standards) to protect designated beneficial uses is critical to water quality management in California. State law defines beneficial uses to include (but not be limited to) "...domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Water Code Section 13050(f)). Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning. Significant points concerning the concept of beneficial uses are:

1. All water quality problems can generally be stated in terms of whether there is water of sufficient quantity or quality to protect or enhance beneficial uses (Central Valley Regional Water Quality Control Board [CVRWQCB] 2016).
2. Beneficial uses do not include all of the reasonable uses of water. For example, disposal of wastewaters is not included as a beneficial use. This is not to say that disposal of wastewaters is a prohibited use; it is merely a use that cannot be satisfied to the detriment of beneficial uses. Similarly, the use of water for the dilution of salts is not a beneficial use although it may, in some cases, be a reasonable and desirable use of water (CVRWQCB 2016).
3. The protection and enhancement of beneficial uses require that certain quality and quantity objectives be met for surface and ground waters (CVRWQCB 2016).
4. Fish, plants, and other wildlife, as well as humans, use water beneficially.

The beneficial uses designated for waters within the area of analysis are presented in Table 4-1 (San Luis Region) and Table 4-2 (Sacramento-San Joaquin River Delta Region). Appendix A, Water Quality Technical Appendix, contains beneficial use definitions. The beneficial uses designated for any specifically-identified water body generally also apply to its tributary streams. In some cases, a beneficial use may not be applicable to the entire body of water. In these cases, CVRWQCB judgment is applied. Water bodies within the basins that do not have beneficial uses designated are assigned municipal and domestic supply designations in accordance with the provisions of State Water Resources Control Board (SWRCB) Resolution No. 88-63. These municipal and domestic supply designations in no way affect the presence or absence of other beneficial uses in these water bodies.

The Porter Cologne Water Quality Control Act defines water quality objectives as, "…the limits or levels of water quality constituents or characteristics which are established for the reasonable protections of the beneficial uses of water or the preventions of nuisance within a specified area" (Water Code 13050(H)). The Basin Plans present water quality objectives in numerical or narrative format for specified water bodies or for protection of specified beneficial uses throughout a specific basin or region.

Table 4-1. Beneficial Uses of Water Bodies in the Merced County Region

Beneficial Use Designation	San Luis Reservoir	O'Neill Forebay
Municipal and Domestic Supply (MUN)	X	X
Agricultural Supply - Irrigation (AGR)	X	X
Agricultural Supply – Stock Watering (AGR)	X	X
Industrial Process Supply (PROC)		
Industrial Service Supply (IND)	X	
Industrial Power (POW)	X	
Water Contact Recreation (REC-1)	X	X
Canoeing and Rafting Recreation (REC-1)		
Non-contact Water Recreation (REC-2)	X	X
Wildlife Habitat (WILD)	X	X
Navigation (NAV)		
Cold Freshwater Habitat (COLD)		
Warm Freshwater Habitat (WARM)	X	X
Cold Migration (MIGR)		
Warm Migration (MIGR)		
Cold Spawning (SPWN)		
Warm Spawning (SPWN)		

Source: CVRWQCB 2016.

Table 4-2. Beneficial Uses of Water Bodies in the Sacramento-San Joaquin River Delta

Beneficial Use Designation	Sacramento-San Joaquin River Delta
Municipal and Domestic Supply (MUN)	X
Agricultural Supply - Irrigation (AGR)	X
Industrial Process Supply (PRO)	X
Industrial Service Supply (IND)	X
Agricultural Supply (AGR)	X
Groundwater Recharge (GWR)	X
Navigation (NAV)	X
Water Contact Recreation (REC-1)	X
Non-contact Water Recreation (REC-2)	X
Shellfish Harvesting (SHELL)	X
Commercial and Sport Fishing (COMM)	X
Warm Freshwater Habitat (WARM)	X
Cold Freshwater Habitat (COLD)	X
Migration of aquatic organisms (MIGR)	X
Spawning, Reproduction, and/or Early Development (SPWN)	X
Estuarine Habitat (EST)	X
Wildlife Habitat (WILD)	X
Rare, Threatened, or Endangered Species (RARE)	X

Source: SWRCB 2006.

4.1.4 Constituents of Concern

Various water bodies within the B.F. Sisk Dam SOD Project area of analysis have been identified as impaired for certain constituents of concern, as listed on the 2012 303(d) list under the Clean Water Act (CWA). CWA Section 303(d) requires States to identify water bodies that do not meet applicable water quality standards after the application of certain technology-based controls on point source discharges. As defined in the CWA and Federal regulations, water quality standards include the designated beneficial uses of a water body, the adopted water quality criteria necessary to protect those uses, and an anti-degradation policy. As defined in the Porter-Cologne Act, water quality standards are associated with designated beneficial uses of a water body, the established water quality objectives (both narrative and numeric), and California's non-degradation policy (SWRCB Resolution No. 68-16). Chapter 28, Consultation, Coordination, and Compliance, contains a description of the CWA and the 303(d) listing process.

Certain water bodies in the area of analysis are listed as water quality limited (impaired) for one or more of the constituents of concern. Table 4-3 presents the 2012 303(d) listed water bodies within the Project area of analysis and information about the constituents of concern contributing to their impairment. Some water quality constituents are also of concern with respect to drinking water. In December 2016, the CVRWQCB approved changes to the 303(d) List for the Central Valley Region. However, the SWRCB and United States Environmental Protection Agency (USEPA) must approve the changes before the 2012 303(d) List is updated (CVRWQCB 2017).

Appendix A, Water Quality Technical Appendix contains a description of each water quality constituent of concern for the 303(d) listed water bodies and for drinking water. The descriptions in Appendix A, Water Quality Technical Appendix include: 1) what the constituent is and how it is commonly used; 2) what happens to the constituent when it enters the environment; 3) how a person may be exposed to the constituent; 4) the potential health effects of exposure; 5) and the human exposure standards as defined by the USEPA, Occupational Safety and Health Administration, National Institute of Occupational Safety and Health, and the Food and Drug Administration.

Table 4-3. 303(d) Listed Water Bodies Within the B.F. Sisk Dam SOD Project Area of Analysis and Associated Constituents of Concern

Name	Constituent	Potential Sources	Estimated Area Affected [1]	Proposed TMDL Completion Year	Region
O'Neill Forebay	Mercury	Source Unknown	2,254 acres	2012	Merced County
San Luis Reservoir	Mercury	Source Unknown	13,007 acres	2021	Merced County
Sacramento-San Joaquin River Delta	Chlordane	Nonpoint Source	41,736 acres	2013	Contra Costa, Sacramento, San Joaquin, Solano and Yolo Counties
	DDT	Nonpoint Source	41,736 acres	2013	
	Dieldrin	Nonpoint Source	41,736 acres	2013	
	Dioxin compounds (including 2,3,7,8-TCDD)	Atmospheric Deposition	41,736 acres	2019	
	Furan Compounds	Atmospheric Deposition	41,736 acres	2019	
	Invasive Species	Ballast Water	41,736 acres	2019	
	Mercury	Industrial Point Sources, Unknown Nonpoint Source, Municipal Point Sources, Resource Extraction	41,736 acres	2008	
	PCBs	Nonpoint Source	41,736 acres	2008	
	PCBs (dioxin-like)	Municipal Point Sources	41,736 acres	2008	
	Selenium	Resource Extraction, Atmospheric Deposition, Unknown Nonpoint Source	41,736 acres	2008	

Source: SWRCB 2012.

Key: DDT = dichlorodiphenyltrichloroethane; PCB = polychlorinated biphenyl; TMDL = Total Maximum Daily Loads

[1] Estimated area affected is given as the surface area (acres) of lakes or estuaries or length (river miles) for river systems.

4.1.5 Existing Conditions

The following sections describe the general water quality for each of the water bodies evaluated in the area of analysis. Environmental setting information varies by geographic area because water quality varies between water bodies. The descriptions cover land use for each water body because land use can affect the quality of runoff that the water body receives and therefore, the water quality of the water body itself. Where available, data describing general water quality parameters[1] data are presented. The description of the Delta Region also includes a detailed discussion of salinity, organic carbon, and bromide, which

[1] General pH, turbidity, dissolved oxygen, total organic carbon, total suspended solids, nitrogen, phosphorus, and electrical conductivity or total dissolved solids.

are constituents of concern with respect to drinking water. Delta water quality is a concern because Delta exports are the primary source into San Luis Reservoir.

4.1.5.1 Merced County Region

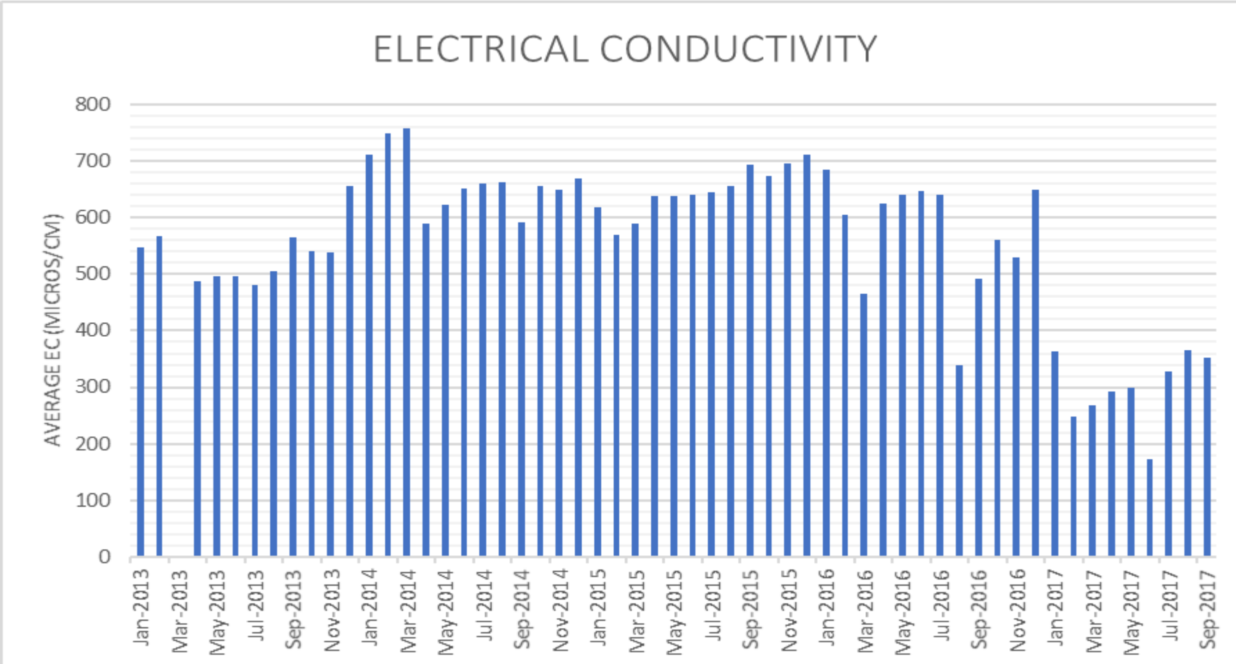
This region includes the area around San Luis Reservoir, which is Federally-owned and leased to the California Department of Parks and Recreation. San Luis Reservoir stores runoff water from the Delta, with a storage capacity of over two million acre-feet (AF). The water arrives through the California Aqueduct and Delta-Mendota Canal, and is pumped from the O’Neill Forebay into the main reservoir during the winter and spring.

San Luis Reservoir and the surrounding area tend to be windy and are characterized by wet, cool winters and warm, dry summers. During the summer months, if water levels are low, water quality in the San Luis Reservoir deteriorates due to a combination of warmer temperatures, wind-induced nutrient mixing, and algal blooms near the reservoir surface. Presently, when San Luis Reservoir approaches its late summer/early fall low point, algae growth may begin to degrade water quality for contractors that utilize the water. If the algal layer is significantly thick, when the lake storage volume is reduced to approximately 300,000 AF, algae may begin to enter the Lower San Felipe Intake. The water quality within the algal blooms is not suitable for agricultural water users with drip irrigation systems in San Benito County or for municipal and industrial water users relying on existing water treatment facilities in Santa Clara County. Increasing water demands in the future will increase pressure to fully utilize all available storage in the reservoir (Santa Clara Valley Water District 2005).

San Luis Reservoir and O’Neill Forebay were designated in 2010 as impaired on the California 303(d) List. The reservoir and forebay were listed for mercury impairment. Potential sources of the impairment are listed as unknown.

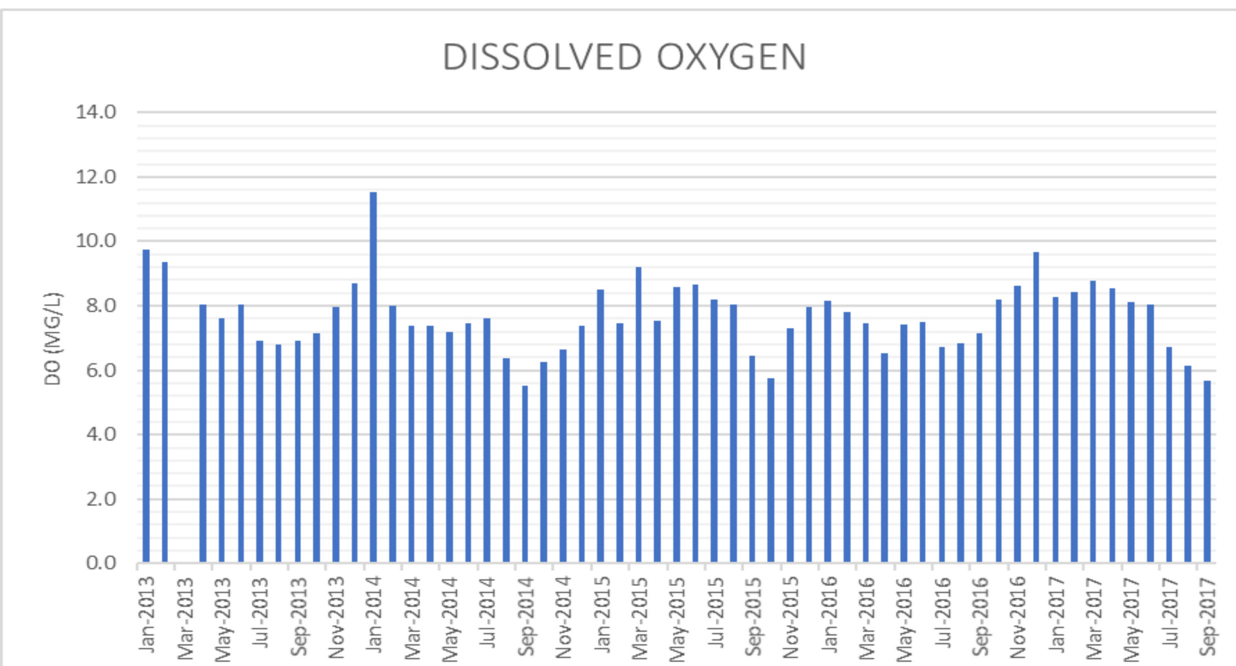
Water quality samples are routinely collected through automated monitoring at O’Neill Forebay at Gianelli Pumping Plant. Electrical Conductivity (EC), Dissolved Oxygen (DO) and Dissolved Nitrate data from this sampling location is presented in Figures 4-2 through 4-4. Periodic boat-based in lake sampling also occurs at multiple locations on San Luis Reservoir. Historic algae count data collected at Pacheco Pumping Plant indicates greatest algae cell counts during mid- to late-summer months, peaking in some years above 70,000 algae cell counts.

EC is directly related to the concentration of dissolved solids in the water. Salinity is related to EC in that dissolved ions that increase conductivity also increase salinity. Historic water quality data at O’Neill Forebay from 2013 thru 2017 is within the typical range of EC values for tap water in the United States.



Source: DWR California Data Exchange Center (CDEC) 2017

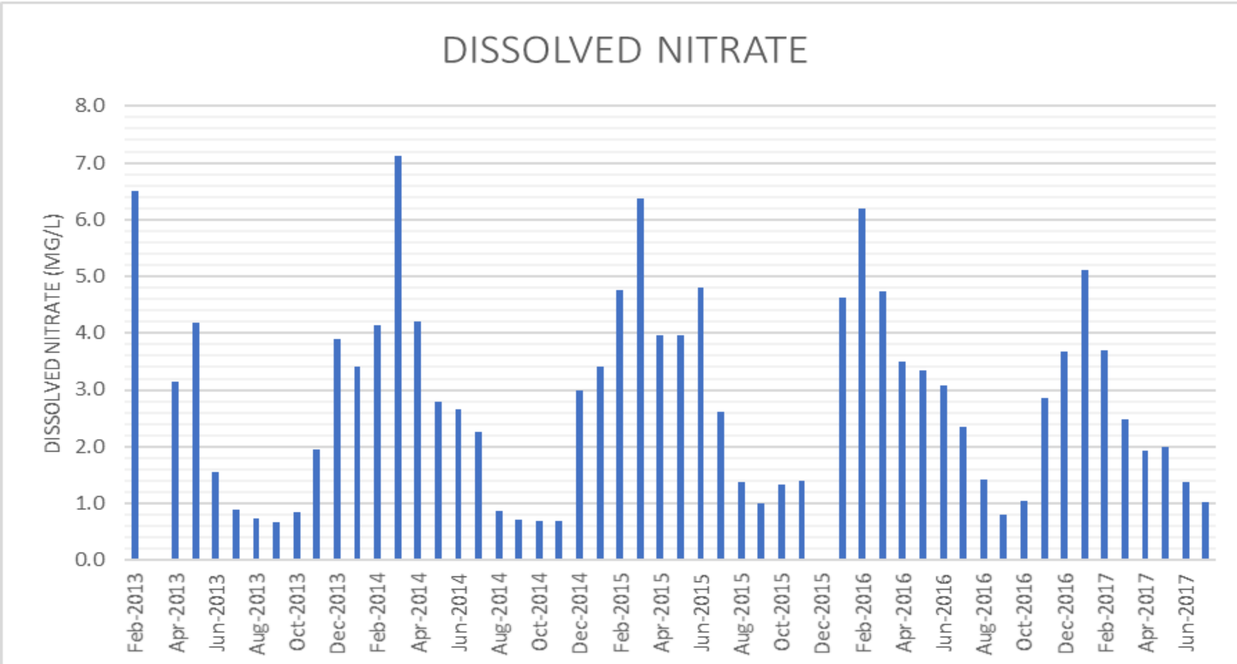
Figure 4-2. Electrical Conductivity in O'Neill Forebay as Measured at Gianelli Pumping Plant



Source: DWR CDEC 2017

Figure 4-3. Dissolved Oxygen in O'Neill Forebay as Measured at Gianelli Pumping Plant

As seen in Figure 4-3, DO concentrations in O'Neil Forebay vary between 5 and 10 milligrams per liter (mg/L) from 2013 through 2017. DO is often lowest in the late summer and fall following excessive algae growth. As algae dies and creates decomposing organic matter the process consumes dissolved oxygen, indicated by the low late summer DO levels in O'Neill Forebay.



Source: DWR CDEC 2017

Figure 4-4. Dissolved Nitrate in O'Neill Forebay as Measured at Gianelli Pumping Plant

Nitrate levels in O'Neill Forebay from 2013 through 2017 indicate late winter/Early spring peaks when algae growth is limited due to low temperatures. Nitrate levels drop beginning in late spring as algae begins to form and depletes nitrate levels through late fall. Despite annual fluctuations of approximately 5 mg/L, nitrate levels fall below the USEPA National Primary Drinking Water Regulations of 10 mg/L even in its raw water form (USEPA 2016).

4.1.5.2 Delta Region and South-of-Delta CVP and SWP Facilities

San Luis Reservoir provides off-stream storage, and the primary source of that water is Delta exports. The Delta Region forms the low-lying outlet of the Central Valley, which is comprised of the channels of the Sacramento and San Joaquin rivers including from about the I-Street Bridge in Sacramento on the Sacramento River and Vernalis on the San Joaquin River, west to Martinez and includes Suisun Bay and the Suisun Marsh. West of Martinez is the Carquinez Straits, San Pablo and San Francisco Bays. Estuarine areas occur from the Delta to San Francisco Bay depending on season of the year and outflow conditions.

Water quality in the Delta Region is governed in part by Delta hydrodynamics, which are highly complex. The principal factors affecting Delta hydrodynamic conditions are: 1) river inflows from the San Joaquin and Sacramento River systems, 2) daily tidal inflows and outflows through the San Francisco Bay, and 3) export pumping from the south Delta through the Harvey O. Banks Pumping Plant and Jones Pumping Plant. These Delta hydrodynamic conditions are primarily measured using the parameters of Sacramento River flow, Delta outflow, Delta inflow, low salinity zone, Old and Middle River flows, and Delta exports.

Of these parameters, the transition area between saline waters and fresh water, frequently referred to as the low salinity zone[2] (LSZ), that is typically located within Suisun Bay and the western Delta. LSZ is commonly associated with the position of X2 and is directly controlled by the other parameters – Delta inflow, Old and Middle River flows, and Delta exports. Given this connection, changes in the position of the LSZ and X2 can be used to characterize likely changes in the other parameters.

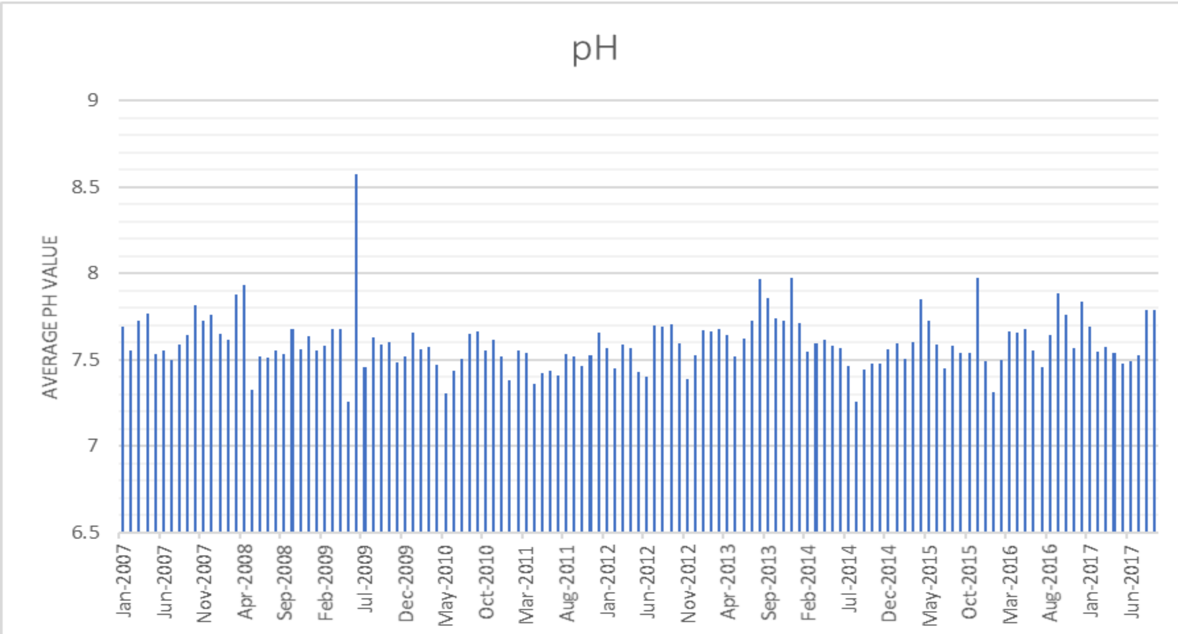
The existing water quality constituents of concern in the Delta can be categorized broadly as metals, pesticides, nutrient enrichment and associated eutrophication, constituents associated with suspended sediments and turbidity, salinity, bromide, and organic carbon. The relative concentrations of these constituents over time is closely related to the hydrodynamic conditions, including the position of X2, described above. Other physical parameters (including pH, temperature, and EC), monitored daily at Clifton Court Forebay (where Banks Pumping Plant diverts from the Delta and near the Jones Pumping Plant diversion), can provide a demonstration of how change in these hydrodynamic conditions can affect water quality conditions in the Delta over time. Figures 4-5 through 4-7 present historical data from 2007-2017 for pH, temperature, and EC.

The Jones Pumping Plant diverts water from the Delta into the Delta-Mendota Canal that conveys CVP water to users in the Central Valley and to and from San Luis Reservoir for storage. The influence of hydrodynamic conditions in the Delta described above for Clifton Court Forebay and indicated in Figures 4-5 through 4-7, is similar at the Jones Pumping Plant. Similar to the Delta Region water quality constituents of concern in the Delta-Mendota Canal can be categorized broadly as metals, pesticides, constituents associated with suspended sediments and turbidity, salinity, bromide, and organic carbon.

The Banks Pumping Plant diverts water from the Delta into Bethany Reservoir that connects to the California Aqueduct. Water diverted to the California Aqueduct is conveyed south to the O'Neill Forebay and San Luis Reservoir. Water quality constituents of concern in the south-of-Delta SWP, similar to the

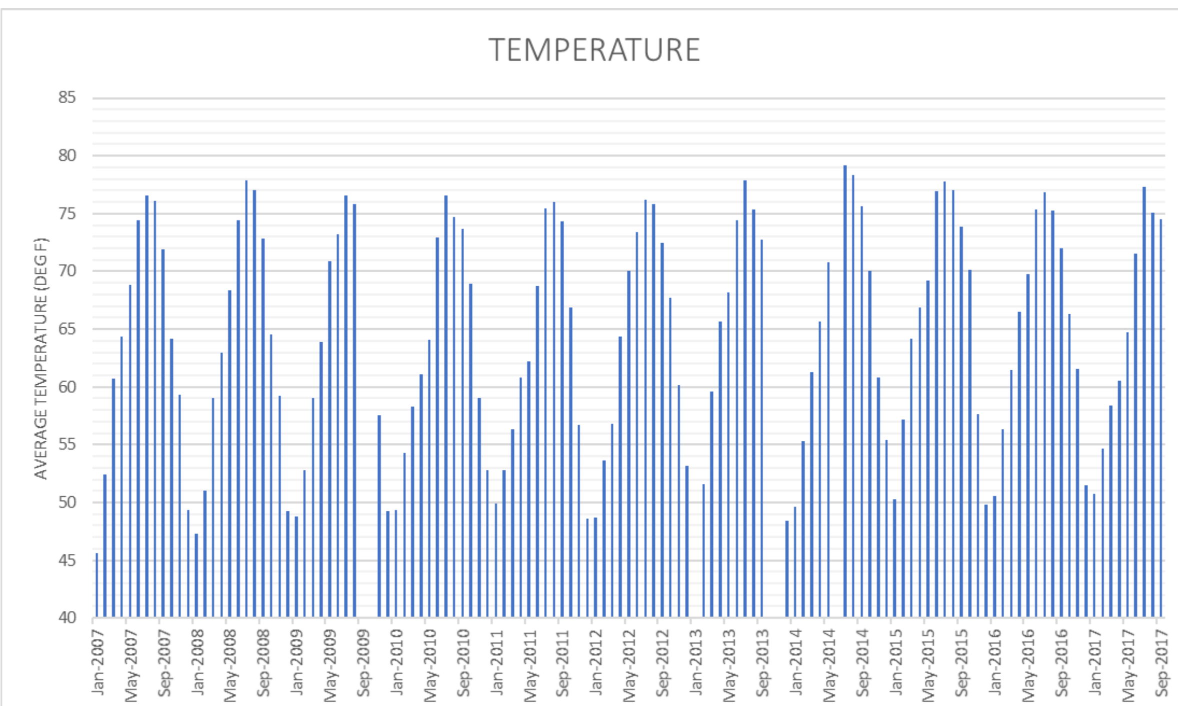
[2] The low salinity zone is often referenced by X2, which is the distance upstream, in kilometers, from the Golden Gate Bridge where tidally averaged salinity is equal to 2 ppt. X2 is largely determined by Delta outflow (Kimmerer 2004).

Delta Region and Delta-Mendota Canal, include metals, pesticides, constituents associated with suspended sediments and turbidity, salinity, bromide, and organic carbon.



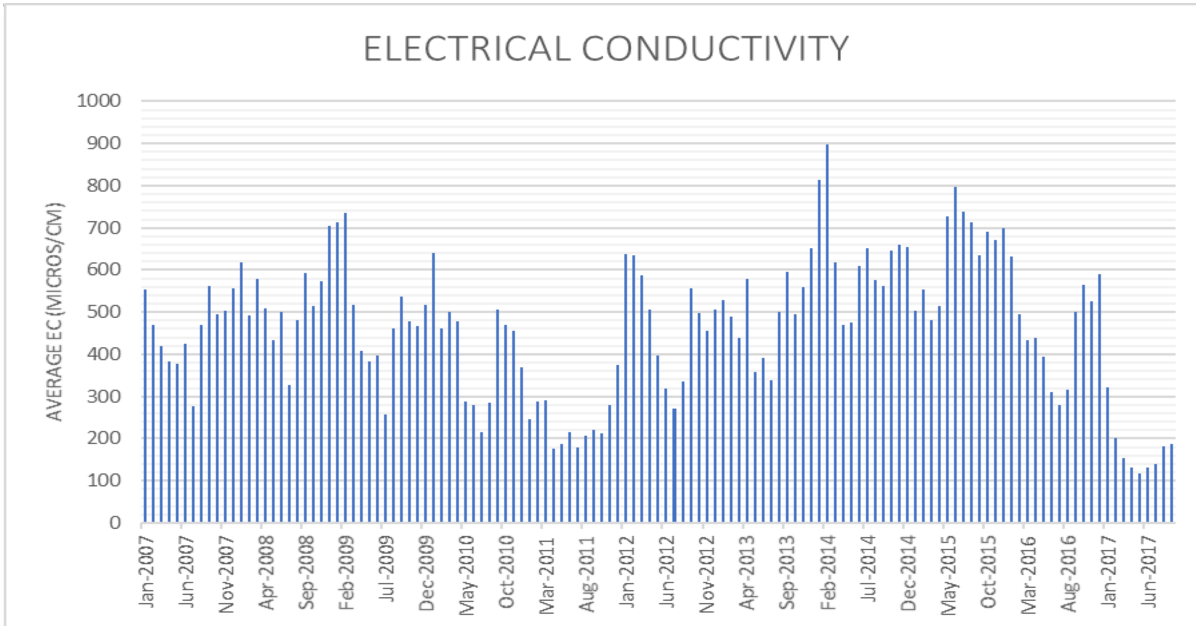
Source: DWR CDEC 2017

Figure 4-5. pH in Clifton Court Forebay



Source: DWR CDEC 2017

Figure 4-6. Temperature in Clifton Court Forebay



Source: DWR CDEC 2017

Figure 4-7. Electrical Conductivity in Clifton Court Forebay

4.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts associated with each alternative.

4.2.1 Assessment Methods

Water quality monitoring data and computer modeling were used to aid in evaluating potential impacts. Both temporary, construction-related effects and long-term operational effects were considered as part of this evaluation. Temporary construction impacts were evaluated qualitatively based on anticipated construction practices, materials, locations, and duration of construction and related activities. Long-term effects were evaluated using results from a computer modeling tool. Specifically, the California Simulation Model II (CalSim II) was used to estimate both existing (short term) and future (long term) changes in reservoir storage, river flow, and Delta outflow within the area of analysis.

4.2.2 Significance Criteria

For the purposes of the B.F. Sisk Dam SOD Project EIS/EIR, effects would be significant if they resulted in one or more of the following conditions or situations:

- Violate existing water quality standards or waste discharge requirements;

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on or off-site;
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade existing water quality conditions; or
- Result in substantial effects on water quality related beneficial uses.

These significance criteria do not address flood control or groundwater resources. The evaluation of these resource areas are presented in other chapters of this EIS/EIR (Chapter 6, Groundwater Resources, and Chapter 9, Flood Protection). Potential effects on water supply are analyzed in Chapter 5, Surface Water Supply, with the exception of analysis of the extent to which changes in water supply affect beneficial uses in the area of analysis, which is described in this chapter.

4.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative includes the most likely future conditions in the absence of the project. No physical modifications, operational or institutional changes would occur under this alternative that would alter existing drainage patters, create or contribute runoff water or degrade existing water quality conditions. Water quality conditions within the area of analysis would remain similar to existing conditions. **Therefore, the No Action/No Project Alternative would have no impact on water quality.**

4.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

4.2.4.1 Delta Division

The Reservoir Restriction Alternative could change Delta salinity and bromide concentrations resulting in water quality impacts. As noted under existing conditions, water quality in the Delta and the south-of-Delta CVP and SWP is closely related to changes in hydrodynamics. Changes in south-of-Delta exports are directly linked to changes in Delta outflow, which can impact water quality conditions (e.g. salinity and Total Dissolved Solid [TDS] levels) in the south Delta and south-of-Delta CVP and SWP.

X2 calculations were completed to determine the movement of salinity throughout the Delta under the Reservoir Restriction Alternative. Table 4-4 summarizes X2 results which modeled potential changes in salinity in comparison to the No Action/No Project Alternative. Positive values indicate movement of the salinity zone into the Delta while negative values indicate the zones movement out of the Delta. Under the Reservoir Restriction Alternative there would be limited changes, less than 100 meters on average, in the position of the X2. **Therefore, there would be no impact.**

Table 4-4. Difference in Delta X2 between the No Action/No Project Conditions and the Reservoir Restriction Alternative (km change)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total[1]
W	0.00	-0.01	-0.01	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	-0.03
AN	0.01	0.01	0.00	0.00	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.01
BN	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	-0.02
D	0.00	0.00	0.00	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.03
C	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
All	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Notes: [1]Totals may not sum due to rounding.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

4.2.4.2 South-of-Delta CVP and SWP Facilities

The Reservoir Restriction Alternative could change south-of-Delta CVP and SWP exports and Delta outflow. Under the Reservoir Restriction Alternative, south-of-Delta exports are expected to decrease in all water year types as a smaller San Luis Reservoir would require fewer exports to fill the reservoir. Exports are expected to decrease by as much as 4 percent, or 268,000 AF, annually under wet water year types. Tables 4-5 and 4-6 summarize the change in south-of-Delta exports under this alternative.

Table 4-5. Difference in Total Delta Exports between the No Action/No Project Conditions and Reservoir Restriction Alternative (1,000 AF)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total[1]
W	-13	-1	-9	-26	-70	-101	-6	-7	-4	-11	0	-20	-268
AN	-15	-9	-29	-24	-13	-27	0	0	0	-8	1	-18	-143
BN	-13	-17	-14	0	-6	-11	0	0	0	-9	-17	-28	-115
D	-1	7	-13	0	0	-4	-1	0	-2	-20	-9	18	-25
C	8	-9	2	-1	-5	7	0	0	-5	-13	-8	5	-19
All	-8	-4	-12	-12	-26	-38	-2	-2	-3	-12	-6	-9	-134

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Notes: [1]Totals may not sum due to rounding.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

Table 4-6. Difference in Total Delta Exports between the No Action/No Project Conditions and Reservoir Restriction Alternative (% change)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
W	-3%	0%	-2%	-5%	-13%	-17%	-3%	-4%	-1%	-2%	0%	-3%	-4%
AN	-4%	-2%	-5%	-6%	-3%	-5%	0%	0%	0%	-1%	0%	-3%	-3%
BN	-3%	-4%	-2%	0%	-2%	-3%	0%	0%	0%	-1%	-2%	-4%	-2%
D	0%	2%	-2%	0%	0%	-1%	-1%	0%	-1%	-4%	-2%	4%	-1%
C	2%	-3%	0%	0%	-2%	3%	0%	0%	-11%	-7%	-6%	2%	-1%
All	-2%	-1%	-2%	-3%	-6%	-9%	-2%	-2%	-1%	-2%	-1%	-2%	-3%

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

Under the Reservoir Restriction Alternative, Delta outflows generally increase, especially during wet and above normal year types due to decreased storage capacity in San Luis Reservoir. During wet and above normal water year types, exports would decrease in months when the restricted San Luis Reservoir has filled to capacity and surplus flows in the Delta cannot be diverted for storage, resulting in an increase in Delta outflows as high as 284 cubic feet per second (cfs) annually in wet water year types. On the contrary, during critical year types Delta outflow would decrease slightly by less than one percent, or 4 cfs, as increases in Delta exports would occur to support contactor deliveries and offset the reduced storage capacity at San Luis Reservoir. Tables 4-7 and 4-8 summarize the change in Delta outflow as a result of this alternative.

Table 4-7. Difference in Delta Outflow between the No Action/No Project Conditions and Reservoir Restriction Alternative (1,000 AF)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total[1]
W	10	8	20	37	84	112	7	7	4	-5	0	1	284
AN	-2	4	26	38	43	50	0	0	0	-5	0	1	155
BN	1	0	2	13	22	17	12	-1	0	-2	0	-11	53
D	2	0	18	-1	3	1	0	0	0	0	-4	2	21
C	4	0	-1	0	2	-9	1	0	1	0	-3	0	-4
All	4	3	14	19	38	45	4	2	2	-3	-1	-1	126

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Notes: [1]Totals may not sum due to rounding.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

Table 4-8. Difference in Delta Outflow between the No Action/No Project Conditions and Reservoir Restriction Alternative (% change)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
W	2%	1%	1%	1%	2%	2%	0%	0%	0%	-1%	0%	0%	1%
AN	-1%	1%	2%	1%	1%	2%	0%	0%	0%	-1%	0%	0%	1%
BN	0%	0%	0%	1%	1%	1%	1%	0%	0%	0%	0%	-5%	1%
D	1%	0%	3%	0%	0%	0%	0%	0%	0%	0%	-2%	1%	0%
C	1%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	-1%	0%	0%
All	1%	0%	1%	1%	1%	2%	0%	0%	0%	-1%	-1%	0%	1%

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

While there would be changes to Delta exports and outflows, changes in Delta water quality would not be impacted, as noted in Table 4-4. Additionally, the source of supply to south-of-Delta CVP and SWP contractors would be of the same quality they receive under the No Action/No Project Alternative; **therefore, there would be no impact.**

4.2.4.3 San Luis Reservoir Region

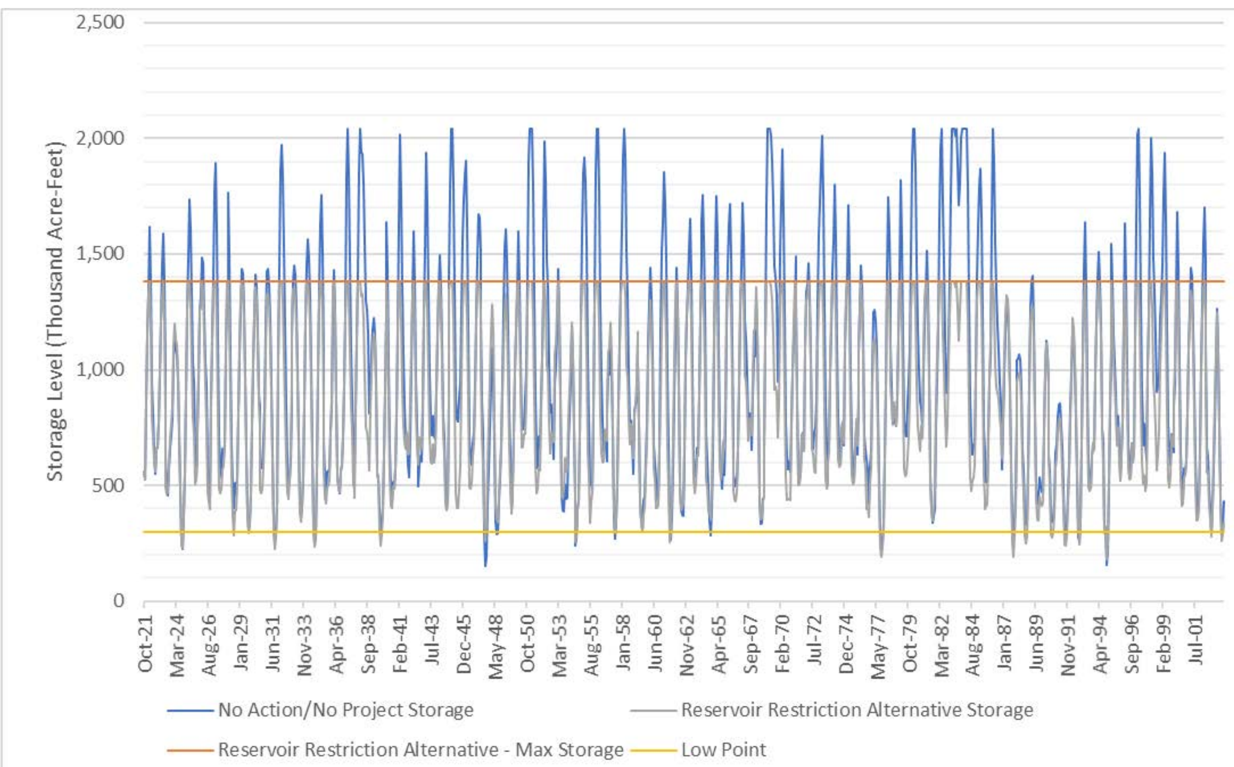
Construction activities could generate water quality impacts which could violate water quality standards. Construction activities under the Reservoir Restriction Alternative would involve installation of a temporary access road and vegetation placement around the entire reservoir rim between the current maximum water surface elevation 544-feet and the proposed 55-foot restriction elevation of 489-feet. During the hydroseeding process, exposure of bare soils, soil and the presence of fuels, lubricants, and solid waste could cause short-term water quality impacts to the reservoir if not managed properly. Construction activities would likely require permits under Sections 402 and 401 of the CWA. Preparation of a Stormwater Pollution Prevention Plan (SWPPP) would be required by the CVRWQCB under the Construction General Permit. Additionally, the CVRWQCB and would require Best Management Practices (BMPs), monitoring and other construction controls to protect water quality.

No short-term or long-term violations of water quality standards or waste discharge requirements and no substantial degradation of water quality are expected as a result of Reservoir Restriction Alternative. **The impact on water quality due to construction under the Reservoir Restriction Alternative would be less than significant.**

Operation of the Reservoir Restriction Alternative and decreases in reservoir storage levels could cause violations of water quality standards. Under the Reservoir Restriction Alternative, the maximum storage capacity of the San Luis Reservoir would be permanently reduced from 2,027,840 AF to 1,383,000 AF. Based on CalSim II modeling results, the Reservoir Restriction Alternative would lead to decreases in storage of an average of up to 20 percent during the summer months.

Figure 4-8 shows the modeled monthly storage under the Reservoir Restriction Alternative compared to storage in San Luis Reservoir under the No Action/No Project Alternative. Storage under the No Action/No Project Alternative is highly variable throughout the year as the reservoir refills in the fall and winter months and releases water in spring and summer to meet CVP and SWP demands. Under the Reservoir Restriction Alternative these same seasonal fluctuations would occur. When compared to the No Action/No Project Alternative, there would be decrease in total storage under the Reservoir Restriction Alternative.

The San Luis Reservoir is currently listed under a Total Maximum Daily Loads (TMDL) for mercury impairment. In reservoirs with mercury contamination, changing the drawdown regime is sometimes identified as a concern because increased wetting and drying cycles of the bottom sediments could promote methylation of mercury (increasing the mobility and bioavailability of mercury). However as indicated in Figure 4-8, the drawdown and refill cycle in the area of active storage under the Reservoir Restriction Alternative would be similar to the No Action/No Project Alternative. The area of the reservoir no longer utilized would not be subject to drawdown and refill and would no longer contribute to mercury mobilization.



Notes: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.

Figure 4-8. Modeled Monthly Storage in San Luis Reservoir

At lower reservoir storage levels, wind and the warming effects of the sun have a larger influence on water temperatures in San Luis Reservoir. As was noted above, under existing conditions these increased water temperatures promote algae growth in the reservoir and result in reduced DO levels, increased cyanobacteria levels and associated taste and odor issues. With permanently reduced storage levels in San Luis Reservoir, water temperatures in the reservoir in the summer would on average be higher and impact reservoir water quality. In addition, reduced storage capacity in San Luis Reservoir would limit its existing use in summer months for blending with Delta exports. These existing blending activities can help to improve the overall quality of CVP and SWP deliveries when Delta water quality is low. While the Reservoir Restriction Alternative would result in algae growth, negatively impacting the quality of water in the reservoir, the same algae growth occurs under the No Action/No Project Alternative. **This would be a less than significant water quality impact for water stored in and delivered from San Luis Reservoir.**

4.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

4.2.5.1. Delta Division

The Crest Raise Alternative could change Delta salinity and bromide concentrations resulting in water quality impacts. As noted in Section 4.2.4.1, under existing conditions, water quality in the Delta and the south-of-Delta CVP and SWP is closely related to changes in hydrodynamics. Construction of the Crest Raise Alternative would be scheduled for completion during times in the water year that San Luis Reservoir is typically drawn down to lower levels to avoid any changes to south-of-Delta CVP and SWP operations. However, implementation of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, during the period that the berm foundation would be excavated. This reduction in surface elevation would reduce storage capacity in the reservoir and would limit CVP and SWP operations during this construction period. This would result in a temporary impact similar to the Reservoir Restriction Alternative, as discussed in Section 4.2.4.1 and X2 results would be similar to those in Table 4-4. Under the Crest Raise Alternative there would be limited changes in the position of the X2. **Therefore, there would be no impact.**

4.2.5.2 South-of-Delta CVP and SWP Facilities

The Crest Raise Alternative could impact south-of-Delta CVP and SWP exports and Delta outflow. As previously mentioned in 4.2.5.1, implementation of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, which would reduce storage capacity in the reservoir and would impact south-of-Delta CVP and SWP exports and Delta outflow during this construction period. This would result in a temporary impact similar to the Reservoir Restriction Alternative, as discussed in Section 4.2.4.2. Changes to south-of-Delta exports would be similar to those in Tables 4-5 and 4-6 and changes to Delta outflow would be similar to those in Tables 4-7 and 4-8.

While there would be changes to Delta exports and outflows, changes in Delta water quality would not be impacted, as noted in Table 4-4. Additionally, the source of supply to south-of-Delta CVP and SWP contractors would be of the same quality they receive under the No Action/No Project Alternative; therefore, **there would be no impact.**

4.2.5.3 San Luis Reservoir Region

Construction activities could generate water quality impacts which could violate water quality standards. Construction activities under the Crest Raise Alternative would involve the placement of additional fill material on the dam embankment to raise the dam crest, installation of two traffic signals, and potential use of a conveyor belt system. During construction, exposure of bare soils, soil and material stockpiles, and the presence of fuels, lubricants, and solid and liquid wastes could cause short-term water quality impacts to the reservoir if not managed properly. Construction activities would likely require permits under Sections 402 and 401 of the CWA. Preparation of a SWPPP would be required by the CVRWQCB under the Construction General Permit. Additionally, the CVRWQCB and would require BMPs, monitoring and other construction controls to protect water quality.

As described in Chapter 2, Project Description, construction of the Crest Raise Alternative would be scheduled for completion during times in the water year that San Luis Reservoir is typically drawn down to lower levels to avoid any adverse impact on storage capacity and water quality. However, implementation of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, during the period that the berm foundation would be excavated. This reduction in surface elevation would reduce storage capacity and would impact water quality. At lower reservoir storage levels, wind and the warming effects of the sun have a larger influence on water temperatures in San Luis Reservoir. As was noted above, under existing conditions these increased water temperatures promote algae growth in the reservoir and result in reduced DO levels, increased cyanobacteria levels and associated taste and odor issues. This impact would be similar to the water quality violations under the Reservoir Restriction, as discussed in Section 4.2.4.3. **Therefore, the water quality impact under the Crest Raise Alternative would be less than significant.**

Operation of the Crest Raise Alternative could cause violations of water quality standards. The Crest Raise Alternative would raise the dam crest an additional 12 feet to a new crest elevation of 566 feet. The additional embankment height would maintain the current water surface elevation level of 544 feet and would not change operations of the San Luis Reservoir. **Therefore, operating the Crest Raise Alternative would have no impact on water quality standards.**

4.3 Comparative Analysis of Alternatives

Table 4-9 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 4-9 are National Environmental Policy Act (NEPA) impacts as well as California Environmental Quality Act (CEQA) impacts, but they are judged for significance only under CEQA.

Table 4-9. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Substantially degrade existing water quality conditions.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Change south-of-Delta CVP and SWP exports and Delta outflow.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Temporary violation of existing water quality standards or waste discharge requirements as a result of construction activities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Violation of existing water quality standards or waste discharge requirements as a result of operations.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	NI	None	NI

Key: B = beneficial; LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

4.4 Mitigation Measures

Significant water quality impacts have been identified for the Reservoir Restriction Alternative; however, no feasible mitigation measures have been identified to reduce these impacts.

4.5 Significant Unavoidable Impacts

None of the action alternatives would result in significant unavoidable impacts on water quality.

Chapter 5
Surface Water Supply

This chapter describes existing surface water supplies, associated surface water infrastructure and facilities, and the management of surface water within the area of analysis. This chapter also discusses the potential changes in water supply and management that would occur from the implementation of the proposed B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) Environmental Impact Statement/Environmental Impact Report (EIS/EIR) alternatives. Groundwater supply effects are analyzed in Chapter 6, Groundwater Resources, and flood control effects are analyzed in Chapter 9, Flood Protection.

5.1 Affected Environment/Environmental Setting

This section provides an overview of the regulatory setting associated with surface water supply and describes water supplies with the potential to be affected by the action alternatives.

5.1.1 Area of Analysis

The area of analysis for Surface Water Supply (see Figure 5-1) includes:

- San Luis Reservoir, Merced County;
- Sacramento-San Joaquin River Delta (Delta);
- California Aqueduct;
- Delta-Mendota Canal; and
- South-of-Delta Central Valley Project (CVP), State Water Project (SWP) Contractors' service areas.

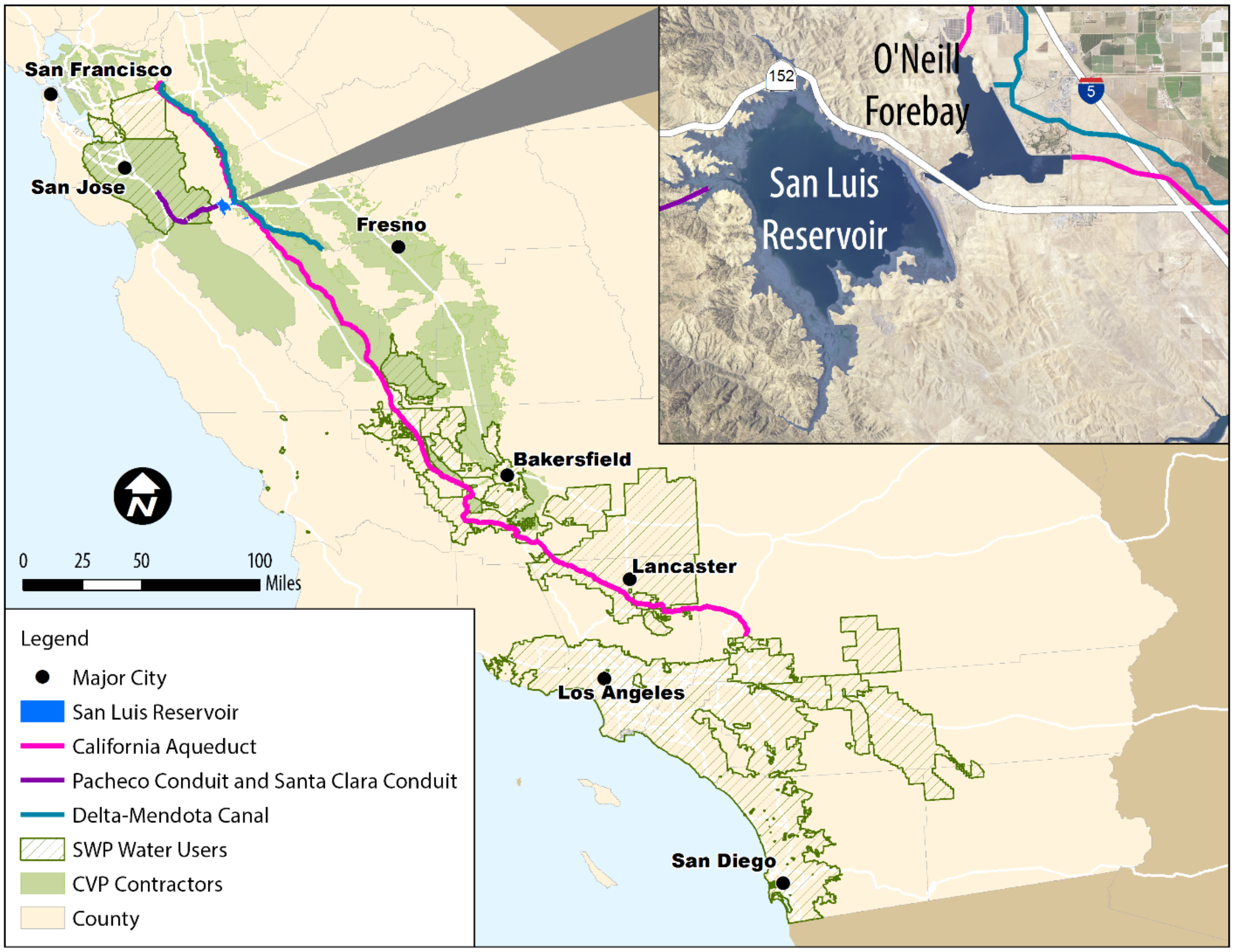


Figure 5-1. Area of Analysis for Surface Water Supply

5.1.2 Regulatory Setting

The following section describes the applicable surface water supply laws, rules, regulations and policies.

5.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Central Valley Project Improvement Act
- Federal Endangered Species Act
- San Luis Act (Public Law 86-488)

5.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Water Code
- 20x2020 Water Conservation Plan

5.1.2.3 Regional/Local

Regional and local plans and policies pertaining to water supply in counties where the action alternatives will be implemented are primarily contained in general plan documents as goals for conservation, provision of adequate supplies to water users, and support for the development of new water supply resources. These plans and policies do not contain limits or restrictions that would impact implementation of the action alternatives evaluated in this EIS/EIR.

5.1.3 Existing Conditions

The Federal and State governments constructed the CVP and SWP in pursuit of the State Water Plan to maximize use of the State's water supplies and provide flood control. The Federal CVP currently has 253 water service contracts (including Sacramento River Settlement Contracts) (United States Fish and Wildlife Service [USFWS] 2008). The SWP currently has contracts to deliver supplies to 29 water suppliers across the State. These water contracts are subject to reductions, depending on the amount of water available each year. Water forecasting starts in the fall of the previous year when storage and hydrologic conditions are assessed. Annual water allocation for both the CVP and SWP are generally announced early in the calendar year for the following growing season and updated monthly.

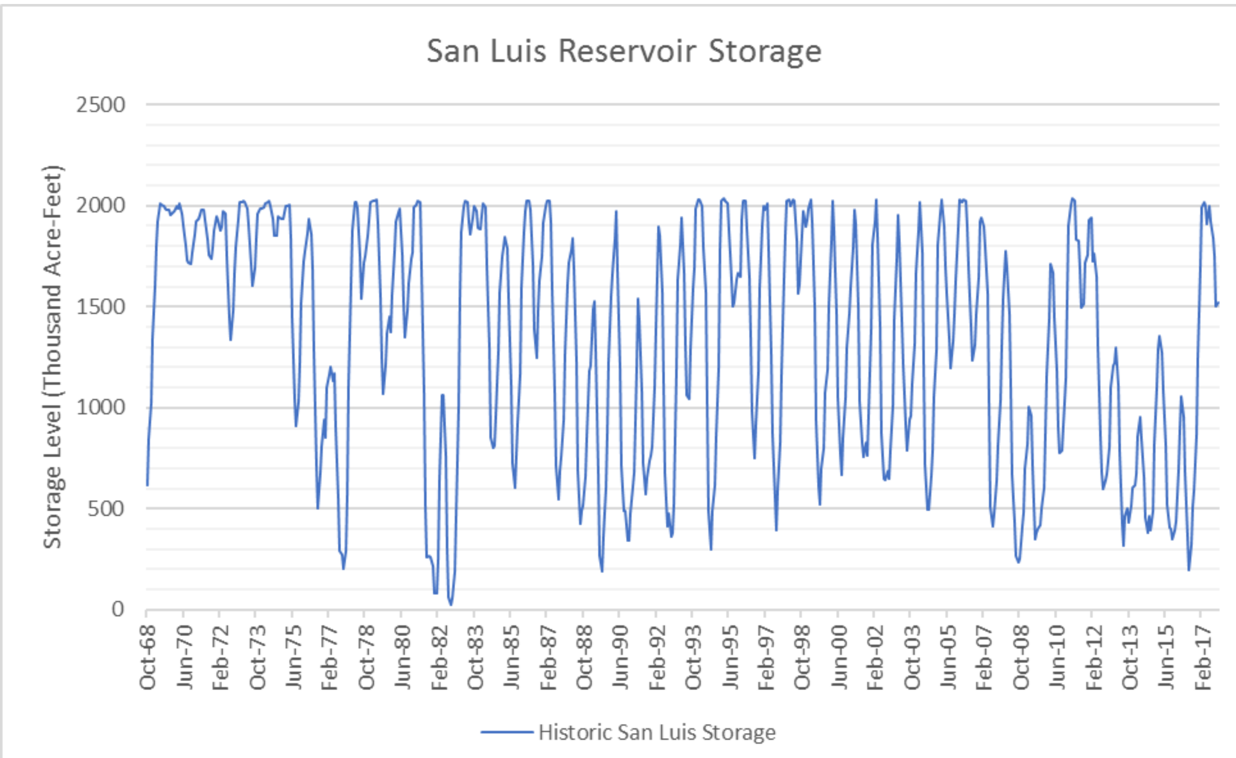
This water supply section includes San Luis Reservoir, CVP facilities including the Delta-Mendota Canal and the San Felipe Division, and SWP facilities including the California Aqueduct.

5.1.3.1 San Luis Reservoir

San Luis Reservoir is an off-stream storage reservoir in Merced County. The United States Department of the Interior, Bureau of Reclamation (Reclamation) owns and jointly operates San Luis Reservoir with the California Department of Water Resources (DWR) to provide seasonal storage for the CVP and the SWP. San Luis Reservoir is capable of receiving water from both the Delta-Mendota Canal and the California Aqueduct, which enables Reclamation and DWR to pump water into the reservoir during the wet season (October through March) and release water into the conveyance facilities during the dry season (April through September) when demands are higher. Deliveries from San Luis Reservoir also flow west through Pacheco Pumping Plant and Conduit to the San Felipe Division of the CVP. The CVP contractors that receive water from San Luis Reservoir include the San Felipe Division and the Central Valley

Region CVP Contractors. This section describes the annual reservoir operations, water storage and releases, and water supply facilities associated with San Luis Reservoir.

Figure 5-2 shows monthly storage in San Luis Reservoir from 1968 through early 2016. Storage is highly variable throughout the year as the reservoir refills in the fall and winter months and releases water in spring and summer to meet CVP and SWP demands. As Figure 5-2 shows, San Luis Reservoir was drawn down in 1981 and 1982 to a storage level of 79 thousand acre-feet (TAF) to facilitate repairs. During the drought periods of 1976–1977, 1988–1992, 2007-2008, and the summer of 2016 the reservoir was drawn down to below 300 TAF.



Source: DWR California Data Exchange Center (CDEC) 2017

Figure 5-2. Monthly Storage in San Luis Reservoir from 1968 to 2017

Table 5-1 presents average monthly storage in San Luis Reservoir from 1970 through 2017. February, March, and April typically have the highest average storage as this is just after spring snowmelt from Northern California has been pumped through the Delta into the California Aqueduct and Delta-Mendota Canal and on to San Luis Reservoir. On average, storage in the reservoir is generally lowest in July, August, and September as water is being released to meet demands.

Table 5-1. Average Monthly Storage in San Luis Reservoir (1970 through 2017)

Month	Storage (acre-feet)
January	1,555,006
February	1,688,833
March	1,793,207
April	1,763,656
May	1,557,341
June	1,248,891
July	971,491
August	847,753
September	936,329
October	1,018,163
November	1,161,686
December	1,332,465

Source: DWR CDEC 2017

During summer months, releases from San Luis Reservoir into O'Neill Forebay are made via the Gianelli Intake and the Gianelli Pumping-Generating Plant turbines, which generate electricity. The water flows east into the San Luis Canal, and occasionally, water is also released from O'Neill Forebay back into the Delta-Mendota Canal, where electricity is also generated.

5.1.3.2 Central Valley Project

The CVP reaches approximately 400 miles, from the Cascade Mountains near Redding in the north to the Tehachapi Mountains near Bakersfield in the south. It consists of 20 dams and reservoirs, 11 power plants, and 500 miles of major canals, as well as conduits, tunnels, and related facilities. The CVP manages approximately 9 million acre-feet (MAF) of water, delivering about 7 MAF of water annually for agricultural, urban, and wildlife use.

The Sacramento River carries water to the Delta. The C.W. "Bill" Jones (Jones) Pumping Plant at the southern end of the Delta lifts the water into the Delta-Mendota Canal. This canal delivers water to CVP contractors and exchange contractors on the San Joaquin River and to water rights contractors on the Mendota Pool. The CVP water is also conveyed to the San Luis Reservoir for deliveries to CVP contractors through the San Luis Canal. Water from the San Luis Reservoir is also conveyed through the Pacheco Tunnel to CVP contractors in Santa Clara and San Benito counties (Reclamation 2017a).

5.1.3.2.1 South-of-Delta CVP Contractors

South-of-Delta CVP contractors are located south of the Sacramento and San Joaquin River's Delta and consist of the Delta-Mendota Canal Unit, Mendota Pool Unit, Cross Valley Canal Unit, San Felipe Division, and San Luis Unit. This area extends from the City of Tracy in San Joaquin County in the north to Kettleman City in Kings County in the south and contains 38 public agencies in the Central Valley Region that contract with Reclamation for CVP water.

Table 5-2 shows the maximum contract quantities for South-of-Delta CVP contractors.

The South-of-Delta CVP contractors hold contracts for approximately 3.0 MAF of CVP water annually. Approximately 2.5 MAF of the water is used for agriculture while about 250 TAF is used for municipal and industrial (M&I) purposes, and about 300 TAF is used for environmental purposes including wildlife habitat management in the San Joaquin Valley (Reclamation 2016a).

Table 5-2. South-of-Delta CVP Contractors

South-of-Delta CVP Contractor	Maximum Contract Quantity (Acre-feet)
Delta-Mendota Canal Unit	
Banta-Carbona ID	20,000
Byron-Bethany ID	20,600
City of Tracy	20,000
Del Puerto WD	140,210
Eagle Field WD	4,550
Mercy Springs WD	2,842
Oro Loma WD	600
Pajaro Valley Water Management Agency	6,260
Patterson WD	22,500
U.S. Department of Veterans Affairs	850
West Side ID	5,000
West Stanislaus ID	50,000
San Luis Unit	
City of Avenal	3,500
City of Coalinga	10,000
Pacheco WD	10,080
Panoche WD	10,080
San Luis WD	125,080
State of California	2,260
Westlands WD	1,150,000
Exchange Contractors	
Central California ID	840,000
Columbia Canal Company	Included above
Firebaugh Canal WD	Included above
San Luis Canal Company	Included above
San Felipe Division	
San Benito County WD	43,800
Santa Clara Valley WD	152,500

South-of-Delta CVP Contractor	Maximum Contract Quantity (Acre-feet)
Mendota Pool Unit	
Coelho Family Trust	2,080
Fresno Slough WD	4,000
James ID	33,300
Laguna WD	800
Reclamation District 1606	228
Tranquillity ID	13,800
Tranquillity Public Utility District	70

Source: Reclamation 2016a

Key: ID = irrigation district; MUD = municipal utility district; WD = water district; WSD = water storage district

In recent years, Reclamation has made significant cutbacks to water deliveries for many CVP contractors due to the drought, among other factors, as shown in Table 5-3. The CVP has only delivered 100 percent of the contracted water to CVP South-of-Delta agricultural and M&I contractors three times since 1990 and SWP has only delivered 100 percent of the contracted amount twice since 1990. In 2015, south-of-delta CVP M&I allocations were 25% of the contract total, which increased to 55% of the contract total in 2016 (Reclamation 2017b). Most CVP South-of-Delta agricultural water service contractors received an initial allocation of 65% of contracted supplies, and South-of Delta M&I contractors initially received a 90% allocation for 2017. However, these allocations were later revised to 100% in April 2017 (Reclamation 2017b).

Table 5-3. Water Allocations for South-of-Delta CVP Contractors, 2012-2017 (Percent of Maximum Contract Allocation)

	2012	2013	2014	2015	2016	2017
Agricultural	40%	20%	0%	0%	5%	100%
M&I	75%	70%	50%	25%	55%	100%
Exchange Contractors	100%	100%	65%	75%	100%	100%
Refuges	100%	100%	65%	75%	100%	100%
Eastside Division	100%	100%	55%	0%	0%	100%
Friant Class I	50%	62%	0%	0%	65%	100%
Friant Class II	0%	0%	0%	0%	0%	100%

Source: Reclamation 2017b

Exchange Contractors

Through an Exchange Contract, Reclamation provides a substitute water supply to the Exchange Contractors (Central California ID, Columbia Canal Company, San Luis Canal Company, and the Firebaugh Canal Water District [WD]), in exchange for the use of waters of the San Joaquin River within the Friant Division. The four Exchange Contractor entities each have separate conveyance and delivery systems operated independently, although their combined water supply is managed as one unit for performance under the Exchange Contract. The Exchange Contractors, along with eight additional water right contractors, have conveyance and delivery systems that generally divert water from the

Delta-Mendota Canal or Mendota Pool, convey water to customer delivery turnouts, and at times discharge to tributaries of the San Joaquin River.

Because of water rights secured before construction of the CVP, San Joaquin Valley Exchange Contractors have a higher level of reliability for their supplies and receive 100 percent of their contract amounts (840 TAF); except in extremely dry years, when the Shasta Hydrologic Index water year type is classified as critical. In Shasta Hydrologic Index critical years, Exchange Contractors receive 75 percent of their contract amounts (not to exceed 650 TAF). The Exchange Contractors have historically been capable of diverting the full amount of the Exchange Contract. When water is available at the Mendota Pool from the San Joaquin River or Kings River (occurrences typically associated with wet conditions), the water is used to offset the need to provide the Exchange Contractors with water from the Delta-Mendota Canal. If the CVP cannot meet the exchange contracts, the Exchange Contractors can call upon water storage and diversion at Friant Dam.

Exchange Contractors provide water deliveries to over 240,000 acres of irrigable land on the west side of the San Joaquin Valley, from roughly the town of Mendota in the south, to the town of Crows Landing in the north. Deliveries include conveying water to the San Luis Wildlife Refuge Complex and the State Water Management Agencies (WMAs).

5.1.3.2.2 C.W. “Bill” Jones Pumping Plant

The CVP Jones Pumping Plant, located about five miles north of Tracy, has a permitted diversion capacity of 4,600 cubic feet per second (cfs) and sits at the end of a 2.5-mile long earth-lined intake channel that extends to Old River (Reclamation 2015). Water diverted at the Jones Pumping Plant is discharged to the CVP Delta-Mendota Canal, which extends 117 miles to the Mendota Pool. Water from Jones Pumping Plant may be pumped from the Delta-Mendota Canal into O’Neill Forebay and then pumped into San Luis Reservoir by the Gianelli Pumping-Generating Plant (Reclamation 2015).

5.1.3.2.3 O’Neill Forebay and San Luis Reservoir

The O’Neill Pumping-Generating Plant consists of six pump-generating units, with a capacity of 700 cfs each. The O’Neill Forebay is a joint CVP/SWP facility with a storage capacity of about 56 TAF. In addition to its interactions with the Delta-Mendota Canal via the O’Neill Pumping-Generating Plant, it is a part of the SWP California Aqueduct. The O’Neill Forebay serves as a regulatory body for San Luis Reservoir; the William R. Gianelli Pumping-Generating Plant, also a joint CVP/SWP facility, can pump flows from the O’Neill Forebay into San Luis Reservoir and also make releases from San Luis Reservoir to the O’Neill Forebay for diversion to either the Delta-Mendota Canal or the California Aqueduct. In addition, several water districts receive diversions directly from the O’Neill Forebay. The William R. Gianelli Pumping-Generating Plant consists of eight units, with 1,375 cfs of pumping capacity and 1,640 cfs of generating capacity each, for a total pumping capacity of 11,000 cfs and a generating capacity of 13,120 cfs.

San Luis Reservoir, impounded by the B.F. Sisk Dam, provides offstream storage for excess winter and spring flows diverted from the Delta. It is sized to provide seasonal carryover storage, with a total capacity of 2,027,840 acre-feet (AF). The CVP share of the storage is 965,660 AF; the remaining 1,062,180 AF of storage are the SWP share. During spring and summer, water demands and schedules are greater than the capability of Gianelli Pumping-Generating Plant to pump water from the Jones and Banks pumping plants; water stored in San Luis Reservoir is used to make up the difference. The CVP share of San Luis Reservoir typically is at its lowest in July, August, and September and at its maximum in April. The San Felipe Division of the CVP supplies water to customers in Santa Clara and San Benito counties from San Luis Reservoir (Reclamation 2008).

5.1.3.3.4 Delta-Mendota Canal

The Jones Pumping Plant diverts water from the Delta to the head of the Delta-Mendota Canal, which extends approximately 65 miles south to the O’Neill Forebay, parallel to the California Aqueduct for most of its journey. South of the O’Neill Forebay, the Delta-Mendota Canal terminates in the Mendota Pool, about 30 miles west of Fresno. From the Delta-Mendota Canal, the CVP makes diversions to multiple water users and refuges. Delta-Mendota Canal capacity at the origin is 4,600 cfs and at the terminus is 3,211 cfs (Reclamation 2015; Reclamation 2008).

5.1.3.3 State Water Project

The SWP operates under long-term contracts with public water agencies throughout California. These agencies, in turn, deliver water to wholesalers or retailers, or deliver it directly to agricultural and M&I water users (DWR 2015). The SWP contracts between DWR and individual State water contractors define several classifications of water available for delivery under specific circumstances (DWR 2016a).

5.1.3.4.1 South-of-Delta SWP Contractors

The SWP delivers water to 24 south-of-Delta public water agencies that hold long-term contracts for surface water deliveries. The maximum contract amounts, known as “Table A” amounts, for south-of-Delta agencies with SWP contracts are shown in Table 5-4. The agencies deliver water for both urban and agricultural use, representing over 25 million municipal water users and 750,000 acres of irrigated farmland. Within the SWP, most Table A contractors receive the same allocation each year and there are no differences between agricultural and M&I contractors.

Table 5-4. South-of-Delta SWP Contractors

Contractor	Maximum Table A Delivery Amounts (acre-feet)
South Bay Area Contractors	
Alameda County Flood Control and Water Conservation District, Zone 7	80,619
Alameda County WD	42,000
Santa Clara Valley WD	100,000
San Joaquin Valley Area Contractors	
Dudley Ridge WD	50,343
Empire West Side ID	2,000
Kern County Water Agency	982,730
Kings County	9,305
Oak Flat WD	5,700
Tulare Lake Basin WSD	88,922
Central Coastal Area Contractors	
San Luis Obispo County Flood Control and Water Conservation District	25,000
Santa Barbara County Flood Control and Water Conservation District	45,486
Southern California Area Contractors	
Antelope Valley–East Kern Water Agency	141,400
Castaic Lake Water Agency	95,200
Coachella Valley WD	138,350
Crestline–Lake Arrowhead Water Agency	5,800
Desert Water Agency	55,750
Littlerock Creek ID	2,300
Metropolitan Water District of Southern California	1,911,500
Mojave Water Agency	82,800
Palmdale WD	21,300
San Bernardino Valley Municipal WD	102,600
San Gabriel Valley Municipal WD	28,800
San Gorgonio Pass Water Agency	17,300
Ventura County Watershed Protection District	20,000

Source: DWR 2015

Key: ID = irrigation district; MUD = municipal utility district; WD = water district; WSD = water storage district

Water supplies for the agencies include imported SWP water, groundwater, local surface water, and for some agencies other imported supplies. The agencies collectively have received deliveries ranging from approximately 1.4 MAF in dry water years to approximately 4.0 MAF in wet years. Historical deliveries of SWP Table A water are shown in Table 5-5.

Similar to CVP south-of-Delta deliveries, SWP exports from the Delta and the corresponding south-of-Delta deliveries have decreased over time. Implementation of the 2008 and 2009 USFWS and National Marine Fisheries Service Biological Opinions for the Long-Term Operations of the SWP and CVP resulted in substantial changes in south-of-Delta SWP deliveries. In the period between 2005 and 2015, average annual SWP exports have fallen by 29 percent (DWR 2017).

Table 5-5. Historical Deliveries of SWP Table A Water, 2005-2015

Year	Table A Annual Deliveries (TAF)
2005	2,827
2006	2,973
2007	2,181
2008	1,244
2009	1,385
2010	2,011
2011	2,848
2012	2,594
2013	1,623
2014	476
2015	852

Source: DWR 2017

5.1.3.4.2 Harvey O. Banks Pumping Plant and Clifton Court Forebay

The nominal capacity of the Banks Pumping Plant is 10,300 cfs. Permits issued by the United States Army Corps of Engineers regulate the rate of diversion of water into the Clifton Court Forebay. This diversion rate is normally restricted to no more than 6,680 cfs as a three-day average inflow to Clifton Court Forebay and 6,993 cfs as a one-day average inflow to Clifton Court Forebay. Clifton Court Forebay diversions may be greater than these rates between December 15 and March 15 when the inflow into Clifton Court Forebay may be augmented by one-third of the San Joaquin River flow at Vernalis when those flows are equal to or greater than 1,000 cfs (Reclamation 2015).

The Clifton Court Forebay is a 31,000 AF reservoir that provides storage for off-peak pumping and moderates the effect of the pumps on the fluctuation of flow and stage in adjacent Delta channels (Reclamation 2015).

5.1.3.4.3 O'Neill Forebay and San Luis Reservoir

O'Neill Forebay and San Luis Reservoir are joint CVP/SWP facilities and are discussed in Section 5.1.3.2.3. The SWP share of San Luis Reservoir's storage is 1,062,180 AF; the remaining 965,660 AF are the CVP share.

5.1.3.4.4 California Aqueduct

South of Banks Pumping Plant, the California Aqueduct flows into Bethany Reservoir, a 5,000 AF forebay for the South Bay Pumping Plant. Exiting Bethany Forebay, the California Aqueduct flows through a series of checks to the O'Neill Forebay and is either pumped into San Luis Reservoir or released to San Luis Canal, the CVP/SWP joint-use portion of the California Aqueduct. Deliveries are made from the California Aqueduct to agricultural and M&I contractors.

Parallel to the Delta-Mendota Canal, the San Luis Canal-California Aqueduct is a joint-use facility for the CVP and SWP. It begins on the southeast edge of O'Neill Forebay and extends about 101.5 miles southeasterly to a point near Kettleman City. Water from the canal serves the San Luis Federal service area, mostly for agricultural purposes and for some M&I uses. The canal has a capacity ranging from 8,350 cfs to 13,100 cfs.

The California Aqueduct continues south as a SWP facility from Kettleman City. When the aqueduct reaches the A.D. Edmonston Pumping Plant, fourteen pumps lift the water almost 2,000 feet over the Tehachapi Mountains, where it is split into two aqueducts that serve Southern California. Water from the West Branch Aqueduct is stored in Pyramid Lake and Castaic Lake for distribution to Los Angeles and surrounding cities. The East Branch Aqueduct passes through Palmdale and Lancaster, and stores water in Silverwood Lake and Lake Perris for distribution to inland cities such as San Bernardino and Riverside (DWR 2016b).

5.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts associated with each alternative.

5.2.1 Assessment Methods

This section describes the assessment methods used to analyze potential water supply effects of the alternatives, including the No Action/No Project Alternative.

This chapter estimates the potential effects of the action alternatives using results from the CalSim II model. See Appendix B, Modeling Technical Report, for a description of the assumptions and methods used in this model. Although CalSim II is the best available planning tool describing SWP and CVP operations, there is still uncertainty surrounding CalSim II hydrologic, operational, and policy assumptions. The effects analysis in this chapter relies on the modeling results and therefore also contains a degree of uncertainty. Appendix B, Modeling Technical Report, describes the CalSim II model limitations.

CalSim II provides output for each year during the period of record. This data was compiled to show results by water year type (wet, above normal, below normal, dry, and critical), and then averaged over the period of record. For the most part, the average values (rather than data by year type) were used in this effects analysis.

5.2.2 Significance Criteria

The significance criteria described below were developed with guidance from California Environmental Quality Act (CEQA) Guidelines to determine the significance of potential impacts on water supply that could result from implementation of the project. Impacts on water supply would be considered potentially significant if the alternative would:

- Reduce the annual supply of water available to the CVP, SWP, or other water users.

The significance criteria described above apply to all water supplies that could be affected by the project.

5.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

5.2.3.1 South-of-Delta CVP and SWP Contractors

The No Action/No Project Alternative could change CVP and SWP deliveries to south-of-Delta CVP and SWP contractors and change storage in San Luis Reservoir. Under the No Action/No Project Alternative, CVP and SWP deliveries from San Luis Reservoir would continue as under existing conditions. Future changes in regulations and environmental protection in the Delta could modify Delta diversions and affect CVP and SWP supplies; however, the types of changes that could occur are unclear and incorporating these changes into the No Action/No Project Alternative would be speculative. There would be no change to reduce the risk of dam failure and the associated risk to continued water supply deliveries from the reservoir. In the event of dam failure, water would no longer be stored in the reservoir and CVP and SWP deliveries would be reduced given the resulting reduction in south-of-Delta storage. **This would be a significant impact.** The proposed modifications to B.F. Sisk Dam and San Luis Reservoir considered as a part of the B.F. Sisk Dam SOD Project would mitigate this impact, however as a part of the No Action/No Project Alternative they cannot be considered. In addition, no other currently available water supply resources available to south of Delta CVP and SWP water users could fully offset this lost supply and the No Action/No Project Alternative would not develop new facilities. **Therefore, this impact is significant and unavoidable.**

5.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

5.2.4.1 South-of-Delta CVP Contractors

Construction of the Reservoir Restriction Alternative could result in temporary interruptions in CVP water supply. Under the Reservoir Restriction Alternative, vegetation would be placed around the reservoir rim. The construction under the Reservoir Restriction Alternative would not result in any interruptions to water supply deliveries. **There would be no impact.**

The Reservoir Restriction Alternative could change CVP deliveries to south-of-Delta contractors and change storage in San Luis Reservoir. South-of-Delta CVP deliveries are expected to decrease under the 55-foot Reservoir Restriction Alternative due to the reduced storage capacity of the San Luis Reservoir. Tables 5-6 and 5-7 summarize the change in delivery of south-of-Delta CVP agricultural water under this option. Tables 5-8 and 5-9 summarize the change in delivery of south-of-Delta CVP M&I water under this option. Tables 5-10 and 5-11 summarize the total change in delivery of south-of-Delta CVP water under this option.

Table 5-6. Difference in Total South-of-Delta CVP Agricultural Deliveries between the No Action/No Project Conditions and the 55-foot Reservoir Restriction Alternative (1,000 acre-feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total[1]
W	-7.7	-5.7	-7.9	7.7	21.6	2.4	-18.2	-29.6	-47.8	-59.4	-42.8	-13.6	-274.9
AN	-4.6	-3.4	-0.8	-4.6	16.2	15.0	-17.9	-27.0	-43.6	-54.2	-39.0	-12.4	-232.9
BN	-7.3	-5.4	-5.1	9.0	6.5	14.3	-13.3	-20.4	-32.9	-40.9	-29.4	-9.3	-202.3
D	-4.6	-3.4	-4.8	7.8	21.1	13.2	-8.2	-13.4	-21.6	-26.8	-19.3	-6.1	-129.2
C	-4.0	-3.0	-4.2	-1.8	4.4	8.4	-1.9	-2.8	-4.5	-5.6	-4.0	-1.3	-47.5
All	-6.0	-4.4	-5.2	4.7	15.6	9.5	-12.8	-20.2	-32.6	-40.5	-29.1	-9.3	-191.1

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Notes: [1]Totals may not sum due to rounding.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

Table 5-7. Difference in Total South-of-Delta CVP Agricultural Deliveries between the No Action/No Project Conditions and the 55-foot Reservoir Restriction Alternative (% change)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
W	-22%	-22%	-22%	12%	28%	3%	-19%	-20%	-20%	-20%	-20%	-20%	-20%
AN	-20%	-20%	-3%	-9%	27%	29%	-25%	-25%	-25%	-25%	-25%	-25%	-24%
BN	-24%	-24%	-16%	15%	9%	34%	-24%	-24%	-24%	-24%	-24%	-24%	-24%
D	-19%	-19%	-19%	18%	42%	60%	-22%	-24%	-24%	-24%	-24%	-24%	-22%
C	-25%	-25%	-25%	-6%	13%	181%	-31%	-34%	-34%	-34%	-34%	-34%	-28%
All	-22%	-22%	-18%	9%	25%	22%	-21%	-23%	-23%	-23%	-23%	-23%	-22%

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

Table 5-8. Difference in Total South-of-Delta CVP Municipal and Industrial Deliveries between the No Action/No Project Conditions and the 55-foot Reservoir Restriction Alternative (1,000 acre-feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total[1]
W	-0.6	-0.4	-0.7	1.5	1.2	1.1	-0.9	-0.9	-0.9	-1.1	-1.2	-1.3	-9.9
AN	-0.4	-1.1	0.4	-0.1	0.8	2.8	-0.7	-0.6	-0.6	-0.7	-0.8	-2.6	-9.6
BN	-0.4	0.7	-0.1	1.6	0.6	3.0	-0.3	-0.3	-0.3	-0.3	0.3	-0.4	-2.9
D	-1.0	-0.9	-0.6	1.1	1.0	2.4	-0.4	-0.4	-0.4	-0.5	-0.5	-0.9	-6.4
C	-0.7	-1.7	-0.6	0.1	0.3	1.4	-0.2	-0.2	-0.2	-0.2	-0.2	-1.8	-6.4
All	-0.7	-0.6	-0.4	1.0	0.8	2.0	-0.5	-0.5	-0.5	-0.6	-0.6	-1.3	-7.4

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Notes: [1]Totals may not sum due to rounding.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

Table 5-9. Difference in Total South-of-Delta CVP Municipal and Industrial Deliveries between the No Action/No Project Conditions and the 55-foot Reservoir Restriction Alternative (% change)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
W	-7%	-3%	-6%	18%	29%	8%	-8%	-9%	-9%	-9%	-9%	-9%	-7%
AN	-6%	-13%	3%	-1%	21%	22%	-7%	-6%	-6%	-6%	-8%	-20%	-8%
BN	-6%	7%	-1%	19%	15%	25%	-3%	-3%	-3%	-3%	3%	-3%	-3%
D	-12%	-9%	-5%	15%	28%	23%	-4%	-5%	-5%	-5%	-5%	-8%	-6%
C	-11%	-18%	-6%	2%	10%	17%	-3%	-3%	-3%	-3%	-3%	-30%	-8%
All	-8%	-6%	-4%	13%	23%	17%	-6%	-6%	-6%	-6%	-5%	-11%	-7%

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

Table 5-10. Difference in Total CVP South-of-Delta Deliveries between the No Action/No Project Conditions and the 55-foot Reservoir Restriction Alternative (1,000 acre-feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total[1]
W	-8.3	-6.1	-8.5	14.4	35.6	15.6	-18.7	-30.5	-48.7	-60.5	-44.0	-14.9	-284.7
AN	-5.1	-4.5	1.8	-3.8	25.7	38.7	-18.6	-27.6	-44.2	-54.9	-39.8	-15.0	-242.5
BN	-7.8	-4.7	-3.7	15.9	14.5	36.5	-13.6	-20.6	-33.2	-41.2	-29.2	-9.7	-205.2
D	-5.5	-4.3	-5.4	12.7	32.5	30.6	-8.6	-13.8	-21.9	-27.3	-19.8	-7.1	-135.5
C	-4.7	-4.7	-4.8	-0.3	9.0	18.0	-2.0	-2.9	-4.7	-5.8	-4.2	-3.1	-53.9
All	-6.6	-5.0	-5.0	9.5	26.0	26.2	-13.2	-20.7	-33.1	-41.1	-29.7	-10.6	-198.4

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Notes: [1]Totals may not sum due to rounding.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

Table 5-11. Difference in Total CVP South-of-Delta Deliveries between the No Action/No Project Conditions and the 55-foot Reservoir Restriction Alternative (% change)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
W	-5%	-6%	-10%	15%	29%	9%	-9%	-10%	-11%	-12%	-11%	-6%	-10%
AN	-3%	-5%	3%	-4%	25%	25%	-10%	-11%	-12%	-13%	-11%	-7%	-10%
BN	-5%	-5%	-5%	17%	12%	26%	-9%	-9%	-10%	-11%	-9%	-5%	-9%
D	-3%	-5%	-8%	17%	35%	26%	-6%	-7%	-8%	-9%	-7%	-4%	-7%
C	-3%	-6%	-8%	-1%	12%	21%	-2%	-2%	-3%	-3%	-2%	-2%	-4%
All	-4%	-5%	-7%	11%	24%	19%	-8%	-9%	-10%	-11%	-9%	-5%	-9%

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

CVP south-of-Delta deliveries would increase in some months (January, February, and March) due to increased availability of water that can be diverted from the Delta but cannot be stored in San Luis Reservoir given its reduced capacity. In these months, there are CVP contractors with the capacity to receive delivery of this surplus supply. However, under the Reservoir Restriction Alternative, overall changes to average annual water supply deliveries to south-of-Delta CVP contractors would be reduced in all water years, relative to No Action/No Project Conditions. **This would be a significant water supply impact for south-of-Delta CVP water contractors in the long-term.** The reduction in water supply deliveries would not be able to be replaced reliably from other sources, such as groundwater pumping, water transfers, or new surface storage. Groundwater banking was evaluated and rejected as infeasible in the Accountability Report for the B.F. Sisk Dam Value Planning Study as a potential alternative to the Crest Raise Alternative, given the lack of availability of capacity in existing groundwater banks to replace this lost storage, along with those banks recovery rates that limit the return of back groundwater to between 50% and 80% of the stored supply (Reclamation 2016b). Additionally, the development of new groundwater banking capacity was rejected in that study given the time it would take to develop a new site large enough to offset the lost storage capacity in San Luis Reservoir including the necessary geologic/environmental investigations, real estate procurement, delivery infrastructure development, and well development (Reclamation 2016b). The potential use of surface water transfers to offset this lost storage capacity would also be infeasible given their dependence on the availability of willing sellers and available conveyance capacity at the time the water supply they would be replacing is needed, in perpetuity. While transfers could potentially offset some of this lost supply, south of Delta CVP contractors are already using water transfers to meet unmet demand under existing conditions and it is unlikely that in the future, with these already existing unmet demands, that transfers could offset the lost supply generated by the Reservoir Restriction Alternative and meaningfully reduce this significant impact. Development of new surface water storage at a different location to offset the lost capacity at San Luis Reservoir would itself likely generate numerous significant environmental impacts and require extensive time to implement, similar to the groundwater bank development option, and has been determined to be infeasible.

Given the environmental and technological limits on other potential options to offset this impact no feasible mitigation (California Environmental Quality Act § 21061.1) has been identified to reduce these impacts to a less than significant level. **Therefore, the water supply impact for south-of-Delta CVP water contractors remains significant and unavoidable.**

5.2.4.2 South-of-Delta SWP Contractors

Construction of the Reservoir Restriction Alternative could result in temporary interruptions in SWP water supply. Under the Reservoir Restriction Alternative, vegetation would be placed around the reservoir rim. The construction under the Reservoir Restriction Alternative would not result in any interruptions to water supply deliveries. **There would be no impact.**

The Reservoir Restriction Alternative could affect deliveries to south-of-Delta SWP contractors and change storage in San Luis Reservoir. South-of-Delta SWP deliveries are expected to decrease under the 55-foot Reservoir Restriction Alternative due to the reduced storage capacity of the San Luis Reservoir. Tables 5-12 and 5-13 summarize the change in delivery of south-of-Delta SWP water under this option.

Table 5-12. Difference in Total SWP Table A Deliveries between the No Action/No Project Conditions and the 55-foot Reservoir Restriction Alternative (1,000 acre-feet)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total[1]
W	-24.9	-28.2	-27.7	2.5	-1.3	-10.4	-35.3	-35.9	-35.9	-30.5	-27.5	-24.1	-279.3
AN	-19.8	-14.8	-21.7	-1.0	-1.8	3.4	-23.9	-20.0	-13.4	-6.1	-4.0	-4.6	-127.6
BN	-18.9	-20.2	-19.1	5.1	2.9	1.8	-22.0	-20.0	-9.1	5.2	4.4	3.7	-86.0
D	-12.9	-13.0	-13.4	0.0	-0.1	-2.6	-23.0	-16.3	-17.2	-16.4	-22.8	-18.8	-156.3
C	-8.0	-6.8	-6.0	0.0	0.0	-0.3	0.3	-3.6	-5.3	-6.6	-5.5	-4.3	-46.1
All	-18.0	-18.4	-19.0	1.5	-0.2	-3.1	-23.4	-21.8	-19.5	-14.2	-14.3	-12.5	-163.0

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Notes: [1]Totals may not sum due to rounding.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

Table 5-13. Difference in Total SWP Table A Deliveries between the No Action/No Project Conditions and the 55-foot Reservoir Restriction Alternative (% change)

Sac Yr Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
W	-9%	-11%	-12%	4%	-2%	-7%	-17%	-12%	-10%	-8%	-7%	-7%	-9%
AN	-8%	-7%	-11%	-5%	-4%	3%	-14%	-8%	-4%	-2%	-1%	-1%	-5%
BN	-7%	-9%	-9%	27%	13%	4%	-15%	-9%	-3%	1%	1%	1%	-3%
D	-6%	-7%	-7%	1%	-1%	-14%	-26%	-10%	-7%	-5%	-7%	-7%	-8%
C	-4%	-4%	-4%	1%	0%	-2%	1%	-4%	-4%	-4%	-3%	-3%	-4%
All	-7%	-9%	-9%	5%	-1%	-4%	-17%	-10%	-7%	-4%	-4%	-4%	-7%

Source: Data results from CalSim modeling presented in Appendix B, Modeling Technical Report.
Key: AN – Above Normal; BN – Below Normal; C – Critical; D – Dry; Sac Yr Type – Sacramento River Water Year Type; W – Wet

Under the Reservoir Restriction Alternative, changes to average water supply deliveries to south-of-Delta SWP contractors would be reduced in all water years, relative to No Action/No Project Conditions. **This would be a significant water supply impact for south-of-Delta SWP water contractors in the long-term.** Similar to the impact identified above for south-of-Delta CVP water contractors, the reduction in water supply deliveries to SWP water contractors would not be able to be replaced reliably from other sources, such as groundwater pumping, water transfers, or new surface water storage, and no feasible mitigation has been identified to reduce these impacts to a less than significant level. **Therefore, the water supply impact for south-of-Delta SWP water contractors remains significant and unavoidable.**

5.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

5.2.5.1 South-of-Delta CVP and SWP Contractors

Construction of the Crest Raise Alternative could result in temporary interruptions in CVP and SWP water supply. As described in Chapter 2, Project Description, construction of the Crest Raise Alternative would be scheduled for completion during times in the water year that San Luis Reservoir is typically drawn down to lower levels to avoid any adverse impact on storage capacity and water supply. However, implementation of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, during the period that the berm foundation would be excavated. This reduction in surface elevation would reduce storage capacity in the reservoir and would limit CVP and SWP deliveries during this construction period. This impact would be similar to the reduction in water supply under the Reservoir Restriction, as discussed in Sections 5.2.4.1 and 5.2.4.2. **The Crest Raise Alternative without the shear key option would have no impact on south-of-Delta CVP and SWP water contractors, however with the shear key option the alternative would have a short-term significant impact for these contractors.** With the shear key option, the temporary reduction in water supply deliveries would not be able to be replaced reliably from other sources, such as groundwater pumping or water transfers, or new surface storage. As was noted above under the Reservoir Restriction Alternative, Reclamation evaluated the potential use of groundwater banking as an option to replace the lost storage in San Luis Reservoir and determined that given the availability of capacity in existing groundwater banks, the time necessary and complexity of developing a new groundwater bank with the capacity to reduce this impact to a less than significant level, that this option would not be feasible. Similarly, the use of water transfers to mitigate this impact was evaluated and was determined to be unable to meaningfully offset this impact given uncertainty with the availability of willing sellers of sufficient amounts of water and the availability of conveyance capacity to transfer those supplies at the time they are needed. The development of new surface storage at a different location to offset the lost capacity at San Luis Reservoir was also evaluated under the Reservoir Restriction Alternative and was determined to be infeasible given the potential for numerous significant environmental effects potentially generated by that action and the time necessary to develop this new storage facility. Given the environmental and technological limits and the time necessary to implement other potential options to offset this impact during the two water years that the Shear Key Option would restrict reservoir operations no feasible mitigation (California Environmental Quality Act § 21061.1) has been identified to reduce these impacts to a less than significant level. **Therefore, the water supply impact for south-of-Delta CVP and SWP water contractors under the Crest Raise Alternative with the shear key option remains significant and unavoidable.**

The Crest Raise Alternative could change CVP and SWP deliveries to south-of-Delta contractors and change storage in San Luis Reservoir. The Crest Raise Alternative would raise the dam crest an additional 12 feet to a new crest elevation of 566 feet. The additional embankment height would maintain the current water surface elevation level of 544 feet and would not add or subtract any additional storage capacity. The Crest Raise Alternative would not change CVP or SWP operations and would not change storage in San Luis Reservoir. **Therefore, operating the Crest Raise Alternative would have no impact on water supply for south-of-Delta CVP and SWP water contractors in the long-term.**

5.3 Comparative Analysis of Alternatives

Table 5-14 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 5-14 are National Environmental Policy Act (NEPA) impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 5-14. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction could result in temporary interruptions in CVP water supply.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	None	SU
Construction could result in temporary interruptions in SWP water supply.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	None	SU
Change deliveries to south-of-Delta CVP contractors.	Alternative 1- No Action/No Project	S	None	SU
	Alternative 2 - Reservoir Restriction	S	None	SU
	Alternative 3 - Crest Raise	NI	None	NI
Change deliveries to south-of-Delta SWP contractors.	Alternative 1 - No Action/No Project	S	None	SU
	Alternative 2 - Reservoir Restriction	S	None	SU
	Alternative 3 - Crest Raise	NI	None	NI

Key: NI = no impact; S = significant; SU = significant and unavoidable; None = no feasible mitigation identified and/or required;
-- = not required per CEQA Guidelines

5.4 Mitigation Measures

Significant water supply impacts have been identified for the No Action/No Project Alternative, Reservoir Restriction Alternative and Crest Raise Alternative; however, no feasible mitigation measures have been identified to reduce these impacts.

5.5 Significant Unavoidable Impacts

The No Action/No Project Alternative, Alternative 2, the Reservoir Restriction Alternative, and Alternative 3, the Crest Raise Alternative, would have significant and unavoidable impacts on water supply. Under the No Action/No Project Alternative, in the event of dam failure, water would no longer be stored in the reservoir and CVP and SWP deliveries would be reduced. The operation of the Reservoir Restriction Alternative would reduce long-term water storage in the San Luis Reservoir, resulting in a decrease of water supply deliveries to CVP and SWP contractors. The construction of the shear key option under the Crest Raise Alternative would temporarily reduce storage in the San Luis Reservoir for two seasons, resulting in a short-term decrease in water supply deliveries to CVP and SWP contractors. The operational impacts associated with the Reservoir Restriction Alternative and the construction impacts associated with the Crest Raise Alternative would also contribute to and result in significant cumulative water supply impacts, as analyzed in Chapter 27, Cumulative Effects. No feasible mitigation measures were identified that could reduce these impacts to a less than significant level.

Chapter 6
Groundwater Resources

This section presents the existing conditions of groundwater resources within the area of analysis and potential impacts to groundwater resources from implementation of proposed alternatives.

6.1 Affected Environment/Environmental Setting

This section presents the area of analysis (Section 6.1.1), describes the regulatory setting pertaining to groundwater resources in the area of analysis (Section 6.1.2), and describes the existing hydrologic and groundwater characteristics in the area of analysis (Sections 6.1.3).

6.1.1 Area of Analysis

The area of analysis for the groundwater resources section includes San Luis Reservoir and the South-of-Delta Central Valley Project (CVP) and State Water Project (SWP) Contractors Service areas as shown in Figure 6-1. The area of analysis includes the following groundwater basins categorized by the hydrologic regions as defined by the California Department of Water Resources (DWR):

- San Joaquin Valley/Tulare Lake Hydrologic Region: San Joaquin Valley Groundwater Basin
- San Francisco Bay Hydrologic Region: Santa Clara Valley Groundwater Basin; and Gilroy-Hollister Valley Groundwater Basin
- South Lohantan Hydrologic Region: Fremont Valley Groundwater Basin; and Antelope Valley Groundwater Basin
- Colorado River Hydrologic Region: Ames Valley Groundwater Basin; Copper Mountain Valley Groundwater Basin; Warren Valley Groundwater Basin; and Coachella Valley Groundwater Basin
- South Coast Hydrologic Region: Northwest Metropolitan Area Groundwater Basins; San Fernando Valley Groundwater Basin; San Gabriel Valley Groundwater Basin; Coastal Plain of Los Angeles; Coastal Plains of Orange County; and Upper Santa Ana Valley Groundwater Basin

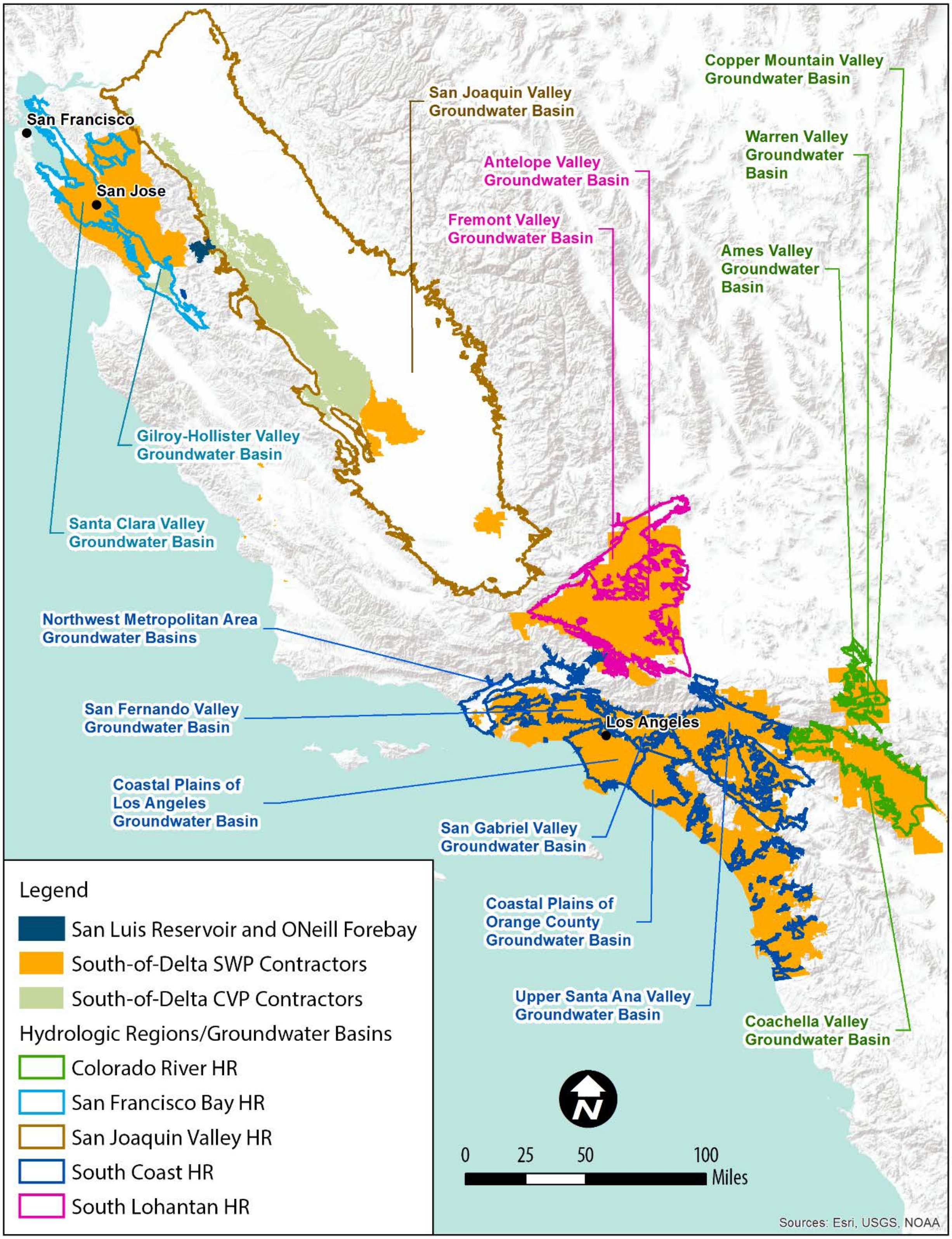


Figure 6-1. Groundwater Resources Area of Analysis

There is no mapped groundwater basin underlying the San Luis Reservoir (DWR 2016a) but the San Joaquin Valley Groundwater Basin (Delta-Mendota sub basin) underlies O'Neill Forebay.

6.1.2 Regulatory Setting

The following section describes the applicable groundwater laws, rules, regulations and policies.

6.1.2.1 State Regulation

Groundwater use is subject to statewide regulation; additionally, all water use in California is subject to constitutional provisions that prohibit waste and unreasonable use of water. The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Water Code
  - Section §10750 or (Assembly Bill [AB] 3030)
  - Section §10753.7 or (Senate Bill [SB] 1938)
  - Section 10920-10936 and 12924 or (SB X7 6)
  - Section 10722.2 or (Basin Boundary Emergency Regulation)
  - Section 10722.4 and 10730 or (AB 939)
  - Section 10540, 10721, 10727.4, 10727.8, 10733.4, 10726.5 and 10732.2 or (AB 617)
  - Sustainable Groundwater Management Act (SGMA)
    - Section 10927, 10933, 12924, 10750.1 and 10720 or (SB 1168)
    - Section 10729, 10730, 10732, 10733 and 10735 or (AB 1739)
    - Section 10735.2 and 10735.8 or (SB 1319)

6.1.2.2 Local Regulation

Local groundwater management plans and county ordinances vary by authority/agency and region, but typically involve provisions to limit or prevent groundwater overdraft, regulate transfers, and protect groundwater quality.

6.1.3 Existing Conditions

6.1.3.1 San Joaquin Valley Hydrologic Region

6.1.3.1.1 San Joaquin Valley Groundwater Basin

The San Joaquin Valley Groundwater Basin extends over the southern two-thirds of the Central Valley regional aquifer system and has an area of approximately 13,500 square miles. The San Joaquin Valley Groundwater Basin extends from just north of Stockton in San Joaquin County to Kern County in the south. DWR's Bulletin 118 subdivides the groundwater basin into sixteen subbasin. As shown in Figure 6-1, the area of analysis for this project extends over the western side of the groundwater basin. Therefore, the discussion in this section focuses on conditions along the western subbasin i.e. Tracy, Delta-Mendota and Westside subbasins.

The aquifer system in most of the San Joaquin Valley Groundwater Basin including the western portions is mostly comprised of unconsolidated alluvial and lacustrine sediments, derived from parent materials of the Coast Ranges and the Sierra Nevada Mountains. The Valley fill reaches a thickness of about 28,000 feet in the southwestern corner (Page 1986). A significant hydrogeologic feature in the basin is the Corcoran Clay. This clay layer divides the aquifer system into two distinct zones, an upper unconfined to semi-confined aquifer and a lower confined aquifer.

Irrigated agriculture in the northern portion of the San Joaquin Valley Groundwater Basin increased from about one million acres in the 1920s to more than 2.2 million acres by the early 1980s (United States Department of the Interior, Bureau of Reclamation [Reclamation] 1997). The western portion of the San Joaquin Groundwater Basins i.e. the Delta-Mendota Subbasin in the United States Geological Survey's (USGS) Central Valley Hydrologic Model (CVHM), show average groundwater pumping to be 60,000 acre-feet (AF) per year from 1962 through 2003 (Faunt 2009). According to CVHM, the cumulative change in groundwater storage for the entire San Joaquin Valley Groundwater Basin was relatively constant from 1962 through 2003, storage dropped during dry periods and increased during wetter years. However according to C2VSim, storage within the San Joaquin Valley has been showing a steady decline since the 1940s. Annual average groundwater production in the basin was estimated to be 900,000 AF in the CVHM model (Faunt 2009).

Land Subsidence. From the 1920s until the mid-1960s, the use of groundwater for irrigation of crops in the San Joaquin Valley increased rapidly, causing land subsidence throughout the west and southern portions of the valley. DWR has prioritized the western portion of the San Joaquin Valley (Tracy, Delta-Mendota and Westside subbasins) as having a high potential for subsidence (DWR 2016a). A continuous Global Position (CGPS) station near Los Banos has recoded over 0.28 feet of subsidence since 2005 (DWR 2016b).

USGS, in coordination with Reclamation, recently studied subsidence along the western portion of the San Joaquin Valley particularly along the Delta-Mendota Canal (DMC). The study shows subsidence along the northern portion of the DMC has been minimal. The southern portion of the DMC (south of the town of El Nido) has measured approximately 10 feet of subsidence from 1927 to 2001 (USGS 2013). Between 2011 to 2018, the southern portion of the DMC measured between 0.3 to 0.15 feet per year of subsidence (Reclamation 2018).

Groundwater Quality. Groundwater quality varies throughout the San Joaquin Valley Groundwater Basin. Groundwater quality in the western portion of basin (Delta Mendota subbasin) is characterized by mixed sulfates, bicarbonates and chlorides in the water. There are also localized areas of high iron, fluoride, nitrate, and boron in the subbasin (DWR 2003).

6.1.3.2 San Francisco Bay Hydrologic Region

6.1.3.2.1 Santa Clara Valley Groundwater Basin

The Santa Clara Valley Groundwater Basin has been divided into four subbasin by DWR. The Santa Clara subbasin is part of the Santa Clara Valley Groundwater Basin and occupies a structural trough parallel to the northwest trending Coast Ranges. The Santa Clara subbasin is a regional groundwater basin that can be divided into two onshore subregions: the confined zone in the northern portion of the subbasin is overlain by a clay layer of low permeability and the southern portion of the subbasin is generally unconfined and contains no thick clay layers (Santa Clara Valley Water District [SCVWD] 2001). SCVWD manages the groundwater basin with active recharge facilities and limits on annual groundwater withdrawal. The operational storage capacity of the Santa Clara Valley subbasin is estimated to be 383,000 AF (SCVWD 2001 and SCVWD 2002 as cited in SCVWD 2012). The operational storage capacity is less than the total storage capacity of the basin and accounts for available pumping capacity and the avoidance of land subsidence and problems associated with high groundwater levels.

Land Subsidence. Historically, Santa Clara County has experienced as much as 13 feet of subsidence caused by excessive pumping of groundwater. Land subsidence since 1980's has primarily been elastic with most of the compaction occurring in the upper aquifer (upper 250 feet of sediments) and trending over seasonal and climatic cycles (Hanson 2015). SCVWD manages its groundwater use to avoid subsidence and has established subsidence thresholds equal to the current acceptable rate of 0.01 feet per year (SCVWD 2012). DWR has categorized Santa Clara valley subbasin as having a low potential for future land subsidence (DWR 2014a).

Groundwater Quality. DWR has prioritized the Santa Clara Valley subbasin as medium priority based on groundwater quality concerns in some wells across the basin (DWR 2014a). Though groundwater in the Santa Clara Valley is typically considered “hard”, the groundwater is suitable for most uses and meets drinking water standards at public supply wells without the use of treatment methods (SCVWD 2001).

6.1.3.2.2 Gilroy-Hollister Valley Groundwater Basin

The Gilroy-Hollister Valley Groundwater Basin has been divided into four subbasin by DWR. The Llagas subbasin is part of the Gilroy-Hollister Groundwater Basin and occupies a northwest trending structural depression. SCVWD manages the Llagas subbasin. Annual average groundwater pumping in Llagas is 20,000 AF and has remained fairly constant over the years. The operational storage capacity of the Llagas subbasin is estimated to be between 150,000 and 165,000 AF (SCVWD 2012).

Land Subsidence. Most of the subsidence within Santa Clara County has occurred in the Santa Clara Valley subbasin. SCVWD manages its groundwater use to avoid subsidence and has established subsidence thresholds equal to the current acceptable rate of 0.01 feet per year (SCVWD 2012). DWR has categorized Llagas subbasin as having a low potential for future land subsidence (DWR 2014a).

Groundwater Quality. DWR has prioritized the Llagas Area subbasin as high priority based on groundwater quality concerns over a significant number of wells across the subbasin (DWR 2014a). Similar to Santa Clara Valley subbasin, groundwater is hard in Llagas subbasin but the water is suitable for most uses and meets drinking water standards at public supply wells without the use of treatment methods. Nitrate is a concern in Lllagas subbasin and appears to be increasing over time and elevated concentrations of nitrate still exist in the Llagas subbasin. SCVWD created a Nitrate Management Program in October 1991 to investigate and remediate increasing nitrate concentrations in the Llagas subbasin (SCVWD 2001).

6.1.3.3 South Lohantan Hydrologic Region

6.1.3.3.1 Fremont Valley Groundwater Basin

Fremont Valley Groundwater Basin underlies Antelope Valley-East Kern Water Agency in eastern Kern County and northwestern San Bernardino County. Alluvium is primary water-bearing formation in this basin and is about 1,190 feet thick along the margin of the basin and thins towards the middle of the basin (DWR 2003). Total storage capacity of the basin is estimated to be approximately 4,800 thousand acre-feet (TAF) and average annual groundwater pumping was estimated to be 32 TAF between 1950s through the early 1960s (DWR 2003).

Land Subsidence. DWR has categorized the subbasin to have a medium to high potential for subsidence (DWR 2014b). CGPS station CalCity_CS2005 located in California City Airport in California City has recorded a little under 0.02 feet of subsidence since 2005 (DWR 2016b).

Groundwater Quality. DWR has prioritized the Fremont Valley Groundwater Basin as a low priority basin with some groundwater quality concerns. The basin has naturally high total dissolved solids (TDS) and other constituents like fluoride and sodium (DWR 2014a). Groundwater is sodium bicarbonate character in the southeastern part of the basin and sodium bicarbonate or calcium-sodium sulfate character in the southwest part of the basin (DWR 2003).

6.1.3.3.2 Antelope Valley Groundwater Basin

Antelope Valley Groundwater Basin also underlies Antelope Valley-East Kern Water Agency in the western Mojave Desert. Primary water-bearing formation in this basin are unconsolidated alluvial and lacustrine deposits. The basin is divided into three large structural basins separated by faults and folds along the San Andreas and Garlock fault zones. Groundwater flow in the basin is impeded by several other faults in addition to the San Andreas and Garlock faults. Groundwater storage capacity is estimated to be 70,000 TAF (DWR 2003). Groundwater pumping in the basin was estimated to be between 130 TAF to 150TAF between 1951 and 2005 (Antelope Valley 2013). DWR has prioritized the Antelope Valley Groundwater Basin as a high priority basin due to concerns over groundwater overuse and extraction in the basin exceeding natural recharge (DWR 2014a). The groundwater basin has been adjudicated since 2015.

Land Subsidence. DWR has categorized the subbasin as having a high potential for subsidence (DWR 2014a). CGPS station BarnardPro_CS2005 located in the northern end of the basin has recorded a little under 0.03 feet of subsidence since 2005 (DWR 2016b). Station LakeLosAnge SCIGN located in southern end of the basin has recorded a little over 0.01 feet of subsidence since 2000 (DWR 2016b).

Groundwater Quality. Groundwater quality in basin degrades towards the northern portion of the dry lake areas. Hardness, high fluoride, boron and nitrates are concern in the basin. DWR has prioritized the Antelope Valley Groundwater Basin as a high priority basin due to concerns over groundwater quality (DWR 2014a).

6.1.3.4 Colorado River Hydrologic Region

6.1.3.4.1 Ames Valley Groundwater Basin

The Ames Valley Groundwater Basin underlies Ames Valley, Homestead Valley, and Pipes Wash in the south-central San Bernardino County. The primary water-bearing formation in this basin consists of unconsolidated to partly consolidated continental deposits (DWR 2003). Several northwest trending faults within the basin form partial barriers to groundwater flow. Total storage capacity of the basin is estimated to be approximately 1.2 million acre-feet (MAF) (DWR 2003).

Land Subsidence. DWR has categorized the subbasin as having a low to medium potential for subsidence (DWR 2014b). CGPS station north of Yucca Valley in Landers has not recoded any subsidence since installation in 1999 (DWR 2016b).

Groundwater Quality. Groundwater in the basin is high on Total Dissolved Solids, fluoride, and chloride contents (DWR 2003). DWR has not identified any specific water quality concerns as part of the groundwater basin prioritization effort.

6.1.3.4.2 Copper Mountain Valley Groundwater Basin

The Copper Mountain Valley Groundwater Basin is approximately one mile north of the town of Joshua Tree and underlies an alluvial valley below and adjacent to Coyote Lake. The primary water-bearing formation in this basin consists of unconsolidated to partly consolidated continental deposits (DWR 2003). The Pinto Mountain fault zone along the southern end of the basin acts as a barrier to groundwater flow (DWR 2003).

Land Subsidence. DWR has categorized the subbasin as having a low potential for subsidence (DWR 2014b).

Groundwater Quality. Bulletin 118 (DWR 2003) had identified some failing septic tanks in the basin that could be causing some localized high TDS issues.

6.1.3.4.3 Warren Valley Groundwater Basin

The Warren Valley Basin is located south of the Copper Mountain Valley Groundwater Basin. The Warren Valley Groundwater Basin has been adjudicated since 1997 and is managed by Warren Valley Basin Watermaster. DWR has prioritized the groundwater basin as medium priority due to groundwater supply concerns (DWR 2014a). Groundwater storage in basin was estimated to be 106 TAF in 1958 using 150 feet saturated thickness and a 11 percent specific yield (DWR 2003). Groundwater pumping in the basin was estimated to 2.6 TAF annually in 1999 (DWR 2003).

Land Subsidence. DWR has categorized the subbasin as having a low potential for subsidence (DWR 2014b). CGPS station in Yucca Valley has not recorded subsidence at this location since its installation in 2000 (DWR 2016b).

Groundwater Quality. Some groundwater quality concerns exist in the basin including increased nitrate concentration, high fluoride concentrations and high levels of salts (DWR 2003). DWR has not identified any specific water quality concerns as part of the groundwater basin prioritization effort.

6.1.3.4.4 Coachella Valley Groundwater Basin

The Coachella Valley Groundwater Basin is located in the northwestern portion of the Salton Trough. The primary water-bearing formation in the basin is made of unconsolidated Pleistocene-Holocene valley fill. The basin includes the Indio, Mission Creek, Desert Hot Spring and San Gorgonio Pass subbasins as defined by Bulletin 118. Total storage capacity of the basin is estimated to be approximately 38.7 MAF (DWR 2003).

Land Subsidence. DWR has also prioritized the Indio subbasin as having a high potential for subsidence and Desert Hot Spring as having a low potential for subsidence (DWR 2014b). CGPS station located in Indio Hills has recorded less than 0.02 feet of subsidence in the basin since 2010 (DWR 2016b).

Groundwater Quality. Localized groundwater concerns in the Coachella Valley Groundwater Basin. High concentrations of total dissolved solids exist throughout the Desert Hot Spring subbasin. A high plume of nitrate also exists in the Indio subbasin. DWR has prioritized the Indio, San Gorgonio and Mission Creek subbasins as medium priority due to groundwater quality concerns (DWR 2014a).

6.1.3.5 South Coast Hydrologic Region

Metropolitan Water District (MWD) is the largest SWP contractors within the South Coast Hydrologic Region. All the groundwater basins discussed in this section are managed by Metropolitan Water District.

6.1.3.5.1 Northwest Metropolitan Area Groundwater Basins

The Northwest Metropolitan Area Groundwater Basins include Oxnard Plain, Oxnard Forebay, Pleasant Valley, Santa Rosa and West, East and South Las Posas subbasins as defined by Bulletin 118. All listed basins are typically east-west trending basins that drain into the Pacific Ocean to their west by the Santa Clara River, Calleguas Creek and Conejo Creek. Total storage capacity of the basins is estimated to be between 3 to 5 MAF (MWD 2007). Natural Safe Yield and Operation Safe Yields are estimated to be approximately 45 TAF and 100 TAF respectively (MWD 2007). Groundwater pumping between 1995 to 2005 was estimated to be 122 TAF per year.

Land Subsidence. DWR has prioritized the Oxnard Plain and Oxnard Forebay subbasins as having a medium to high potential for subsidence (DWR 2014b). All other subbasins have a medium to low priority for subsidence (DWR 2014b). There are five CGPS stations within the basin and they are all showing signs of subsidence. One station located in the coastal region recorded up to 0.13 feet of subsidence since 2000 (DWR 2016b).

Groundwater Quality. Water quality issues in the basin include seawater intrusion in the coastal aquifers (Oxnard Plain subbasins) and nitrate and sulfate concerns in the agricultural areas (Oxnard Plain and Oxnard Forebay subbasins). TDS concentrations throughout much of the basin exceed 1,000 milligrams per liter (mg/L) (higher than secondary maximum contamination limit of 500 mg/L).

6.1.3.5.2 San Fernando Valley Groundwater Basin

The San Fernando Valley Groundwater Basins is located within Los Angeles River Watershed in Los Angeles County. Total storage capacity of the groundwater basin is estimated to be approximately 3.2 MAF (MWD 2007). Natural Safe Yield and Operation Safe Yields are estimated to be approximately 43.6 TAF and 96.8 TAF respectively (MWD 2007). DWR has prioritized the groundwater basin as medium priority due to groundwater contamination issues in the basin (DWR 2014a). The basin has been adjudicated since 1979 (DWR 2014a).

Land Subsidence. DWR has prioritized the basin as having a low to medium potential for land subsidence (DWR 2014b). There are three CGPS station within the basin and they have all not recoded any subsidence since installation in 1999 (DWR 2016b).

Groundwater Quality. Bulletin 118 (DWR 2003) identified groundwater contamination of volatile organic compounds (VOCs) such as trichloroethylene, perchloroethylene, petroleum compounds, chloroform, nitrate, sulfate and heavy metals in the basin.

6.1.3.5.3 San Gabriel Valley Groundwater Basin

The San Gabriel Valley Groundwater Basin is located in eastern Los Angeles County. Total storage capacity of the groundwater basin is estimated to be approximately 8.6 MAF (MWD 2007). Natural Safe Yield is estimated to be approximately 152.7 TAF (MWD 2007). The basin has been adjudicated since 1971 (DWR 2014a).

Land Subsidence. DWR has also categorized the basin to have a high potential for subsidence due to subsidence concerns in the adjacent subbasins (DWR 2014b). Two of the three CGPS stations in the basin are showing subsiding trends with one measuring up to 0.03 feet of subsidence since 2000 (DWR 2016b).

Groundwater Quality. DWR has prioritized the groundwater basin as high priority due to the presence of superfund sites within the basin (DWR 2014a). The watermaster currently coordinates the Title 22 sampling of approximately 200 active wells in the basin. Water quality within the basin is good in most areas. Key constituents of concern in basin include TDS, nitrate, volatile organic compounds, perchlorate and N-Nitrosodimethylamine (NDMA) (MWD 2007).

6.1.3.5.4 Coastal Plains of Los Angeles Groundwater Basin

The Coastal Plain of Los Angeles Groundwater Basin lies within central Los Angeles County. The basin includes the Santa Monica, Hollywood, West Coast and Central subbasins as defined by Bulletin 118. Total storage capacity of the groundwater basin is estimated to be approximately 13.8 MAF (MWD 2007). Natural Safe Yield and Operation Safe Yields are estimated to be approximately 125.8 TAF and 217.3 TAF respectively (MWD 2007). DWR has prioritized the Santa Monica and West Coast basins as medium priority for groundwater contamination and overdraft concerns respectively. The central subbasin was prioritized as high priority due to overdraft concerns (DWR 2014a). The central and west coast basins are adjudicated basins since 1965 and 1961 respectively (DWR 2014a).

Land Subsidence. The coastal subbasin (Santa Monica, Hollywood and West Coast) all have a low potential for subsidence as identified by DWR (DWR 2014b). DWR has also categorized the Central subbasin to have a medium to high potential for subsidence (DWR 2014b). Two CGPS stations located within the Central subbasin have recorded up to 0.11 feet of subsidence since installation in 2000 (DWR 2016b).

Groundwater Quality. Groundwater in the main producing aquifers of the basins is generally good and sufficient for municipal, agricultural, domestic, and industrial uses. Localized areas of poor water quality exist in the subbasin, shallower and deeper aquifers in the coastal area are impacted by seawater intrusion. VOCs contamination exists in the Central subbasins and have impacted many production wells. Most of the wells that have the VOCs do not exceed drinking water quality standards (MWD 2007).

6.1.3.5.5 Coastal Plains of Orange County Groundwater Basin

The Coastal Plain of Orange County Groundwater Basin lies in north and central Orange County within the lower Santa Ana River watershed. Total storage capacity of the groundwater basin is estimated to be approximately 66 MAF (MWD 2007). Natural Safe Yield is estimated to be approximately 70.5 TAF (MWD 2007).

Land Subsidence. DWR has categorized the basin as having a high potential for subsidence due to measured subsidence at the adjacent Coastal Plains of Los Angeles Groundwater Basin (DWR 2014b).

Groundwater Quality. DWR has prioritized the groundwater basin as medium priority due to sea water intrusion concerns (DWR 2014a). The shallow aquifer has nitrate and VOC contamination issues. In many portions of the groundwater basin, water from the shallow aquifer is prevented from migration to the deep aquifer due to formation of aquitards. Colored groundwater concerns exist in the basin but are limited to the shallow aquifer near the coast (MWD 2007).

6.2 Environmental Consequences/Environmental Impacts

This section describes assessment methods and presents effects of the proposed alternatives on groundwater resources in the area of analysis. The proposed alternatives could alter the existing subsurface hydrology and thus result in a variety of effects to groundwater levels, land subsidence, or groundwater quality, which are further described below.

Groundwater Levels: Changes in groundwater levels could cause multiple secondary effects. Declining groundwater levels could result in: (1) increased groundwater pumping costs due to increased pumping depth; (2) decreased yield from groundwater wells due to reduction in the saturated thickness of the aquifer; (3) lowered groundwater table elevation to a level below the vegetative root zone in agricultural areas; or (4) substantially deplete groundwater supplies such that drainage patterns are altered eventually affecting stream base flow, which could result in environmental effects.

Land Subsidence: Excessive groundwater extraction from confined and unconfined aquifers could lower groundwater levels and decrease water pressure within the groundwater aquifer. The reduction in water pressure could result in a loss of structural support for clay and silt beds in the aquifer. The loss of structural support could cause the compression of clay and silt beds, which could lower the ground surface elevation (i.e., land subsidence). The compression of fine-grained deposits, such as clay and silt, is largely permanent. Infrastructure damage and alteration of drainage patterns are possible consequences of land subsidence.

Groundwater Quality: Changes in groundwater levels and the potential change in groundwater flow directions could cause a change in groundwater quality through a number of mechanisms. One mechanism is the potential mobilization of areas of poorer quality water, drawn down from shallow zones, or drawn up into previously unaffected areas. Changes in groundwater gradients and flow directions could also cause (or speed) the lateral migration of poorer quality water or saline water.

6.2.1 Assessment Methods

Potential impacts to groundwater resources would be generated by potential surface water delivery increases/reductions for CVP and SWP exports depending on each alternative. CVP and SWP exports were estimated using results from the CalSim II model (see Appendix B, Modeling Technical Report, for description of the assumptions and methods used in the CalSim II model). The CalSim II model provides the projected change in imported water supply under each Alternative. Potential changes to groundwater levels, land subsidence, and changes in groundwater quality were assessed qualitatively. For land subsidence, the expected increase in groundwater pumping and drawdown were compared to areas with existing subsidence to identify areas that may be susceptible to impacts. Groundwater quality impacts were assessed by considering areas of known quality concerns and determining whether groundwater drawdown could cause those areas to migrate.

6.2.2 Significance Criteria

An impact would be potentially significant if the proposed alternative would result in:

- Result in increases in groundwater use that generates a net reduction in groundwater levels that would result in adverse environmental effects.
- Degradation in groundwater quality such that it would exceed regulatory standards or would substantially impair reasonably anticipated beneficial uses of groundwater; or
- Result in increases in groundwater use that generates permanent/inelastic land subsidence caused by water level declines

such that it causes saltwater intrusion that degrades groundwater quality and flooding that damages buildings and infrastructure.

6.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

Under the No Action/No Project Alternative, there would be no construction associated with the B.F. Sisk Dam SOD Project and no changes to operations of the San Luis Reservoir. There would be no changes to water supply to CVP and SWP water contractors in the San Joaquin Valley Region, Bay Area Region or Southern California Regions. Therefore, the No Action/No Project Alternative would not introduce or increase groundwater extraction or recharge where they do not currently exist and as a result would have no effect on groundwater quality through the introduction of contaminated water or the inducement of new groundwater migration. There would be no change to reduce the risk of dam failure. In the event of dam failure, water would no longer be stored in the reservoir and CVP and SWP deliveries from the reservoir would be eliminated, potentially resulting in increased groundwater use. In the future, implementation of SGMA would prevent the use of groundwater that would result in overdraft or subsidence and any increase in groundwater use under the No Action/No Project Alternative would be groundwater that was previously recharged. **The No Action/No Project Alternative would result in no impact on groundwater.**

6.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

The Reservoir Restriction Alternative would reduce the maximum elevation of the San Luis Reservoir from 544 feet to 489 feet. This would permanently reduce the maximum capacity of the reservoir from 2,027,840 AF to 1,383,000 AF. This reduction in reservoir storage capacity would change water supply to south-of-Delta CVP and SWP water contractors. The Reservoir Restriction Alternative would also not involve any construction activities with the potential to decrease groundwater levels.

6.2.4.1 South-of-Delta CVP Contractors Service Area (San Joaquin Valley Basin)

Decreased water supply allocations to south-of-Delta CVP contractors could result in increased groundwater use that would cause changes to groundwater levels. The Reservoir Restriction Alternative would result in 11 to 15 percent reduction in deliveries to CVP agricultural contractors (between 20,200 to 201,100 AF/year deficit based on year type as summarized in Tables 5-6 and 5-7) in comparison to the No Action Alternative. CVP municipal and industrial (M&I) deliveries would reduce deliveries by one to five percent (between 1,100 to 4,200 AF/year deficit based on year type as summarized in Tables 5-8 and 5-9) in comparison to the No Action Alternative. Reduced water supply deliveries under this alternative could be made up through groundwater pumping. The agricultural economics modeling presented in Appendix H, shows that under the Reservoir Restriction Alternative there would be 95,300 AF/year on average increase in groundwater pumping in the San Joaquin Valley in normal (above and below normal) and dry year types in comparison to the No Action Alternative. In comparison, CalSim II modeling results show Section 215 water increasing by 95,000 AF/year and Article 21 water increasing by 174,000 AF/year on average in comparison to the No Action Alternative. Historic operations of Kern Water Bank suggest that the portion of this surplus Section 215 and Article 21 water delivered to the bank would be stored for use in subsequent periods in response water supply reductions. Given the implementation of SGMA and designation of the western portion of the San Joaquin Valley Groundwater Basin (Delta-Mendota and Westside subbasins) as high priority basins and the associated regulatory limits on future groundwater use in this basin to avoid overdraft, it is assumed that most if not all of the 95,300 AF/year increase in pumping would be extraction of previously recharged water provided by the increases in available surplus supplies. Therefore, the net increase in groundwater pumping under the Reservoir Restriction Alternative is expected to not cause any significant long-term changes to groundwater levels. **Therefore, the potential for the Reservoir Restriction Alternative to cause long-term changes to groundwater levels due to decreased allocation to south-of-Delta CVP contractors would be less than significant.**

Increased groundwater pumping in lieu of surface water could substantially alter groundwater levels and/or flow patterns. Substantial reductions in groundwater levels for a long period of time could induce the movement or migration of reduced quality groundwater into previously unaffected areas. Reduced water supply deliveries under this alternative could result in a substantial increase in groundwater pumping. However, as discussed previously implementation of SGMA would manage groundwater levels in the Delta-Mendota and Westside subbasins (San Joaquin Valley Groundwater Basin). **Therefore, potential for Reservoir Restriction Alternative to cause long-term changes to groundwater quality due to decreased allocation to south-of-Delta CVP contractors would be less than significant.**

Increased groundwater pumping in lieu of surface water could decrease groundwater levels, increasing the potential for subsidence. Reduced water supply deliveries under this alternative could result in a substantial increase in groundwater pumping. These potentially long-term increases in groundwater pumping could alter groundwater levels in the basin. As discussed previously implementation of SGMA would manage groundwater levels in the Delta-Mendota and Westside subbasins (San Joaquin Valley Groundwater Basin). There would be no reductions in groundwater levels greater than historic low groundwater levels under the Reservoir Restriction Alternative. **Therefore, the potential for Reservoir Restriction Alternative to increase subsidence due to decreased allocation to south-of-Delta CVP contractors would be less than significant.**

6.2.4.2 South-of-Delta SWP Contractors Service Area (Colorado River Hydrologic Region; San Francisco Bay Hydrologic Region; San Joaquin Valley Hydrologic Region; South Coast Hydrologic Region and South Lohantan Hydrologic Region)

Decreased water supply allocations to south-of-Delta SWP contractors could result in increased groundwater use that would cause changes to groundwater levels. Under this alternative, south-of-Delta SWP deliveries would be lower than under the no action alternative. The Reservoir Restriction Alternative would result in 3 to 9 percent reduction in SWP Table A deliveries to SWP contractors (between 46,100 to 279,300 AF/year deficit based on year type as summarized in Tables 5-12 and 5-13) in comparison to the No Action Alternative. The agricultural economics modeling presented in Appendix H shows that under the Reservoir Restriction Alternative there would be 95,300 AF/year on average increase in groundwater pumping in the San Joaquin Valley in normal (above and below normal) and dry year types in comparison to the No Action Alternative. In comparison, CalSim II modeling results show Section 215 water increasing by 95,000 AF/year and Article 21 water increasing by 174,000 AF/year on average under the Reservoir Restriction Alternative in comparison to the No Action Alternative. Historic operations of Kern Water Bank suggest that surplus Section 215 and Article 21 water would be stored in groundwater banks for use during water supply reductions. Most of the groundwater basins in the SWP service area have been categorized as medium or high priority basins by DWR. Given the implementation of SGMA and designation of the SWP Groundwater Basin as medium and high priority basins, it is assumed that most if not all of the 95,300 AF/year increase in pumping would be extraction of recharged water. Therefore, the net increase in groundwater pumping under the Reservoir Restriction Alternative is expected to not cause any significant long-term changes to groundwater levels. **The potential for the Reservoir Restriction Alternative to cause long-term changes to groundwater levels due to decreased allocation to south-of-Delta SWP contractors would be less than significant.**

Increased groundwater pumping in lieu of surface water could substantially alter groundwater levels and/or flow patterns. Substantial reductions in groundwater levels for a long period of time could induce the movement or migration of reduced quality groundwater into previously unaffected areas. Reduced water supply deliveries under this alternative could result in a substantial increase in groundwater pumping. However, as discussed previously implementation of SGMA would manage groundwater levels in the SWP service areas. **The potential for Reservoir Restriction Alternative to cause long-term changes to groundwater quality due to decreased allocation to south-of-Delta SWP contractors would be less than significant.**

Increased groundwater pumping in lieu of surface water could decrease groundwater, increasing the potential for subsidence. Reduced water supply deliveries under this alternative could result in a substantial increase in groundwater pumping. These potentially long-term increases in groundwater pumping could alter groundwater levels in the basin. As discussed previously implementation of SGMA would manage groundwater levels in the SWP service areas. There would be no reductions in groundwater levels greater than historic low groundwater levels under the Reservoir Restriction Alternative. **Therefore, the potential for Reservoir Restriction Alternative to increase subsidence due to decreased allocation to south-of-Delta SWP contractors would be less than significant.**

6.2.4.3 San Luis Reservoir

Reductions in reservoir storage capacity could reduce reservoir seepage rates that could decrease groundwater levels in the surrounding groundwater aquifer. The Reservoir Restriction Alternative would result in maximum capacity of the reservoir reducing by approximately 32 percent. This reduction in storage capacity could in turn reduce seepage out of the reservoir into the surrounding groundwater basin. As discussed previously, there is no mapped groundwater basin underlying the San Luis Reservoir. The O'Neill forebay immediately down slope from San Luis Reservoir, overlies the Delta-Mendota subbasin. USGS's geologic mapping of the O'Neill Forebay (USGS 1979), discussed the geologic topology in the O'Neill Forebay area. As discussed in the 1979 USGS document, the area is primarily comprised of clay soils including the Tulare Formation and the Great Valley Sequence which is a stratigraphic formation of sandstones, shale and clayey soils (USGS 1979). Clayey soils are not conducive to seepage due to reduced subsurface soil drainage properties. **Therefore, any reductions in storage capacity at the San Luis Reservoir is expected to have a less than significant impact on seepage to the surrounding groundwater aquifer and a result on surrounding groundwater levels.**

6.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

The Crest Raise Alternative would raise the dam crest an additional 12 feet to a new crest elevation of 566 feet. Following completion of construction of the Crest Raise Alternative operation of San Luis Reservoir will continue consistent with existing configuration and no change in storage capacity at the reservoir. There would be no changes to water supply to CVP and SWP water contractors in the San Joaquin Valley Region, Bay Area Region or Southern California Regions. Therefore, the Crest Raise Alternative would not introduce or increase groundwater extraction or recharge where they do not currently exist and as a result would have no effect on groundwater quality through the introduction of contaminated water or the inducement of new groundwater migration.

6.2.5.1 South-of-Delta CVP Contractors Service Area (San Joaquin Valley Basin)

Decreased water supply allocations to south-of-Delta CVP contractors could result in increased groundwater use that would cause changes to groundwater levels. As described in Chapter 2, Project Description, construction of the Crest Raise Alternative would be scheduled for completion during times in the water year that San Luis Reservoir is typically drawn down to lower levels to avoid any adverse impact on storage capacity and water supply. However, implementation of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, during the period that the berm foundation would be excavated. This reduction in surface elevation would reduce storage capacity in the reservoir and would limit CVP deliveries during this construction period. However, as discussed in Section 6.2.4.1, given the implementation of SGMA the San Joaquin Valley Groundwater Basin i.e. Delta-Mendota and Westside subbasins would be managed to not cause any significant long-term changes to groundwater levels. **Therefore, the potential for the Crest Raise Alternative to cause long-term changes to groundwater levels due to decreased allocation to south-of-Delta CVP contractors would be less than significant.**

Increased groundwater pumping in lieu of surface water could substantially alter groundwater levels and/or flow patterns. Substantial reductions in groundwater levels for a long period of time could induce the movement or migration of reduced quality groundwater into previously unaffected areas. Construction of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, resulting in reduced CVP deliveries during this construction period. Reduced water supply deliveries under this alternative could temporarily result in a substantial increase in groundwater pumping. However, as discussed previously implementation of SGMA would manage groundwater levels in the Delta-Mendota and Westside subbasins (San Joaquin Valley Groundwater Basin). **Therefore, potential for the Crest Raise Alternative to cause long-term changes to groundwater quality due to decreased allocation to south-of-Delta CVP contractors would be less than significant.**

Increased groundwater pumping in lieu of surface water could decrease groundwater, increasing the potential for subsidence. Construction of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, resulting in reduced CVP deliveries during this construction period. Reduced water supply deliveries under this alternative could temporarily result in a substantial increase in groundwater pumping. This short-term increase in groundwater pumping could alter groundwater levels in the basin. As discussed previously implementation of SGMA would manage groundwater levels in the Delta-Mendota and Westside subbasins (San Joaquin Valley Groundwater Basin). There would be no reductions in groundwater levels greater than historic low groundwater levels under the Crest Raise Alternative. **Therefore, the potential for the Crest Raise Alternative to increase subsidence due to decreased allocation to south-of-Delta CVP contractors would be less than significant.**

6.2.5.2 South-of-Delta SWP Contractors Service Area (Colorado River Hydrologic Region; San Francisco Bay Hydrologic Region; San Joaquin Valley Hydrologic Region; South Coast Hydrologic Region and South Lohantan Hydrologic Region)

Decreased water supply allocations to south-of-Delta SWP contractors could result in increased groundwater use that would cause changes to groundwater levels. As described in Chapter 2, Project Description, construction of the Crest Raise Alternative would be scheduled for completion during times in the water year that San Luis Reservoir is typically drawn down to lower levels to avoid any adverse impact on storage capacity and water supply. However, implementation of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, during the period that the berm foundation would be excavated. This reduction in surface elevation would reduce storage capacity in the reservoir and would limit SWP deliveries during this construction period. However, as discussed in Section 6.2.4.2, given the implementation of SGMA the groundwater basins within the SWP service area would be managed to not cause any significant long-term changes to groundwater levels. **The potential for the Crest Raise Alternative to cause long-term changes to groundwater levels due to decreased allocation to south-of-Delta SWP contractors would be less than significant.**

Increased groundwater pumping in lieu of surface water could substantially alter groundwater levels and/or flow patterns. Substantial reductions in groundwater levels for a long period of time could induce the movement or migration of reduced quality groundwater into previously unaffected areas. Construction of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, resulting in reduced SWP deliveries during this construction period. Reduced water supply deliveries under this alternative could temporarily result in a substantial increase in groundwater pumping. However, as discussed previously implementation of SGMA the groundwater basins within the SWP service area would be managed to not cause any significant long-term changes to groundwater levels. **Therefore, potential for the Crest Raise Alternative to cause long-term changes to groundwater quality due to decreased allocation to south-of-Delta SWP contractors would be less than significant.**

Increased groundwater pumping in lieu of surface water could decrease groundwater, increasing the potential for subsidence. Construction of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, resulting in reduced SWP deliveries during this construction period. Reduced water supply deliveries under this alternative could temporarily result in a substantial increase in groundwater pumping. This short-term increase in groundwater pumping could alter groundwater levels in the basin. As discussed previously implementation of SGMA the groundwater basins within the SWP service area would be managed to not cause any significant long-term changes to groundwater levels. There would be no reductions in groundwater levels greater than historic low groundwater levels under the Crest Raise Alternative. **Therefore, the potential for the Crest Raise Alternative to increase subsidence due to decreased allocation to south-of-Delta SWP contractors would be less than significant.**

6.2.5.3 San Luis Reservoir

Reductions in reservoir storage capacity could reduce reservoir seepage rates that could decrease groundwater levels in the surrounding groundwater aquifer. The Crest Raise Alternative would raise the dam crest an additional 12 feet to a new crest elevation of 566 feet. The additional embankment height would maintain the current water surface elevation level of 544 feet and would not add or subtract any additional storage capacity. The Crest Raise Alternative would not change CVP or SWP operations and would not change storage in San Luis Reservoir. **Therefore, the Crest Raise Alternative would have no impact on San Luis Reservoir seepage rates or groundwater levels.**

6.3 Comparative Analysis of Alternatives

Table 6-1 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 6-1 are National Environmental Policy Act (NEPA) impacts as well as California Environmental Quality Act (CEQA) impacts, but they are judged for significance only under CEQA.

Table 6-1. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Decreased south-of-Delta CVP water supply allocations could result in increased groundwater use that would cause changes to groundwater levels.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Increased groundwater pumping in lieu of south-of-Delta CVP surface water would decrease groundwater, increasing the potential for subsidence.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Increased groundwater pumping in lieu of south-of-Delta CVP surface water could substantially alter groundwater levels and/or flow patterns. Substantial reductions in groundwater levels for a long period of time could induce the movement or migration of reduced quality groundwater into previously unaffected areas.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Decreased south-of-Delta SWP water supply allocations could result in increased groundwater use that would cause changes to groundwater levels.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Increased groundwater pumping in lieu of south-of-Delta SWP surface water would decrease groundwater, increasing the potential for subsidence.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Increased groundwater pumping in lieu of south-of-Delta SWP surface water could substantially alter groundwater levels and/or flow patterns. Substantial reductions in groundwater levels for a long period of time could induce the movement or migration of reduced quality groundwater into previously unaffected areas.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Reductions in reservoir storage capacity could reduce reservoir seepage rates that could decrease groundwater levels in the surrounding groundwater aquifer.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	NI	None	NI

Key:
LTS = less than significant
NI = no impact
None = no mitigation required
-- = not required per CEQA Guidelines

6.4 Mitigation Measures

No significant groundwater impacts were identified for the action alternatives and no mitigation measures have been developed.

6.5 Significant Unavoidable Impacts

None of the action alternatives would result in significant unavoidable impacts on groundwater resources.

Chapter 7 Air Quality

This chapter presents the existing air quality within the area of analysis and discusses potential effects on air quality from the proposed alternatives. Appendix C1 provides detailed information on the regulatory background associated with the proposed project. Appendix C2, Air Quality Emission Calculations, provides detailed emission calculations.

7.1 Affected Environment/Environmental Setting

This section provides an overview of the regulatory setting associated with air quality standards and provides a description of the air basins with the potential to be affected by the action alternatives.

7.1.1 Area of Analysis

This air quality impact analysis evaluates the existing conditions and impacts in Merced County. San Luis Reservoir is located in Merced County and the San Joaquin Valley Air Basin (SJVAB). Chapter 2, Project Description, identifies the locations of the various project components. Figure 7-1 identifies the air basins that would be affected by the alternatives.

7.1.2 Regulatory Setting

Air quality management and protection responsibilities exist in Federal, State, and local levels of government. The Federal Clean Air Act (CAA) and the California Clean Air Act (CCAA) are the primary statutes that establish ambient air quality standards and establish regulatory authorities to enforce regulations designed to attain those standards.

7.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams (SOD) Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Clean Air Act
- General Conformity

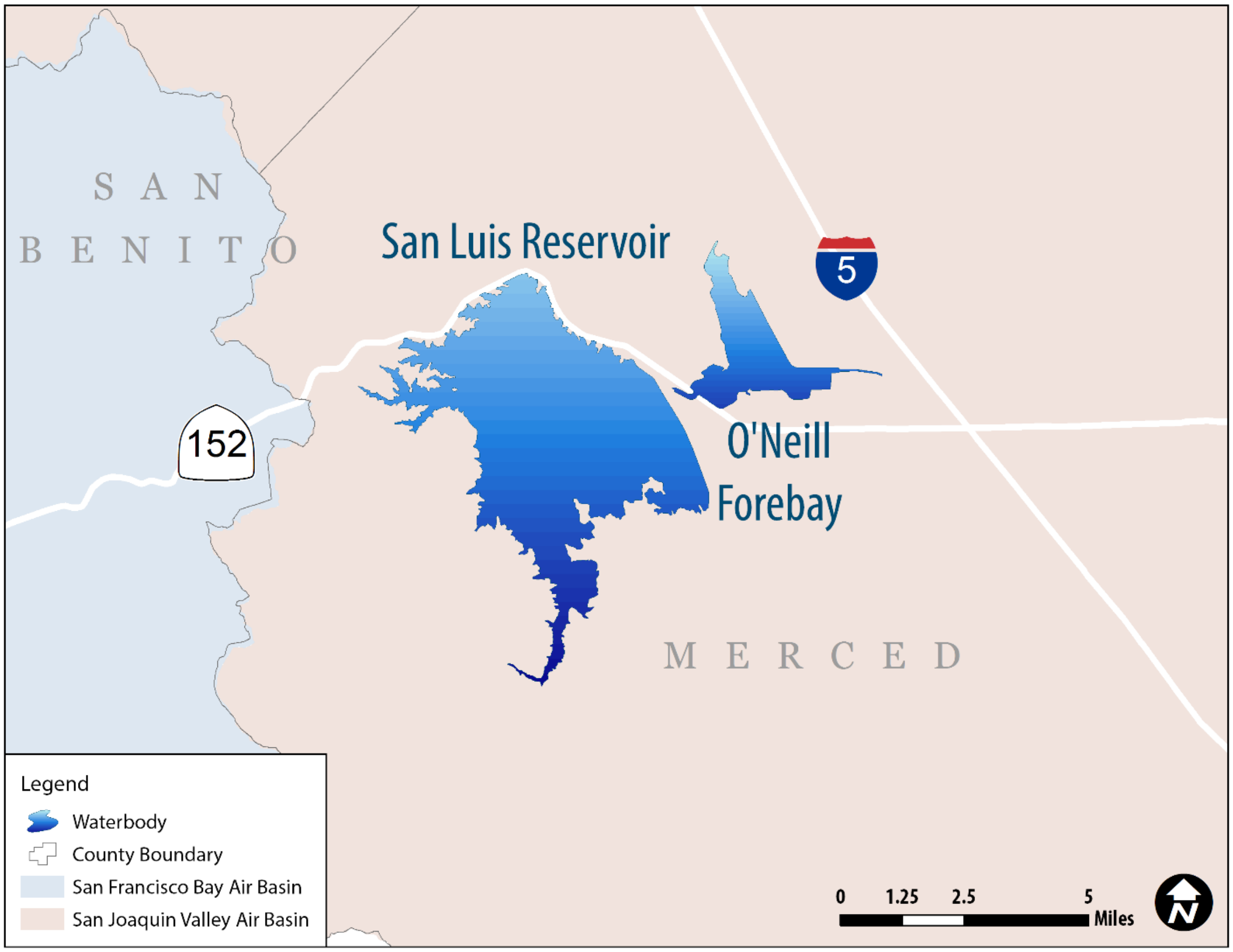


Figure 7-1. California Air Basins

7.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Clean Air Act

7.1.2.3 Regional/Local

The following regional and local laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- San Joaquin Valley Air Pollution Control District (SJVAPCD) Air Quality Management Plans

7.1.3 Existing Conditions

The following section describes the existing air quality conditions within the study area.

This includes the area around San Luis Reservoir which is Federally-owned and leased to the California Department of Parks and Recreation. San Luis Reservoir is located in Merced County, which is within the SJVAB. The Valley is bordered on the west by the Coast Ranges, by the Sierra Nevada Mountains on the east and by the Tehachapi Mountains on the south. The region is highly susceptible to pollutant accumulation over time because of the mountains that surround the valley. Marine air flows towards the east through gaps in the Coast Range at the Golden Gate and Carquinez Strait.

Low wind speeds contribute to high concentrations of air pollutants in the winter time. During the summer, winds typically originate from the north end of the basin and flow in a south-southeast direction through the valley. These conditions contribute to persistent summer inversions that prevent the vertical dispersion of air pollutants. Summer time inversions occur when a layer of cool, marine air is trapped below a mass of warmer air above.

7.1.3.1 Attainment Status

The Federal CAA requires States to classify air basins (or portions thereof) as either attainment or nonattainment with respect to criteria air pollutants, based on whether the National Ambient Air Quality Standards (NAAQS) have been achieved, and to prepare air quality plans containing emission reduction strategies for those areas designated as nonattainment. Table 7-1 shows the attainment status for the SJVAB.

7.1.3.2 Sensitive Receptors

Sensitive receptors are segments of the population susceptible to poor air quality like children, the elderly, and those with pre-existing health problems. Examples of sensitive receptors include residences, schools and school yards, parks and play grounds, daycare centers, nursing homes, and medical facilities. Please refer to Chapter 11, Noise and Vibration, for more information on sensitive receptors in the study area.

Table 7-1. Attainment Status for the San Joaquin Valley Air Basin

Pollutant	NAAQS [1,2,3]	CAAQS [1,2]
O_3	Nonattainment, extreme	Nonattainment
CO	Attainment [4]	Unclassified
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment
PM_{10}	Maintenance	Nonattainment
$PM_{2.5}$	Nonattainment [5]	Nonattainment
Pb	Attainment	Attainment

Source: California Air Resources Board (CARB) 2017a; United States Environmental Protection Agency (USEPA) 2017

Notes:

1 Nonattainment means that the area does not meet the ambient air quality standard for that pollutant.

2 Attainment means that the area meets the ambient air quality standard for that pollutant.

3 Maintenance means that the area has recently met the standard and must continue to provide USEPA with information showing that it is maintaining the standard before the area can qualify for redesignation as attainment.

4 Certain urban areas of the SJVAB are designated as maintenance for CO including Bakersfield (Kern County), Fresno (Fresno County), Modesto (Stanislaus County), and Stockton (San Joaquin County); however, these areas are not located within the project study area.

5 Classified as moderate nonattainment for the 2012 annual primary NAAQS, serious nonattainment for the 2006 24-hour NAAQS, and serious nonattainment for the 1997 NAAQS.

Key: CAAQS = California ambient air quality standard; CO = carbon monoxide; NAAQS = national ambient air quality standard; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; PM_{10} = inhalable particulate matter; $PM_{2.5}$ = fine particulate matter; SO_2 = sulfur dioxide

7.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts associated with each alternative.

7.2.1 Assessment Methods

The emissions estimation method was based on the California Emission Estimator Model (CalEEMod), Version 2016.3.2 (California Air Pollution Officers Association [CAPCOA] 2017), although the calculations were performed outside of the model for flexibility. Construction-related emissions were estimated using multiple sources as described below.

- OFFROAD2017 Off-Road Emissions Inventory Model (CARB 2017b)
- EMFAC2014 Web Database (CARB 2014)
- California Emission Inventory and Reporting System particle size fraction data for source categories (CARB 2017c)
- Paved road dust emission factors (USEPA 2011)
- Material handling emission factors (USEPA 2006)
- Grading and bulldozing emission factors (USEPA 1998)
- CalEEMod User's Guide, Appendix D: Default Data Tables (CAPCOA 2017)

The following sections provide additional discussion of emission estimation methodologies used for each source group.

7.2.1.1 On-Site Construction Equipment Engine Emissions

Emission factors were developed using several of CARB's emission factor models. For off-road construction equipment, the OFFROAD2017 emission factor model was used. Emission factors were developed for the San Joaquin Valley Air Basin for 2020, which was assumed to be the start of construction. Although construction would occur over multiple years, because emission factors tend to decrease in future years from improved engine technology, only analyzing the first year of construction provides a worst-case emissions estimate.

The average power rating (horsepower [hp]) for the equipment was provided by United States Department of the Interior, Bureau of Reclamation (Reclamation). If the equipment data provided by Reclamation did not specify the hp for a specific piece of equipment, then the average horsepower from CalEEMod was used.

The emission factors that were developed for each piece of equipment are multiplied by maximum number of hours that a piece of equipment could operate in one day or in one year to estimate worst-case emissions. Peak daily and annual emissions were calculated based on the emission factors and data provided by the design engineers.

The construction schedule is based on two 10-hour shifts plus one 3-hour maintenance shift that would occur 7 days per week. While it is expected that night construction would occasionally occur, it is assumed that it would happen no more than 6 months per year. The Bureau of Reclamation indicated a preferred construction duration of 8 to 12 years (Reclamation 2017), depending on fiscal and emission constraints. As was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend this construction schedule to 20 years. The air quality impact analysis considers an 8-year construction period for the No Shear Key option and a 10-year construction period for the Shear Key option. These construction periods represent the minimum duration that is feasible for each option, thereby maximizing emissions for a worst-case scenario.

7.2.1.2 Off-Site Haul/Delivery Truck and Construction Worker Engine Emissions and Road Dust

Engine exhaust emissions would occur from several on-road vehicles including dump trucks, concrete trucks, delivery trucks, gravel/paving trucks, and soil hauling trucks. Water trucks, flatbed trucks, dump trucks, and various pickup trucks would also operate onsite during construction activities. Furthermore, emissions would also occur from construction workers commuting to the various construction sites. Off-site vehicle trip assumptions are consistent with those used in Chapter 12, Traffic and Transportation.

EMFAC2014 was used to estimate emission factors from on-road motor vehicles depending on the vehicle's gross vehicle weight rating provided in the construction details. Construction worker commuting emissions were estimated from the San Joaquin Valley Air Basin's fleet mix for passenger automobiles and light-duty trucks. Both gasoline and diesel engines were assumed to be used by the construction workers.

For the haul/delivery trucks and construction workers, emission factors were estimated from the aggregated speeds in San Joaquin Valley Air Basin (i.e., a "burden" model run), rather than a specific speed. The onsite trucks were assumed to operate at 40 miles per hour (mph), which is the default on-road speed for motor vehicles in CalEEMod.[1] In addition to engine exhaust emissions, emission factors for tire wear, brake wear, and re-entrained paved road dust were also estimated. The EMFAC2014 model estimates tire wear and brake wear, but paved road dust emissions were estimated using the USEPA's *Compilation of Air Pollutant Emission Factors* (AP-42, USEPA 2011).

7.2.1.3 Material Handling

Fugitive dust emissions would also occur from material handling activities, from truck loading/unloading, and other "drops." The methodology documented in Section 13.2.4 (USEPA 2006) of AP-42 was used to estimate fugitive dust emissions from these activities. Dust emissions were estimated using the following equation:

$$E = k(0.0032)\frac{(U/5)^{1.3}}{(M/2)^{1.4}}$$

Where:

E = emission factor (pounds per ton [lbs/ton])

k = particle size multiplier (0.35 for PM_{10}, 0.053 for fine particulate matter with an aerodynamic diameter less than or equal to 2.5 microns [$PM_{2.5}$])

U = wind speed (9.18 mph)[2]

M = material moisture content (12 percent)

Emissions were calculated from the total assumed excavated material per construction option and the construction duration. Emission factors were calculated as 0.00020 pounds PM_{10} per ton of soil and 0.000030 pounds $PM_{2.5}$ per ton of soil.

[1] SJVAPCD Regulation VIII (Rule 8021) states that operators should "limit the speed of vehicles traveling on uncontrolled unpaved access/haul roads within construction sites to a maximum of 15 miles per hour." Additionally, the SJVAPCD limits traffic speeds on unpaved roads when necessary to mitigate PM_{10} impacts. However, because unmitigated emissions are less than the CEQA significance thresholds, it is not necessary to limit vehicular speeds.

[2] Wind speed estimated for 2016 calendar year data from the Route 152 San Luis meteorological station (CF031) (MesoWest 2017).

7.2.1.4 Grading

Fugitive dust emissions would also occur during grading activities. Fugitive dust emissions from this activity were estimated in accordance with Section 11.9 of AP-42 with the following equations (USEPA 1998):

$$E_{TSP} = 0.040(S)^{2.5} \text{ and } E_{PM15} = 0.051(S)^{2.0}$$

Where:

> E_{TSP} = emission factor for total suspended particles up to 30 microns (lbs/VMT)
>
> E_{PM15} = emission factor for particles up to 15 microns (lbs/VMT)
>
> S = mean vehicle speed (mph)

To estimate PM_{10} emissions, the equation for total suspended particulate matter (TSP) was multiplied by a scaling factor of 0.60, while the PM_{15} equation was multiplied by 0.031 to estimate $PM_{2.5}$ emissions. The average grader speed was assumed to be 7.1 mph, which is the default value in AP-42. Using these assumptions, the emission factors were calculated as 1.54 pounds PM_{10} per vehicle miles traveled (VMT) and 0.17 pounds $PM_{2.5}$ per VMT.

The total VMT for grading activities was calculated from equipment-specific grading rates (CAPCOA 2017) and the estimated equipment count.

7.2.1.5 Bulldozing

Fugitive dust emissions would also occur during bulldozing. Fugitive dust emissions from this activity were estimated in accordance with Section 11.9 of AP-42 (USEPA 1998) with the following equations:

$$E_{TSP} = \frac{5.7(s)^{1.2}}{(M)^{1.3}} \text{ and } E_{PM15} = \frac{1.0(s)^{1.5}}{(M)^{1.4}}$$

Where:

> E_{TSP} = emission factor for total suspended particles up to 30 microns (lbs/VMT)
>
> E_{PM15} = emission factor particles up to 30 microns (lbs/VMT)
>
> s = material silt content (6.9 percent)
>
> M = material moisture content (7.9 percent)

To estimate PM_{10} emissions, the equation for TSP was multiplied by the scaling factor of 0.75, while the PM15 equation was multiplied by 0.105 to estimate $PM_{2.5}$ emissions (USEPA 1998). The material silt and moisture contents were assumed to be 6.9 and 7.9 percent, respectively, which are the default values in

AP-42. Using these assumptions, the emission factors were calculated as 0.75 pounds PM_{10} per hour and 0.41 pounds $PM_{2.5}$ per hour.

Using the total project hours provided by the design engineer and the construction duration, the daily and annual operating hours were estimated.

7.2.1.6 Crushing

Fugitive dust emissions would occur from crushing, screening, drilling, and other activities associated with processing material obtained from Basalt Hill. Emission factors were obtained from Section 11.19.2 of AP-42 (USEPA 2004). Because of strict fugitive dust requirements from the SJVAPCD, it was assumed that fugitive dust emissions would be controlled; therefore, the controlled emission factors were added together with the wet drilling and truck unloading emission factors to estimate the total emission factor. Under these assumptions, the following emission factors were calculated:

- PM_{10}: 0.004922 pounds per ton of processed material
- $PM_{2.5}$: 0.000233 pounds per ton of processed material

Using the "probable high estimate" of material to be crushed provided by the design engineer, the maximum daily and annual fugitive dust emissions were estimated. A density of 184 pounds per cubic foot for basalt (Perry and Chilton 1997) was used to convert the volume of crushed material (cubic yards) to weight (tons).

7.2.1.7 Blasting

Fugitive dust emissions would also occur during blasting activities. Fugitive dust emissions from this activity were estimated in accordance with Section 11.9 of AP-42 with the following equations (USEPA 1998):

$$E_{TSP} = 0.000014(A)^{1.5}$$

Where:

E_{TSP} = emission factor for total suspended particles up to 30 microns (lbs/blast)

A = horizontal area (ft^2), with blasting depth ≤ 70 feet. Not for vertical face of a bench.

To estimate PM_{10} and PM2.5 emissions, the TSP equation was multiplied by scaling factors of 0.52 and 0.03. The total amount of material assumed to be blasted was based on the "probable high estimate" of material to be crushed, as provided by the design engineer. The horizontal area of each blast was then estimated based on a maximum depth of 70 feet, a maximum of 4 blasts per day, and the construction duration for each option of the Crest Raise Alternative.

7.2.2 Significance Criteria

The significance criteria described below were developed consistent with the California Environmental Quality Act (CEQA) Guidelines to determine the significance of potential impacts on air quality. Impacts on air quality would be considered potentially significant if the proposed project or alternatives would:

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any ambient air quality standard or contribute substantially to an existing or projected violation of any ambient air quality standard.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the area of analysis is nonattainment under an applicable Federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone [O_3] precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

Changes in air quality are determined relative to existing conditions (for CEQA) and to the No Action/No Project Alternative (for National Environmental Policy Act [NEPA]). In addition to the general criteria provided above, individual air districts have established significance criteria that are used in the impact analysis. The significance criteria developed by the individual air districts are used to evaluate significance associated with the first three criteria summarized above. Additional significance criteria by air district are provided below.

7.2.2.1 San Joaquin Valley Air Pollution Control District

The SJVAPCD publishes a *Guidance for Assessing and Mitigating Air Quality Impacts* (GAMAQI) (2015) to assist Lead Agencies with uniform procedures for addressing air quality impacts in environmental documentation. The GAMAQI contains qualitative and quantitative significance thresholds for assessing impacts from construction and operational activities.

If emissions are less than these thresholds, then the project would be determined to not conflict with or obstruct implementation of the various air quality management plans maintained by the SJVAPCD. Furthermore, if emissions do not exceed the significant levels, then it is assumed that the project would not violate or contribute substantially to an existing or projected air quality violation.

Impacts on air quality would be significant if implementing an alternative would result in any of the following:

- **Temporary and short-term construction-related emissions of criteria pollutants or precursors –** Violate an air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations, as described below:
  - **CO**: Emissions would exceed the SJVAPCD-recommended threshold of 100 tons per year (tpy).
  - **NOx or ROG**: Emissions would exceed the SJVAPCD-recommended threshold of 10 tpy.
  - **SOx**: Emissions would exceed the SJVAPCD-recommended threshold of 27 tpy.
  - **PM_{10} or $PM_{2.5}$**: Emissions would exceed the SJVAPCD-recommended threshold of 15 tpy, or SJVAPCD-required control measures in compliance with Regulation VIII, "Fugitive Dust PM_{10} Prohibitions," or other SJVAPCD-recommended mitigation measures applicable to the project would not be incorporated into project design or implemented during project construction.
- **Long-term operation-related (regional) emissions of criteria air pollutants or precursors –** Violate an air quality standard or contribute substantially to an existing or projected air quality violation, expose sensitive receptors to substantial pollutant concentrations, or conflict with or obstruct implementation of the applicable air quality plan, as described below:
  - **CO**: Emissions would exceed the SJVAPCD-recommended threshold of 100 tpy.
  - **NOx or ROG**: Emissions would exceed the SJVAPCD-recommended threshold of 10 tpy.
  - **SOx**: Emissions would exceed the SJVAPCD-recommended threshold of 27 tpy.
  - **PM_{10} or $PM_{2.5}$**: Emissions would exceed the SJVAPCD-recommended threshold of 15 tpy.
- **Long-term operational-related (local) emissions of criteria pollutants or precursors –** Violate an air quality standard or contribute substantially to an existing or projected air quality violation,

or expose sensitive receptors to substantial pollutant concentrations (e.g., CO concentrations exceeding the 1-hour California Ambient Air Quality Standards [CAAQS] of 20 ppm or the 8-hour CAAQS of 9 ppm). If emissions do not exceed the mass emissions thresholds described above for construction and operational sources, then it is assumed that the project would also not exceed the ambient air quality standards.

- **Temporary and short-term construction-related emissions of toxic air contaminants –** Expose sensitive receptors to substantial pollutant concentrations (i.e., result in exposure to a toxic air contaminant [TAC], as identified by CARB and/or USEPA, at a level for which the risk of contracting cancer exceeds 20 in 1 million or for which the non-cancer risk hazard index exceeds 1 for the maximally exposed individual).

- **Odors –** Create objectionable odors affecting a substantial number of people in the short or long term. Specifically, locate projects that would potentially generate odorous emissions near existing sensitive receptors or other land uses where people may congregate.

7.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative includes the most likely future conditions in the absence of the project. This analysis assumes that no short-term construction activities or long-term operational impacts would occur. As such, air quality conditions under the No Action/No Project Alternative would be the same as existing conditions. **The No Action/No Project Alternative would result in no impact on air quality.**

7.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

Construction associated with the Reservoir Restriction Alternative could cause temporary and short-term construction-related emissions of criteria pollutants or precursors that would exceed the SJVAPCD's significance thresholds or the general conformity de minimis thresholds. The Reservoir Restriction Alternative would restrict the amount of water stored in the San Luis Reservoir to reduce the likelihood of overtopping if the dam failed during a seismic event. Short-term construction activities at B.F. Sisk Dam would occur from the construction and removal of 21-miles of access road. Additionally, minor emissions would occur from hydroseeding activities that would take place to cover the new exposed areas of the reservoir rim. No long-term operational impacts to air quality from changes in reservoir operation would occur. Table 7-2 summarizes the annual construction-related emissions associated with construction equipment, hydroseeding trucks, and construction worker commuting. While construction and hydroseeding activities would likely occur over 18 months, all construction activities were assumed to occur in one year to maximize potential emissions.

Table 7-2. Reservoir Restriction Alternative – Unmitigated Construction Emissions

Source	VOC (tpy)	NOx (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Onsite construction equipment	0.3	4.6	1.8	<0.1	0.2	0.2
Construction worker commuting	<0.1	<0.1	0.4	<0.1	0.1	<0.1
Fugitive dust	n/a	n/a	n/a	n/a	1.6	0.8
Maximum Annual Emissions[1]	**0.3**	**4.7**	**2.3**	**<0.1**	**1.9**	**1.0**
SJVAPCD Significance Threshold	10	10	100	27	15	15
General Conformity *De Minimis* Threshold	10	10	n/a	100	100	100
Significant?	No	No	No	No	No	No

Note:

[1] Totals may not add exactly because of rounding.

Key: CO = carbon monoxide; n/a = not applicable; NOx = nitrogen oxides; PM_{10} = inhalable particulate matter; $PM_{2.5}$ = fine particulate matter; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; tpy = tons per year; VOC = volatile organic compound

As shown in Table 7-2, emissions of all pollutants would be less than the SJVAPCD's significance thresholds. **Therefore, the potential for the Reservoir Restriction Alternative to violate any ambient air quality standard or contribute substantially to an existing or projected violation of any ambient air quality standard would be less than significant.**

As described previously, there would be no long-term changes in operations from this alternative that would result in air quality impacts. As shown in Table 7-2, emissions associated with the Federal action would be less than the general conformity *de minimis* threshold. **Therefore, a general conformity determination would not need to be developed for this alternative before a ROD can be issued for the Reservoir Restriction Alternative.**

Operational activities associated with the Reservoir Restriction Alternative could cause long-term operation-related emissions of criteria pollutants or precursors that would exceed the SJVAPCD's significance thresholds. As discussed in Chapter 2, Project Description, following completion of the Reservoir Restriction Alternative, operation of San Luis Reservoir would be constrained by a new lower maximum surface elevation and associated reduction in total storage capacity at the reservoir. Given the reduction in storage capacity at the reservoir there would be no increase in pumping at the reservoir during annual fill operations, and there would be no increase in air emissions when compared to existing conditions. **Therefore, there would be no impact in the potential for the Reservoir Restriction Alternative to cause**

long-term operation-related emissions of criteria pollutants or precursors that would exceed the SJVAPCD's significance thresholds.

Construction associated with the Reservoir Restriction Alternative could cause temporary and short-term construction-related emissions of TACs that would exceed the SJVAPCD's significance thresholds. Construction of the proposed project has the potential to emit TACs in exhaust emissions, such as diesel particulate matter (DPM); however, construction impacts will be temporary. DPM is listed by Office of Environmental Health Hazard Assessment as a carcinogen and has a non-cancer chronic reference exposure level; DPM does not contribute to acute health hazards. As discussed in Chapter 11, Noise and Vibration, the closest sensitive receptors are located 8,250 feet away at a subdivision of State Route 152.[3] As discussed in CARB's *Air Quality and Land Use Handbook* (2005), pollutant concentrations are expected to drop-off 80 percent at approximately 1,000 feet from a distribution center and will drop 70 percent 500 feet from a major freeway. Therefore, the exposure of DPM to sensitive receptors is expected to be minimal because of the distance from the construction activities. Because there will be no long-term exposures to any TACs, the impact to sensitive receptors would be minimal. **The Reservoir Restriction Alternative would have a less than significant impact on sensitive receptors.**

Construction associated with the Reservoir Restriction Alternative could create objectionable odors affecting a substantial number of people. The use of diesel equipment during construction may generate near-field odors that are considered to be a nuisance. Diesel equipment emits a distinctive odor that may be considered offensive to certain individuals. Due to the short installation period and distance to sensitive receptors, the nearest receptor being approximately one mile away, odors from diesel exhaust would not affect a substantial number of people. Therefore, implementation of this alternative would not create objectionable odors affecting a substantial number of people. **Odors from the proposed hydroseeding activities would have a less than significant impact on air quality.**

7.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

Construction associated with the Crest Raise Alternative could cause temporary and short-term construction-related emissions of criteria pollutants or precursors that would exceed the SJVAPCD's significance thresholds or the general conformity de minimis thresholds. Construction activities under the Crest Raise Alternative would involve the placement of additional fill material on the dam embankment to raise the dam crest, installation of two traffic signals, and potential use of a conveyor belt system. Construction-related emissions in the SJVAPCD were estimated for off-road construction equipment,

[3] Although the San Luis Creek Use Area is located closer at 5,600 feet away, because there are no long-term residents on site, there would be no long-term exposure to construction-related impacts, and it was not considered.

on-road haul trucks and delivery vehicles, and construction worker commuting. As described in Chapter 2, Project Description, the development of a foundation shear key is being evaluated as an optional modification in the Crest Raise Alternative.[4]

The emission calculations assume that each piece of offroad equipment operates at full capacity (i.e., 10 hours per shift for 250 days per year). Certain equipment, which are identified in Appendix C2, may operate for two shifts. Total operating hours over the length of the project were provided by Reclamation for the offroad equipment. Based on the estimated construction period (i.e., 8 years for the no shear key option and 10 years for the shear key option), the number of equipment necessary to meet the schedule were estimated.

Table 7-3 summarizes the unmitigated annual construction-related emissions if the shear key was constructed, while Table 7-4 summarizes unmitigated emissions without the shear key option. The emissions shown in these tables assume that no dust control measures are used and no changes were made to the default emission factors for equipment used in the San Joaquin Valley Air Basin.

Table 7-3. Crest Raise Alternative (Shear Key Option) – Unmitigated Construction Emissions

Source	VOC (tpy)	NOx (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Onsite construction equipment	8.3	85.1	65.2	0.2	3.5	3.1
Construction worker commuting	<0.1	0.2	1.8	<0.1	0.4	0.1
Haul truck trips	0.2	6.2	0.7	<0.1	0.3	0.1
Fugitive dust	n/a	n/a	n/a	n/a	8.9	3.0
Maximum Annual Emissions[1]	**8.5**	**91.6**	**67.7**	**0.2**	**13.2**	**6.4**
SJVAPCD Significance Threshold	10	10	100	27	15	15
General Conformity *De Minimis* Threshold	10	10	n/a	100	100	100
Significant?	No	Yes	No	No	No	No

Note:
[1] Totals may not add exactly because of rounding.
Key: CO = carbon monoxide; n/a = not applicable; NOx = nitrogen oxides; PM_{10} = inhalable particulate matter; $PM_{2.5}$ = fine particulate matter; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; tpy = tons per year; VOC = volatile organic compound

[4] A foundation shear key is developed by over excavating the weak overburden foundation soils found beneath the berm footprint and replacing them with material with a higher shear strength.

Table 7-4. Crest Raise Alternative (No Shear Key) – Unmitigated Construction Emissions

Source	VOC (tpy)	NOx (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Onsite construction equipment	7.2	71.3	63.1	0.1	3.1	2.7
Construction worker commuting	<0.1	0.2	1.8	<0.1	0.4	0.1
Haul truck trips	0.2	7.8	0.8	<0.1	0.4	0.1
Fugitive dust	n/a	n/a	n/a	n/a	7.8	2.3
Maximum Annual Emissions[1]	**7.4**	**79.3**	**65.8**	**0.2**	**11.7**	**5.2**
SJVAPCD Significance Threshold	10	10	100	27	15	15
General Conformity *De Minimis* Threshold	10	10	n/a	100	100	100
Significant?	No	Yes	No	No	No	No

Note:
[1] Totals may not add exactly because of rounding.
Key: CO = carbon monoxide; n/a = not applicable; NOx = nitrogen oxides; PM_{10} = inhalable particulate matter; $PM_{2.5}$ = fine particulate matter; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO2 = sulfur dioxide; tpy = tons per year; VOC = volatile organic compound

As shown in Table 7-3 and Table 7-4, NOx emission would exceed the SJVAPCD's significance threshold. **Therefore, the potential for the Crest Raise Alternative to violate any ambient air quality standard or contribute substantially to an existing or projected violation of any ambient air quality standard would be significant.**

Implementation of Mitigation Measures AQ-1, AQ-2, and AQ-3 would reduce criteria pollutant emissions. Table 7-5 summarizes the mitigated annual construction-related emissions if the shear key was constructed, while Table 7-6 summarizes mitigated emissions without the shear key option.

Table 7-5. Crest Raise Alternative (Shear Key Option) – Mitigated Construction Emissions

Source	VOC (tpy)	NOx (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Onsite construction equipment	2.7	8.2	40.9	0.2	0.6	0.4
Construction worker commuting	<0.1	0.2	1.8	<0.1	0.4	0.1
Haul truck trips	0.1	1.1	0.5	<0.1	0.3	0.1
Fugitive dust	n/a	n/a	n/a	n/a	4.8	1.3
Maximum Annual Emissions[1]	**2.8**	**9.5**	**43.2**	**0.2**	**6.1**	**1.9**
SJVAPCD Significance Threshold	10	10	100	27	15	15

Source	VOC (tpy)	NOx (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
General Conformity *De Minimis* Threshold	10	10	n/a	100	100	100
Significant?	No	No	No	No	No	No

Note:
[1] Totals may not add exactly because of rounding.
Key: CO = carbon monoxide; n/a = not applicable; NOx = nitrogen oxides; PM_{10} = inhalable particulate matter; $PM_{2.5}$ = fine particulate matter; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; tpy = tons per year; VOC = volatile organic compound

Table 7-6. Crest Raise Alternative (No Shear Key) – Mitigated Construction Emissions

Source	VOC (tpy)	NOx (tpy)	CO (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Onsite construction equipment	2.5	7.1	42.1	0.1	0.7	0.5
Construction worker commuting	<0.1	0.2	1.8	<0.1	0.4	0.1
Haul truck trips	0.1	1.4	0.6	<0.1	0.4	0.1
Fugitive dust	n/a	n/a	n/a	n/a	4.7	1.0
Maximum Annual Emissions[1]	**2.6**	**8.7**	**44.5**	**0.2**	**6.1**	**1.7**
SJVAPCD Significance Threshold	10	10	100	27	15	15
General Conformity *De Minimis* Threshold	10	10	n/a	100	100	100
Significant?	No	No	No	No	No	No

Note:
[1] Totals may not add exactly because of rounding.
Key: CO = carbon monoxide; n/a = not applicable; NOx = nitrogen oxides; PM_{10} = inhalable particulate matter; $PM_{2.5}$ = fine particulate matter; SJVAPCD = San Joaquin Valley Air Pollution Control District; SO_2 = sulfur dioxide; tpy = tons per year; VOC = volatile organic compound

As shown in Table 7-5 and Table 7-6, NOx emissions would be reduced to less than the SJVAPCD's significance threshold. Therefore, the potential for Alternative 3 to conflict with or obstruct implementation of an applicable air quality plan would be **less than significant after mitigation**.

As described previously, there would be no long-term changes in operations from this alternative. As shown in Table 7-5 and Table 7-6, emissions associated with the Federal action would be less than the general conformity *de minimis* threshold. Because the CEQA-related mitigation measures are fully enforceable under Public Resources Code Section 21081.6 and would be a requirement of project implementation, meaning that the Federal Action definition includes the CEQA mitigation measures, the CEQA mitigated emissions for this alternative were compared to the general conformity de minimis thresholds (i.e., should this alternative be selected and approved, implementation of the alternative would be subject to the requirements of the air quality mitigation measures presented herein). **Therefore, a general conformity determination would not need to be developed for this alternative before a ROD can be issued for the Crest Raise Alternative.**

Operational activities associated with the Crest Raise Alternative could cause long-term operation-related emissions of criteria pollutants or precursors that would exceed the SJVAPCD's significance thresholds. As discussed in Chapter 2, Project Description, following completion of the Crest Raise Alternative, operation of San Luis Reservoir would continue consistent with the existing configuration and no change in storage capacity at the reservoir. Because operation of the reservoir would not change, there would be no change in air emissions from existing conditions. **Therefore, there would be no impact in the potential for the Crest Raise Alternative to cause long-term operation-related emissions of criteria pollutants or precursors that would exceed the SJVAPCD's significance thresholds.**

Construction associated with the Crest Raise Alternative could cause temporary and short-term construction-related emissions of TACs that would exceed the SJVAPCD's significance thresholds. Construction of the proposed project has the potential to emit TACs in exhaust emissions, such as DPM; however, construction impacts will be temporary. DPM is listed by Office of Environmental Health Hazard Assessment as a carcinogen and has a non-cancer chronic reference exposure level; DPM does not contribute to acute health hazards. As discussed in Chapter 11, Noise and Vibration, the closest sensitive receptors are located 8,250 feet away at a subdivision of State Route 152.[5] As discussed in CARB's *Air Quality and Land Use Handbook* (2005), pollutant concentrations are expected to drop-off 80 percent at approximately 1,000 feet from a distribution center and will drop 70 percent 500 feet from a major freeway. Therefore, the exposure of DPM to sensitive receptors is expected to be minimal because of the distance from the construction activities. Because there will be no long-term exposures to any TACs, the impact to sensitive receptors would be minimal. **The Crest Raise Alternative would have a less than significant impact on sensitive receptors.**

Construction associated with the Crest Raise Alternative could create objectionable odors affecting a substantial number of people. The use of diesel equipment during construction may generate near-field odors that are considered to be a nuisance. Diesel equipment emits a distinctive odor that may be considered offensive to certain individuals. Due to the distance to sensitive receptors, the nearest receptor being approximately one mile away, odors from diesel exhaust would not affect a substantial number of people. Therefore, implementation of this alternative would not create objectionable odors affecting a substantial number of people. **Odors from the proposed construction of the enlarged reservoir would have a less than significant impact on air quality.**

[5] Although the San Luis Creek Use Area is located closer at 5,600 feet away, because there are no long-term residents on site, there would be no long-term exposure to construction-related impacts, it was not considered.

7.3 Comparative Analysis of Alternatives

Table 7-7 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 7-5 are NEPA impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 7-7. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction of the alternative could cause temporary and short-term construction-related emissions of criteria pollutants or precursors that would exceed the SJVAPCD's significance thresholds or the general conformity *de minimis* thresholds.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	AQ-1, AQ-2, and AQ-3	LTS
Operational activities associated with the alternative could cause long-term operation-related emissions of criteria pollutants or precursors that would exceed the SJVPCD's significance thresholds.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Construction associated with the alternative could cause temporary and short-term construction-related emissions of TACs that would exceed the SJVAPCD's significance thresholds.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction associated with the alternative could create objectionable odors affecting a substantial number of people.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key:
-- = not required per CEQA Guidelines
LTS = less than significant
NI = no impact
None = no mitigation required
S = significant

7.4 Mitigation Measures

The following mitigation measures would reduce the severity of air quality impacts:

Mitigation Measure AQ-1: ***Reduce emissions from off-road construction equipment by using Tier 4 construction equipment.***

Impacts on air quality from construction activities will be reduced by using construction equipment compliant with the Tier 4 emission standards for off-road diesel engines instead of the fleet average for the San Joaquin Valley Air Basin. Records will be maintained by the construction contractor that demonstrate that actual emissions would not exceed the SJVAPCD's significance criteria and would be submitted to Reclamation monthly.

If NOx emissions are forecasted to exceed thresholds, then changes will be made so that the threshold is not exceeded, or work will be stopped.

Mitigation Measure AQ-2: ***Reduce exhaust emissions from on-road trucks***

All haul trucks, vendor trucks, or other vehicles operating onsite with on-road engines will meet model year 2015 or better emission standards.

Mitigation Measure AQ-3: ***Implement Best Available Mitigation Measures for Construction Phase***

As required by the SJVAPCD, the project must apply the following best available mitigation measures for the construction phase:

- All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilize of dust emission using water, chemical stabilizer/suppressant, covered with a tarp or other suitable cover or vegetative ground cover.
- All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized of dust emissions using water or chemical stabilizer/suppressant.
- All land clearing, grubbing, scraping, excavation, land leveling, grading, cut & fill, and demolition activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by presoaking.
- With the demolition of buildings up to six stories in height, all exterior surfaces of the building shall be wetted during demolition.
- When materials are transported off-site, all material shall be covered, or effectively wetted to limit visible dust emissions, and at least six inches of freeboard space from the top of the container shall be maintained.

- All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at the end of each workday. *(The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions.) (Use of blower devices is expressly forbidden.)*

- Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/suppressant.

- Within urban areas, trackout shall be immediately removed when it extends 50 or more feet from the site and at the end of each workday.

- An owner/operator of any site with 150 or more vehicle trips per day, or 20 or more vehicles trips per day by vehicles with three or more axles shall implement mitigation measures to prevent carryout and trackout.

7.5 Potentially Significant Unavoidable Impacts

None of the action alternatives would result in potentially significant unavoidable impacts on air quality.

Chapter 8
Greenhouse Gas Emissions

This chapter presents the existing greenhouse gas (GHG) emissions within the area of analysis and discusses potential effects on GHG emissions from the proposed alternatives. Appendix D1, Greenhouse Gas Emissions Calculations, provides detailed emission calculations. Appendix D2 contains the Department of Water Resources (DWR) Consistency Determination Checklists associated with the action alternatives. Appendix E, Climate Change Analysis, also provides an assessment of the proposed alternatives under projected future climate conditions and discusses the environmental impacts of the project alternatives described in Chapters 4 through 25, under projected future climate conditions.

8.1 Affected Environment/Environmental Setting

This section presents the existing GHG emissions within Merced County along with projections of the foreseeable affected environment, the area of analysis and regulatory setting.

8.1.1 Area of Analysis

The GHG impact analysis evaluates the existing conditions and impacts in Merced County. San Luis Reservoir is in Merced County and the San Joaquin Valley Air Basin. Chapter 2, Project Description, identifies the locations of the various project components.

8.1.2 Regulatory Setting

The following section describes the applicable climate change laws, rules, regulations and policies.

8.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams (SOD) Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Department of the Interior Secretarial Order No. 3289, Amendment No. 1
- Department of the Interior Secretarial Order No. 3360
- Executive Order 13783 – Promoting Energy Independence and Economic Growth

- Interior's Plan for a Coordinated, Science-Based Response to Climate Change Impacts on Our Land, Water, and Wildlife Resources
- United States Department of the Interior, Bureau of Reclamation (Reclamation) National Environmental Policy Act (NEPA) Handbook
- Principles and Requirements for Federal Investments in Water Resources
- Department of the Interior Climate Change Adaptation Plan

8.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Executive Order S-3-05
- California Global Warming Solutions Act of 2006 (Assembly Bill 32)
- California Executive Order B-30-15 and Senate Bill 32
- California Environmental Quality Act Guidelines

8.1.2.3 Regional/Local

The following regional and local laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- San Joaquin Valley Air Pollution Control District (SJVAPCD) Programs

8.1.3 Existing Conditions

This section presents projections of the foreseeable affected environment for use as the basis against which the incremental effects of the alternatives are compared in Section 8.2 and to indicate the likely effect of climate change on the alternatives.

GHGs – carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons – are emitted from human activities and natural systems into the atmosphere and trap heat that would otherwise be released into space. Thermal radiation absorbed by the GHGs is re-radiated in all directions, including back toward the surface of the earth. This results in an increase of Earth's surface temperatures above what they would be without the presence of the GHGs, which are persistent and remain in the atmosphere for long periods of time. GHGs differ from criteria pollutants in that GHG emissions do not cause direct adverse human health effects. Rather, the direct environmental effect of GHG emissions is the increase in global temperatures, which in turn has numerous indirect effects on the environment and humans.

Scientific research shows that global GHG emissions from human activities have grown since pre-industrial times, with an increase of 78 percent between 1970 and 2010 (Intergovernmental Panel on Climate Change [IPCC] 2014). Atmospheric concentrations of carbon dioxide equivalent (CO2e) were 430 parts per million (ppm) (uncertainty range of 340 to 520 ppm) in 2011, far exceeding the natural range over the last 800,000 years, as measured in ice core samples (IPCC 2014). A majority of anthropogenic CO_2 emissions is attributed to the burning of fossil fuels and land use changes, such as deforestation (California Energy Commission [CEC] 2011).

If left unchecked, by the end of the century CO_2 concentrations could reach levels three times higher than pre-industrial times, leading to climate change that threatens our public health, economy, and environment. Efforts are underway globally to both mitigate GHG emissions to prevent further climate change as well as to adapt to the unavoidable changes in climate that will result from GHGs that have already been emitted. However, recent studies show that global GHG emissions continue to rise (Melillo 2014).

8.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts associated with each alternative. The GHG analysis evaluated the following three pollutants: CO_2, CH_4, and N_2O. The other two pollutant groups commonly evaluated in various GHG reporting protocols, hydrofluorocarbons and perfluorocarbons, are not expected to be emitted in large quantities by the alternatives and are not discussed further in this section.

Additionally, the relationship of climate change effects to the environmental impacts and mitigation measures presented in other resource areas is examined in Appendix E. The Appendix discusses impacts of the action alternatives and proposed mitigation measures as anticipated for a range of possible future socioeconomic-climate scenarios.

8.2.1 Assessment Methods

8.2.1.1 Greenhouse Gas Emissions

Construction emissions are described as temporary or “short term” in duration. These temporary and short-term emissions have the potential to represent a significant impact to GHG emissions and climate change. GHG emissions are caused by on- and off-road vehicle exhaust.

The emissions estimation method (i.e., specific emission calculation equations) was based on the California Emission Estimator Model (CalEEMod), Version 2016.3.2 (California Air Pollution Control Officers Association [CAPCOA] 2017) although the calculations were performed outside of the model for flexibility. CalEEMod is “inflexible” because it is difficult to analyze projects with multiple phases or alternatives since nuanced assumptions cannot always be included in the calculations. The types and quantity of construction equipment were estimated by data provided by Reclamation. Construction-related emissions were estimated using multiple sources as described below.

- CalEEMod User's Guide, Version 2016.3.2 (CAPCOA 2017)
- OFFROAD2017 Off-Road Emissions Inventory Model (California Air Resources Board [CARB] 2017a)
- EMFAC2014 Mobile Source Emission Inventory Model (CARB 2014)
- The Climate Registry CH_4 and N_2O emission factors for highway and non-highway vehicles (The Climate Registry 2018)

Each GHG contributes to climate change differently, as expressed by its global warming potential (GWP). GHG emissions are discussed in terms of CO_2e emissions, which express, for a given mixture of GHG, the amount of CO_2 that would have the same GWP over a specific timescale. CO_2e is determined by multiplying the mass of each GHG by its GWP.

This analysis uses the GWP from the IPCC Fourth Assessment Report (Forster et al. 2007) for a 100-year time period to estimate CO_2e. This approach is consistent with the Federal GHG Reporting Rule (40 Code of Federal Regulations [CFR] 98), as effective on January 1, 2014 (78 FR 71904) and California's 2000-2015 GHG Inventory Report (CARB 2017b). The GWPs used in this analysis are 25 for CH_4 and 298 for N_2O.

The following sections provide additional discussion of emission estimation methodologies used for each source group.

8.2.1.1.1 On-Site Construction Equipment Engine Emissions

Emission factors were developed using CARB's OFFROAD2017 model. Emission factors were developed for the San Joaquin Valley Air Basin for 2020, which was assumed to be the start of construction. Although construction would occur over multiple years, because emission factors tend to decrease in future years from improved engine technology, only analyzing the first year of construction provides a worst-case emissions estimate.

The OFFROAD2017 model does not estimate emissions of CH_4 and N_2O; therefore, it was necessary to estimate these emissions separately. The Climate Registry's 2018 Default Emission Factors were used to estimate emissions. Emission factors for "Construction/Mining Equipment" were used to estimate CH_4 and N_2O emissions for all off-road construction equipment.

The average power rating (horsepower [hp]) for the equipment was provided by Reclamation. If the equipment data provided by Reclamation did not specify the hp for a specific piece of equipment, then the average hp from CalEEMod was used.

The emission factors that were developed for each piece of equipment are multiplied by the maximum number of hours that a piece of equipment could operate in one year to provide a worst-case emissions estimate. Annual emissions were calculated based on the emission factors and data provided by the design engineers.

The construction schedule is based on two 10-hour shifts plus one 3-hour maintenance shift that would occur 7 days per week. Although construction could occur during night shifts, the duration would be limited to six months per year. Reclamation indicated a preferred construction duration of 8 to 12 years, depending on fiscal and emission constraints. As was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend this construction schedule to 20 years. GHG emissions under an extended 20-year schedule would result in lower emissions in a single year of construction that cumulatively over the full 20-year schedule would be the same in total magnitude as the unconstrained schedule. The GHG impact analysis considers an 8-year construction period for the No Shear Key option and a 10-year construction period for the Shear Key option. These construction periods represent the minimum duration that is feasible for each option.

8.2.1.1.2 Off-Site Haul/Delivery Truck and Construction Worker Engine Emissions

Engine exhaust emissions would occur from several on-road vehicles including dump trucks, concrete trucks, delivery trucks, gravel/paving trucks, and soil hauling trucks. Water trucks, flatbed trucks, dump trucks, and various pickup trucks would also operate onsite during construction activities. Furthermore, emissions would also occur from construction workers commuting to the various construction sites. Off-site vehicle trip assumptions are consistent with those used in Chapter 12, Traffic and Transportation.

EMFAC2014 was used to estimate emission factors from on-road motor vehicles depending on the vehicle’s gross vehicle weight rating provided in the construction details. Construction worker commuting emissions were estimated from the San Joaquin Valley Air Basin’s fleet mix for passenger automobiles and light-duty trucks. Both gasoline and diesel engines were assumed to be used by the construction workers.

For the haul/delivery trucks and construction workers, emission factors were estimated from the aggregated speeds in the San Joaquin Valley Air Basin (i.e., a “burden” model run), rather than a specific speed. The onsite trucks were assumed to operate at 40 miles per hour (mph).

The EMFAC2014 model does not estimate emissions of CH_4 and N_2O; therefore, it was necessary to estimate these emissions separately. The Climate Registry’s 2018 Default Emission Factors were used to estimate emissions. Emission factors for “Diesel Medium and Heavy-Duty Vehicles (Trucks and Busses)” were used to estimate CH_4 and N_2O emissions for all haul and delivery trucks. Construction worker emission factors were estimated based on the county-specific fleet mix of "Gasoline Passenger Cars," "Gasoline Light Trucks (Vans, Pickup Trucks, Sport Utility Vehicles)," "Diesel Passenger Cars," and "Diesel Light Trucks."

8.2.1.2 Climate Change Analysis

The climate change impact assessment characterizes the sensitivity of environmental effects evaluated in this Environmental Impact Statement/Report (EIS/EIR) to uncertainties in potential future socioeconomic and climatic conditions. As previously discussed, Section 15126.2(a) of the California Environmental Quality Act (CEQA) Guidelines require Lead Agencies to consider the effects of placing projects in locations susceptible to hazardous conditions. Because climate change can affect hazards like flooding and wildfire, this section thereby requires the effects of climate change to be analyzed under CEQA.

Appendix E, Climate Change Analysis, presents the significance determinations made in Chapters 4 through 25, and evaluates how those significance determinations could be changed under future climate change scenarios. This analysis does not identify new impacts that were not already analyzed in the other chapters; it instead describes how those impacts might change with future climate change.

8.2.2 Significance Criteria

The significance criteria described below were developed consistent with the CEQA Guidelines to determine the significance of potential impacts on air quality. Impacts on GHG emissions would be considered potentially significant if the proposed project or alternatives would:

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

In addition to the general criteria provided above, individual air districts may also establish significance criteria that would also be applicable. Additional significance criteria by air district are provided below.

8.2.2.1 DWR Climate Action Plan

In May 2012, DWR adopted the DWR Climate Action Plan-Phase I: Greenhouse Gas Emissions Reduction Plan (GGERP), which details DWR's efforts to reduce its GHG emissions consistent with Executive Order S-3-05 and the Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32). DWR also adopted the Initial Study/Negative Declaration prepared for the GGERP in accordance with the CEQA Guidelines review and public process. Both the GGERP and Initial Study/Negative Declaration are incorporated herein by reference and are available at:

http://www.water.ca.gov/climatechange/CAP.cfm. The GGERP provides estimates of historical (back to 1990), current, and future GHG emissions related to operations, construction, maintenance, and business practices (e.g., building-related energy use). The GGERP specifies aggressive 2020 and 2050 emission reduction goals and identifies a list of GHG emissions reduction measures to achieve these goals.

DWR specifically prepared its GGERP as a "Plan for the Reduction of Greenhouse Gas Emissions" for purposes of CEQA Guidelines Section 15183.5. That section provides that such a document, which must meet certain specified requirements, "may be used in the cumulative impacts analysis of later projects." Because global climate change, by its very nature, is a global cumulative impact, an individual project's compliance with a qualifying GHG reduction plan may suffice to mitigate the project's incremental contribution to that cumulative impact to a level that is not "cumulatively considerable." (See CEQA Guidelines, Section 15064, subd. (h)(3).)

More specifically, "[l]ater project-specific environmental documents may tier from and/or incorporate by reference" the "programmatic review" conducted for the GHG emissions reduction plan. "An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project." (CEQA Guidelines Section 15183.5, subd. (b)(2).)

Section 12 of the GGERP outlines the steps that each DWR project will take to demonstrate consistency with the GGERP. These steps include: 1) analysis of GHG emissions from construction of the proposed project, 2) determination that the construction emissions from the project do not exceed the levels of construction emissions analyzed in the GGERP, 3) incorporation into the design of the project DWR's project level GHG emissions reduction strategies, 4) determination that the project does not conflict with DWR's ability to implement any of the "Specific Action" GHG emissions reduction measures identified in the GGERP, and 5) determination that the project would not add electricity demands to the State Water Project system that could alter DWR's emissions reduction trajectory in such a way as to impede its ability to meet its emissions reduction goals.

Consistent with these requirements, a GGERP Consistency Determination Checklist for each alternative documenting if the project has met each of the required elements is included as Appendix D2.

8.2.2.2 DWR Extraordinary Construction Project Determination

If construction activities are to be performed by outside contractors, then the project must be evaluated against the Extraordinary Construction Project Thresholds established by DWR:

- Total Construction Emissions of 25,000 metric tons CO_2e ($MTCO_2e$)
- Maximum Annual Construction Emissions of 12,500 $MTCO_2e$

If the project exceeds either one of these thresholds, then the construction emissions from the project must be analyzed and, if necessary, mitigated on a project-specific basis. Even if a project exceeds the Extraordinary Construction Project thresholds, only the construction activity emissions need to be analyzed on a project-specific basis. However, projects can still rely on the analysis in the GGERP for operations, maintenance, and business activity emissions provided they meet other consistency requirements.

8.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative includes the most likely future conditions in the absence of the project. This analysis assumes that no short-term construction activities or long-term operational impacts would occur. As such, GHG emissions would be the same as those presented in Section 8.1.3, Existing Conditions. **Therefore, the No Action/No Project Alternative would have no impact to GHG emissions.**

8.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

Construction and operation associated with the Reservoir Restriction Alternative could generate GHG emissions, either directly or indirectly, that could have a significant impact on the environment. The Reservoir Restriction Alternative would restrict the amount of water stored in the San Luis Reservoir to reduce the likelihood of overtopping if the dam failed during a seismic event. No short-term construction activities at B.F. Sisk Dam or long-term operational impacts to GHG emissions from changes in reservoir operations would occur. However, minor emissions would occur from hydroseeding activities that would take place to cover the new exposed areas of the reservoir rim. Table 8-1 summarizes the construction-related emissions associated with construction equipment, hydroseeding trucks, and construction worker commuting. All construction activities were assumed to occur in one year.

Table 8-1. Reservoir Restriction Alternative – Unmitigated Construction Emissions

Source	CO_2e (MT/project)	CO_2e (MT/year)
Onsite Construction Equipment	1,025	1,025
Construction Worker Commuting	155	155

Source	CO_2e (MT/project)	CO_2e (MT/year)
Total Construction Emissions [1]	**1,181**	**1,181**
Significance Threshold	25,000	12,500
Significant?	No	No

Notes:
[1] Totals may not add exactly because of rounding.
Key: CO_2e = carbon dioxide equivalent; MT = metric tons

As discussed in Chapter 2, Project Description, following completion of the Reservoir Restriction Alternative, operation of San Luis Reservoir would be constrained by a new lower maximum surface elevation and associated reduction in total storage capacity at the reservoir. Given the reduction in storage capacity at the reservoir there would be no increase in pumping at the reservoir during annual fill operations, and there would be no increase in GHG when compared to existing conditions.

As shown in Table 8-1, maximum project and annual emissions would not exceed the significance thresholds of 25,000 $MTCO_2e$ per project and 12,500 $MTCO_2e$ per year. **Therefore, the potential for the Reservoir Restriction Alternative to generate GHG emissions, either directly or indirectly, that would have a significant impact on the environment would be less than significant.**

Construction and operation associated with the Reservoir Restriction Alternative could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. If a project exceeds the significance criterion used to evaluate GHG emissions, it is assumed the project would impede the State's ability to meet its GHG emission reduction goals outlined in AB 32. Because impacts associated with the proposed construction activities would not exceed the significance criteria of 25,000 $MTCO_2e$ per project and 12,500 $MTCO_2e$ per year, the Reservoir Restriction Alternative also **would not conflict with an applicable plan, policy, or regulation adopted to reduce GHG emissions, resulting in a less than significant impact.**

8.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

Construction and operation associated with the Crest Raise Alternative could generate GHG emissions, either directly or indirectly, that could have a significant impact on the environment. Construction activities under the Crest Raise Alternative would involve the placement of additional fill material on the dam embankment to raise the dam crest, installation of two traffic signals, and potential use of a conveyor belt system. Construction-related emissions were estimated for off-road construction equipment, on-road haul trucks and delivery vehicles, and construction worker commuting. As described in Chapter 2, Project Description, the development of a foundation shear key is being evaluated as an optional modification in the Crest Raise Alternative.[1]

Table 8-2 summarizes the total (project) and annual construction-related emissions if the shear key was constructed, while Table 8-3 summarizes emissions without the shear key option.

Table 8-2. Crest Raise Alternative (Shear Key Option) – Unmitigated Construction Emissions

Source	CO_2e (MT/project)	CO_2e (MT/year)
Onsite Construction Equipment	116,093	15,488
Construction Worker Commuting	7,092	709
Haul Truck Trips	22,391	2,239
Total Construction Emissions [1]	**145,575**	**18,437**
Significance Threshold	25,000	12,500
Significant?	Yes	Yes

Notes:
[1] Totals may not add exactly because of rounding.
Key: CO_2e = carbon dioxide equivalent; MT = metric tons

Table 8-3. Crest Raise Alternative (No Shear Key) – Unmitigated Construction Emissions

Source	CO_2e (MT/project)	CO_2e (MT/year)
Onsite Construction Equipment	73,846	13,405
Construction Worker Commuting	5,673	709
Haul Truck Trips	22,391	2,799
Total Construction Emissions [1]	**101,910**	**16,913**
Significance Threshold	25,000	12,500
Significant?	Yes	Yes

Notes:
[1] Totals may not add exactly because of rounding.
Key: CO_2e = carbon dioxide equivalent; MT = metric tons

As discussed in Chapter 2, Project Description, following completion of construction of the Crest Raise Alternative, operation of San Luis Reservoir will continue consistent with the existing configuration and no change in storage capacity at the reservoir will occur. Therefore, no long-term changes in operational emissions would occur.

[1] A foundation shear key is developed by over excavating the weak overburden foundation soils found beneath the berm footprint and replacing them with material with a higher shear strength.

As shown in Table 8-2 and Table 8-3, maximum project and annual emissions would exceed the significance thresholds of 25,000 $MTCO_2e$ per project and 12,500 $MTCO_2e$ per year. **Therefore, the potential for the Crest Raise Alternative to generate GHG emissions, either directly or indirectly, that would have a significant impact on the environment would be significant.** Implementation of Mitigation Measure GHG-1 would reduce impacts to less than significant. **Impacts associated with the proposed construction and operation of the Crest Raise Alternative would be reduced to less than significant after implementation of mitigation.**

Construction and operation associated with the Crest Raise Alternative could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. If a project exceeds the significance criterion used to evaluate GHG emissions, it is assumed the project would impede the State's ability to meet its GHG emission reduction goals outlined in AB 32. Because impacts associated with the proposed construction activities would exceed the significance criteria of 25,000 $MTCO_2e$ per project and 12,500 $MTCO_2e$ per year, the Crest Raise Alternative also **would conflict with an applicable plan, policy, or regulation adopted to reduce GHG emissions, resulting in a significant impact.** Implementation of Mitigation Measure GHG-1 would reduce impacts to less than significant. **The proposed construction and operation of the Crest Raise Alternative would conflict with GHG reduction plans, policies or regulations pre-mitigation, but would not conflict with plans, policies, or regulations after implementation of mitigation, resulting in a less than significant impact on GHG emissions.**

8.3 Comparative Analysis of Alternatives

Table 8-4 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 8-4 are NEPA impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 8-4. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction and operation associated with the alternative could generate GHG emissions, either directly or indirectly, that could cause a significant impact on the environment.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	GHG-1	LTS

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction and operation associated with the alternative could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	GHG-1	LTS

Key: -- = not required per CEQA Guidelines; LTS = less than significant; NI = no impact; None = no mitigation required; S = significant

8.4 Mitigation Measures

The following mitigation measures would reduce the severity of the GHG impacts. They would be included in bid documents and construction contracts and their implementation would be monitored by the Lead Agencies.

GHG-1 Reclamation will require the contractor to purchase carbon offsets before construction activities commence in an amount sufficient to reduce GHG emissions to less than significant levels using DWR significance thresholds; a minimum of 120,575 $MTCO_2e$ would be required to reduce emissions below the project-level significance threshold. Only emission offsets generated as part of CARB's Compliance Offset Protocols (developed for the AB 32 cap-and-trade program) may be used to reduce GHG emissions. These protocols assure that offsets are real, permanent, quantifiable, verifiable, enforceable, and additional (Health and Safety Code Section 38562(d)). Registries selling approved offsets include the American Carbon Registry, the Climate Action Reserve, and the Verified Carbon Standard.

8.5 Potentially Significant Unavoidable Impacts

None of the action alternatives would result in potentially significant unavoidable impacts on GHG emissions.

Chapter 9
Flood Protection

This section presents existing flood protection conditions in the area of analysis and potential impacts to flood protection from the implementation of the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) Environmental Impact Statement/Environmental Impact Report (EIS/EIR) alternatives.

9.1 Affected Environment/Environmental Setting

This section provides a description of applicable flood protection and dam safety regulations, laws, rules, and ordinances at the Federal, State, and local levels. In addition, current flood protection, dam safety (as it relates to flooding) and hydrologic systems in the area of analysis with the potential to be affected as a result of implementation of the No Action/No Project and action alternatives are described and discussed.

9.1.1 Area of Analysis

The project alternatives are located in Merced County and include the San Luis Reservoir; associated dams, spillways, and creeks; and the surrounding San Luis Reservoir State Recreation Area.

9.1.2 Regulatory Setting

9.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- National Flood Insurance Program
- Dam Safety Guidelines
- Executive Order 11900 – Floodplain Management
- United States Department of the Interior, Bureau of Reclamation (Reclamation), Safety of Dams Act

9.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Department of Water Resources (DWR), Division of Safety of Dams
- DWR, Division of Flood Management

9.1.2.3 Regional/Local

The following Regional/Local laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Merced County General Plan

9.1.3 Existing Conditions

9.1.3.1 Merced County - San Luis Reservoir Region

9.1.3.1.1 Hydrology

San Luis Reservoir is a major off-stream reservoir that functions by storing excess winter and spring flows exported from the Delta that are later supplied to the State Water Project (SWP) and Central Valley Project (CVP) contractors.The reservoir has a capacity of 2,027,840 acre-feet (AF) and a surface area of approximately 12,700 acres. The main purpose of the reservoir is to store and regulate water for use in the San Joaquin Valley, Santa Clara Valley and Southern California (Reclamation and California Department of Parks and Recreation [CDPR] 2013).

The entire San Luis Reservoir area is in the Panoche-San Luis Reservoir watershed, part of the San Joaquin River Basin. The Basin covers 15,880 square miles, with its major river systems consisting of the San Joaquin River and its larger tributaries, the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno Rivers (United States Geologic Survey [USGS] 1998).

The San Luis Reservoir area is drained by San Luis Creek, a tributary to the San Joaquin River. The hydrology of the watershed has been altered by the development of the reservoirs. Natural runoff is captured by canals, reservoirs, and pumping facilities, and directed into a complex network of water supply infrastructure for SWP and CVP beneficial uses. Key components of the infrastructure in the project area are the Delta-Mendota Canal (DMC), O’Neill Forebay, the California Aqueduct, San Luis Reservoir, and Los Banos Creek Reservoir (Reclamation and CDPR 2013).

San Luis Reservoir is impounded by B.F. Sisk Dam (formerly called San Luis Dam), which is at the reservoir's eastern edge and has a structural height of 382 feet and a dam crest length of 18,600 feet. The dam is owned by Reclamation, and operated as part of the CVP/SWP by DWR. Constructed between 1963 and 1967, the dam is an earthfill dam with a maximum water surface elevation of 544 feet (Reclamation 2017a). The reservoir is filled predominantly with water diverted from the Delta. Streams that drain into the reservoir include Cottonwood Creek, Portuguese Creek, and San Luis Creek, as well as numerous tributaries. There is no current streamflow monitoring at any of these inlets into the reservoir.

Historical streamflow data exists for USGS water monitoring sites located near O'Neill Forebay on San Luis Creek and on Wolf Creek near the northwestern shore of the reservoir. Historical streamflow data is summarized in Table 9-1 (USGS 2017). Figure 9-1 shows the location of these USGS stations.

Table 9-1. Historical Peak Streamflows near San Luis Reservoir

USGS Stream Gauge Site	Latitude/ Longitude	Period of Measurement (peak streamflow)	Drainage Area (sq. mi.[1])	Historical Maximum Peak Streamflow (cfs[2]) and water year	Historical Minimum Peak Streamflow (cfs) and water year	Historical Average[3] Streamflow (cfs)
11263000, San Luis Creek	37º03'55''/ -121 º04'15''	1950-1963	84.6	3,420 (1958)	0 (1950)	336
11262950, Wolf Creek	37º04'05''/ -121 º09'40''	1959-1968	2.82	207 (1963)	0 (1961 and 1964)	15.5

Source: USGS 2017.
Note:
[1] sq. mi. = square mile
[2] cfs = cubic feet per second;
[3] Measured as the median peak streamflow for the period of measurement.

O'Neill Forebay and Los Banos Creek Reservoir O'Neill Forebay is adjacent to San Luis Reservoir and acts as an equalizing basin for San Luis Reservoir. Water flows into O'Neill Forebay from the DMC and the California Aqueduct before it is pumped into San Luis Reservoir for storage. During the irrigation season, water received through the California Aqueduct is released from O'Neill Forebay into the San Luis Canal and is not stored in San Luis Reservoir. The Forebay has a surface area of 2,210 acres and a capacity of approximately 56,400 AF. The DMC is located immediately east of O'Neill Forebay, and is connected to the Forebay by a short canal (Reclamation and CDPR 2013; Reclamation 2017b).

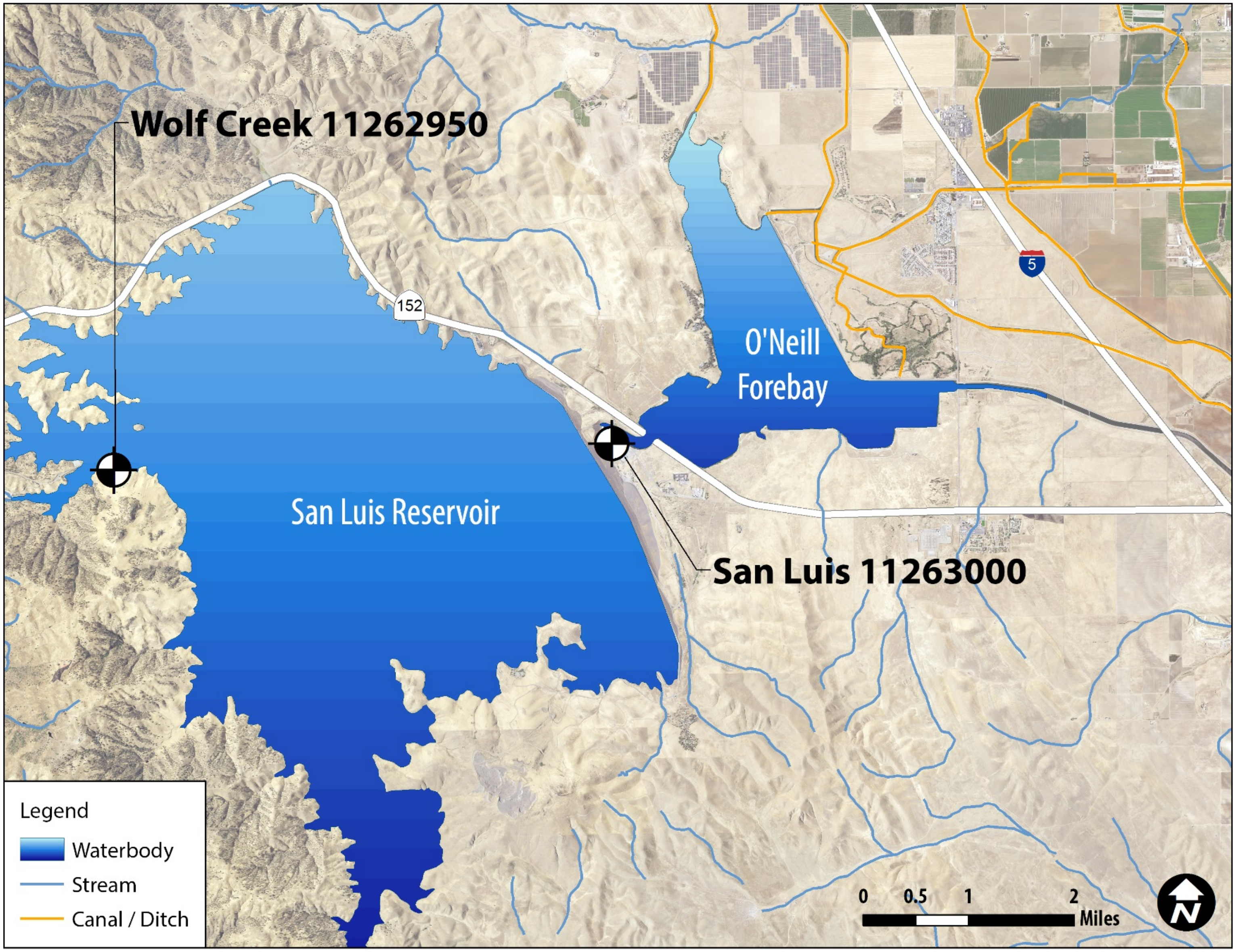


Figure 9-1. USGS Streamflow Gauges in the Area of Analysis

O’Neill Forebay operates as a forebay for water that is pumped into San Luis Reservoir and as an afterbay for San Luis Reservoir releases associated with power production and for water supply purposes. SWP water (from the California Aqueduct) and CVP water (pumped from the DMC via the O’Neill Pumping-Generating Plant) mix in the forebay (Reclamation and CDPR 2013).

The O’Neill Dam was constructed during the same time period as the B.F. Sisk Dam and has a crest elevation of 233 feet, a crest length of 14,300 feet, and a maximum water surface elevation of 225 feet (Reclamation 2017b).

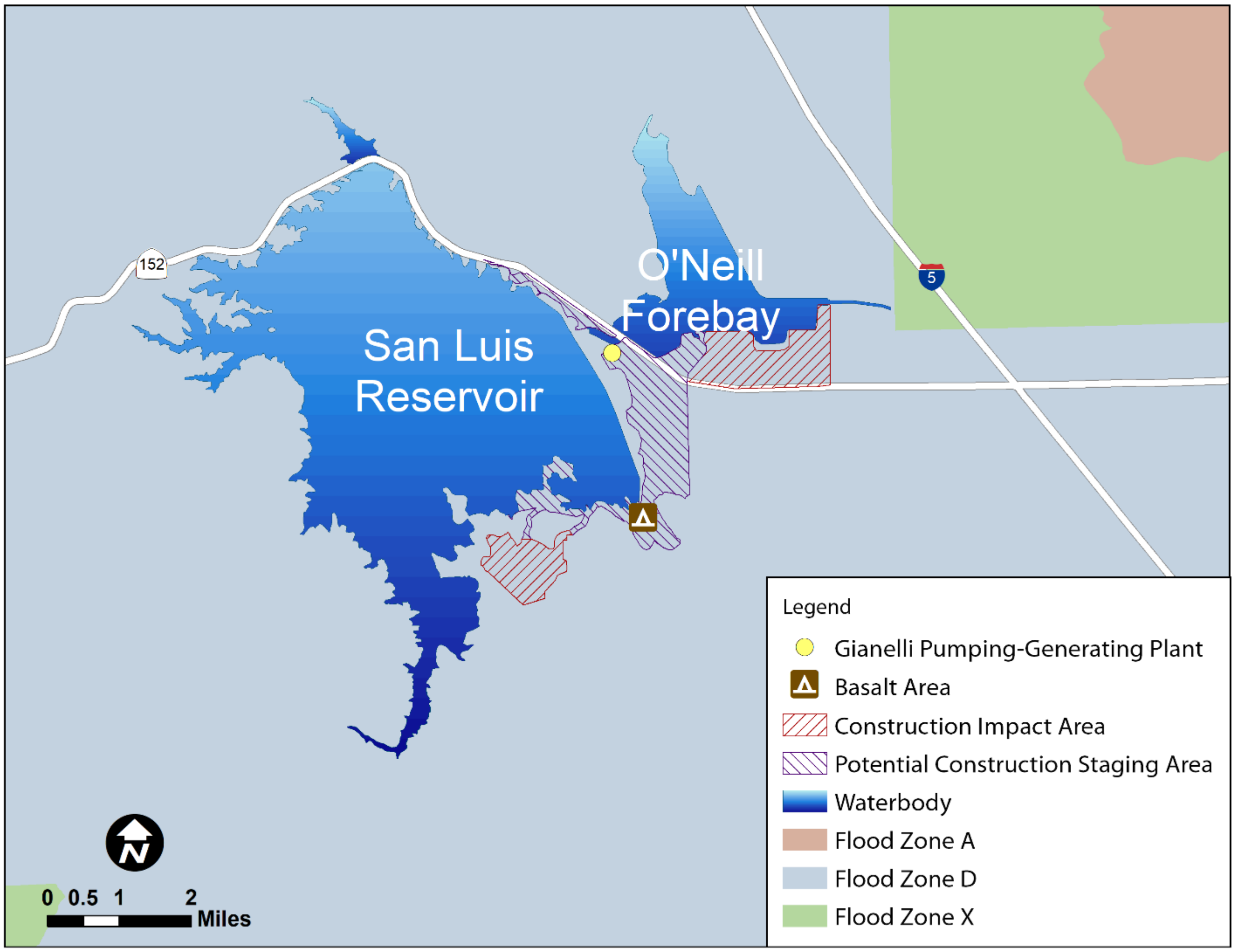
Los Banos Creek Reservoir was completed in 1965 in order to prevent stormwater runoff from flooding the California Aqueduct and the DMC. The reservoir is approximately 485 surface acres with a capacity of 34,600 AF (Reclamation and CDPR 2013).

9.1.3.1.2 Flood Risk

As shown on Figure 9-2, the area around San Luis Reservoir and O’Neill Forebay is designated on Federal Emergency Management Agency’s (FEMA) current flood insurance rate maps (FIRMs) as within Zone D and X, and some areas of Zone A at the Volta State Wildlife Area (FEMA 2017). Areas that are susceptible to flooding include the low-lying areas along San Luis Creek, Cottonwood Creek, and Los Banos Creek, as well as along the banks of San Luis and Los Banos Creek reservoirs. Flood potential at O’Neill Forebay is extremely low because water is pumped into it (Reclamation and CDPR 2013).

The San Joaquin County and City of Los Banos San Luis Reservoir dam failure inundation maps and area descriptions describe flood waters flowing in a northeast direction from the reservoir through Los Banos toward the San Joaquin River which could impact communities extending downstream and upstream along the river through Merced County, Stanislaus County, and into San Joaquin County to Stockton and San Joaquin River Delta Islands (McDonald, Bacon, Web Tract, Venice, Brannan and Staten); and upstream within Merced County (San Joaquin County OES 2003 and City of Los Banos 2013).

As noted in Chapter 25, Geology, Seismicity, and Soils, Reclamation conducted an evaluation of the dam at San Luis Reservoir and concluded that during a severe earthquake, failure of the dam could occur, leading to overtopping as a result of embankment sloughing and/or seiche generated wave action. Seiches, or large waves occurring in confined bodies of water, can also result from earthquake activity. The general plan describes that given the San Luis Reservoirs’ proximity to the San Andreas, Calaveras, and Ortigalita faults, the reservoir poses the greatest danger in the county for seiches generation (Merced County 2013b).



Source: Merced County 2013a

Figure 9-2. FEMA Flood Zones, San Luis Reservoir Area

9.2 Environmental Consequences/Environmental Impacts

The following sections describe the environmental consequences/environmental impacts associated with each alternative relative to flood protection.

9.2.1 Assessment Methods

Flood impacts under the action alternatives would stem from construction activities impeding flood flow or exposing people to flooding risks. Additionally, short-term or long-term increases in runoff could result in flooding impacts. Assessment of these potential impacts is analyzed qualitatively based on location of the alternatives in FEMA-defined flood zones as well as construction activities and the likelihood of runoff and flooding during construction. Potential impacts are discussed both for the short-term construction period as well as for long-term operations of the alternatives.

Flood risks are assessed qualitatively by considering potential changes to flood risk and to flood frequency based on existing flood risk assessment data under existing conditions of the dam.

9.2.2 Significance Criteria

The significance criteria described below were developed consistent with the California Environmental Quality Act (CEQA) Guidelines to determine the significance of potential impacts in relation flooding and flood hydrology. Impacts related to flooding would be considered potentially significant if the project would result in the:

- Placement within a 100-year flood hazard area of structures which would impede or redirect flood flows;

- Unaddressed exposure of people or structures to an unacceptable risk of loss, injury or death involving flooding, including flooding because of increase in the potential for the failure of a levee or dam.

- Substantial alteration of the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.

- Creation or contribution of runoff water which would exceed the capacity of existing or planned stormwater drainage systems.

9.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative could result in the placement of structures in the 100-year flood hazard area that could impede or redirect flood flows. There would be no construction of any new structures under the No Action/No Project Alternative. **There would be no impact from the placement of structures within the 100-year flood hazard areas compared to existing conditions.**

The No Action/No Project Alternative could result in the unaddressed exposure of people or structures to an unacceptable risk of loss, injury, or death involving flooding, including flooding because of increases in the potential for the failure of a levee or dam. Under the No Action/No Project Alternative, current operations at San Luis Reservoir would remain unchanged. Flooding would continue to occur in Merced County as it does currently under existing conditions; the flood risk would not change. There would be no construction that would result in the placement of structures in FEMA-defined flood zones and there would be no alteration of existing drainage patterns.

The modifications to B.F. Sisk Dam and foundation modifications to address seismic concerns that could result in the dam failure from overtopping generated by embankment sloughing and/or seiche generated wave action would not be addressed under the No Action/No Project Alternative. The potential for dam failure in a seismic event would remain unaddressed and the potential for flooding downstream of the dam would continue to exist unchanged. **This would be a significant impact.** The proposed modifications to B.F. Sisk Dam and San Luis Reservoir considered as a part of the B.F. Sisk Dam SOD Project would mitigate this impact, however as a part of the No Action/No Project Alternative they cannot be considered. **Therefore, this impact is significant and unavoidable.**

The No Action/No Project Alternative could result in the alteration of the existing drainage pattern and/or the creation of runoff water that would exceed the capacity of the existing or planned stormwater drainage system. Since there would be no construction and no permanent structures erected in the floodplain, there would be no alteration of the existing drainage pattern. There would be no addition of impervious surfaces under the No Action/No Project Alternative; therefore, there would be no increase in runoff water that would exceed the capacity of existing or planned stormwater drainage facilities. **There would be no impact.**

9.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

The Reservoir Restriction Alternative could result in the placement of structures in the 100-year flood hazard area that could impede or redirect flood flows. There would be no construction of any new structures under the Reservoir Restriction Alternative. **There would be no impact.**

The Reservoir Restriction Alternative could result in the unaddressed exposure of people or structures to an unacceptable risk of loss, injury, or death involving flooding, including flooding because of increases in the potential for the failure of a levee or dam. Under the Reservoir Restriction Alternative, current operations at San Luis Reservoir would change reducing the maximum surface elevation 55 feet from the current maximum elevation of 544 feet to a new maximum elevation of 489 feet. This would permanently reduce the maximum capacity of the reservoir from 2,027,840 AF to 1,383,000 AF. The reduction in water surface elevation would reduce dam failure consequences during a seismic event compared to the No Action/No Project Alternative since less water would be stored in the reservoir. There would be no construction that would result in the placement of structures in FEMA-defined flood zones and there would be no alteration of existing drainage patterns.

The potential for dam failure in a seismic event would remain unchanged under the Reservoir Restriction Alternative and the potential for flooding downstream of the dam would remain unchanged although the consequences of dam failure may be reduced.

There would be beneficial impact for unaddressed exposure of people or structures to an unacceptable risk of loss, injury, or death involving flooding from the Reservoir Restriction Alternative because the consequences of dam failure would be reduced.

The Reservoir Restriction Alternative could result in the alteration of the existing drainage pattern and/or the creation of runoff water that would exceed the capacity of the existing or planned stormwater drainage system. There would be no permanent structures erected in the floodplain, however, there would be construction associated with installation of a temporary access road and vegetation placement around the entire reservoir rim between the current maximum water surface elevation 544 feet and the proposed 55-foot restriction elevation of 489 feet. During construction there would be a temporary alteration of the existing drainage pattern. As described in more detail in Chapter 4, Water Quality, the creation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) would ensure that stormwater during construction is captured and runoff volume is reduced. With implementation of the SWPPP, stormwater runoff from the construction sites would not exceed the capacity of the existing drainage systems. Controls like temporary on site stormwater retention ponds to allow sediment settling and control flow rates specified by the SWPPP and sediment barriers would reduce flooding and stormwater discharges during construction. There would be no addition of impervious surfaces under the Reservoir Restriction Alternative; therefore, there would be no increase in runoff water that would exceed the capacity of existing or planned stormwater drainage facilities. **Therefore impacts to existing stormwater drainage system and flood control system capacity would be less than significant.**

9.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

Implementation of the Crest Raise Alternative could result in the placement of structures in the 100-year flood hazard area that could impede or redirect flood flows. As described in Section 9.1.3.1.2, San Luis Reservoir and the surrounding lands are in FEMA-designated Flood Zone D, that identifies areas with an undetermined but possible risk of flood hazard. Construction activity associated with the crest raise would temporarily place equipment and temporary structures on the dam face and in the staging areas adjacent to the dam. Final design of the Crest Raise Alternative will include the development of a construction schedule that times the completion work in the direct path of potential flood flows or on infrastructure specifically designed to direct flood flows to occur in periods of the year when rain is unlikely and reservoir levels are lower. In addition, the contractor would be required to develop a health and safety plan as an environmental commitment that includes a response plan to flood forecasts that would require the suspension of construction activities and the movement of construction equipment to higher ground.

The borrow/staging areas at Basalt Hill would be located in Flood Zone D. Although proposed improvements would be in areas where flood risks are undetermined, they would not result in significant additions of new impervious surfaces or structures that would impede flows in undeveloped areas around the reservoir and are all located upstream of the reservoir. The proposed improvements at B.F. Sisk Dam would not adversely impede or redirect flood flows compared to existing conditions. **Impacts to flood flows would be less than significant.**

Construction of the Crest Raise Alternative could result in the increased exposure of people or structures to an unacceptable risk of loss, injury or death involving flooding, including flooding because of increases in the potential for the failure of a levee or dam. As described above, areas around San Luis Reservoir are located in FEMA Flood Zone D, defined as areas of undetermined but possible flood hazard. Construction activities could temporarily increase flood hazards at B.F. Sisk Dam and in the downstream inundation area.

Modifications to B.F. Sisk Dam in support of the Crest Raise Alternative would require the temporary removal of portions of the dam embankment on the downstream slope and excavation to the dam foundation to support the anchoring of downstream stability berms to bedrock and the placement of additional embankment materials to raise the dam crest to address the potential for overtopping following embankment deformation in a seismic event. This temporary removal of embankment material and excavation of portions of the embankment down to bedrock would temporarily reduce the dam’s capacity until the fill material is replaced. As was described above, final design of the Crest Raise Alternative will include the development of a construction schedule to time embankment removal during periods of the year when reservoir levels are lower to avoid storage capacity conflicts. With the timing of construction to avoid reservoir capacity conflicts, no increases in flooding, including flooding as a result of the failure of a levee or dam would be anticipated. **Impacts to flood risk during construction of the Crest Raise Alternative would be less than significant.**

Operation of the Crest Raise Alternative could result in the unaddressed exposure of people or structures to an unacceptable risk of loss, injury or death involving flooding, including flooding because of increases in the potential for the failure of a levee or dam. Long-term operations of the Crest Raise Alternative would not differ from operations under existing conditions. The reservoir’s maximum storage capacity would not change as a result of the crest raise. The dam failure inundation area, described in Section 9.1.3.1.2, that includes the communities downstream of the dam and extending along the San Joaquin River through Merced County, Stanislaus County and into San Joaquin County to Stockton and San Joaquin River Delta Islands (McDonald, Bacon, Web Tract, Venice, Brannan and Staten) would not change. The relative risk of dam failure would be substantially reduced with implementation of the crest raise. As was described in above, B.F. Sisk Dam is currently at risk for overtopping and failure following seismic generated embankment deformation and/or seiche generated wave action. The Crest Raise Alternative has been designed to help prevent overtopping and failure as a result of seismic activity at the dam. With implementation of these dam modifications, the San Luis Reservoir crest raise would reduce the risk of flooding, including flooding as a result of the failure of a levee or dam. **Impacts to flood risk during operation of the Crest Raise Alternative would be beneficial.**

Construction of the Crest Raise Alternative could result in the alteration of the existing drainage pattern and/or the creation of runoff water that would exceed the capacity of the existing or planned stormwater drainage system. Construction activities would not significantly alter the existing drainage pattern of the areas around San Luis Reservoir where construction would take place. This includes the earthmoving activities on B.F. Sisk Dam, the modifications to the outlet structure, earthmoving activities at the borrow areas and construction and fill material storage in the staging areas.

As described in more detail in Chapter 4, Water Quality, the creation and implementation of a SWPPP would ensure that stormwater during construction is captured and runoff volume is reduced. With implementation of the SWPPP, stormwater runoff from the construction sites would not exceed the capacity of the existing drainage systems. Controls like temporary on site stormwater retention ponds to allow sediment settling and control flow rates specified by the SWPPP would reduce flooding during construction. **Impacts to flood control system capacity during construction of the Crest Raise Alternative would be less than significant.**

9.3 Comparative Analysis of Alternatives

Table 9-2 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 9-2 are National Environmental Policy Act (NEPA) impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 9-2. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction and operations of new facilities could result in the placement of structures in the 100-year flood hazard area which could impede or redirect flood flows.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction could result in the increased exposure of people or structures to an unacceptable risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Operation could result in the unaddressed exposure of people or structures to an unacceptable risk of loss, injury or death involving flooding, including flooding because of increases in the potential for the failure of a levee or dam.	Alternative 1 - No Action/No Project	S	--	SU
	Alternative 2 - Reservoir Restriction	B	None	B
	Alternative 3 - Crest Raise	B	None	B
Construction and operations could result in the alteration of the existing drainage pattern and/or the creation of runoff water that would exceed the capacity of the existing or planned stormwater drainage system.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key:
B = Beneficial
LTS = less than significant
NI = no impact
S = significant
SU = significant and unavoidable
None = no mitigation required
-- = not required per CEQA Guidelines

9.4 Mitigation Measures

No significant flood hydrology or flood protection impacts were identified for the action alternatives and no mitigation measures have been developed.

9.5 Significant Unavoidable Impacts

None of the action alternatives would result in significant and unavoidable impacts to flood hydrology or flood protection.

Chapter 10 Visual Resources

The aesthetic value of an area is derived from both natural and artificial features. The value is determined by contrasts, forms, and textures exhibited by geology, hydrology, vegetation, wildlife, and man-made features. Individuals respond differently to changes in the physical environment depending on prior experiences and expectations as well as proximity and duration of views. Consequently, aesthetic effects analyses tend to be highly subjective in nature.

This chapter describes the existing conditions with respect to aesthetic and visual resources within the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) area of analysis. Aesthetic and visual impacts as a result of the proposed alternatives are identified and discussed including mitigation measures to reduce these impacts to less-than-significant levels.

10.1 Affected Environment/Environmental Setting

This section provides an overview of the regulatory setting, and the concepts and terminology for the protection and evaluation of visual resources. It also presents a description of the visual resources with the potential to be affected by the action alternatives.

The evaluation of changes in the visual environment is based on the visual features of the landscape, their quality and character, and their importance to people. These features of the project landscape are assessed and described below. Identification of a project area's existing visual resources and conditions involves three steps:

- Objective identification of visual resources of the landscape,
- Assessment of the character and quality of those resources relative to overall regional visual character, and
- Determination of the importance of views of visual resources in the landscape to people.

10.1.1 Area of Analysis

The area of analysis for the evaluation of visual resources comprises the areas where important visual resources could be affected in the short- and long-term from implementation of the alternatives. Specifically, areas considered below include San Luis Reservoir and O'Neill Forebay vicinities (Merced County). Figure 10-1 shows the visual resources areas of analysis.

10.1.2 Regulatory Setting

The following section considers Federal, State, and local policies, guidelines and regulations applicable to the maintenance and protection of visual resources.

10.1.2.1 Federal

The following Federal policy is applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- San Luis Reservoir State Recreation Area Resource Management Plan/ General Plan

There is a Federal Scenic Byway Program, however no federally listed scenic byways are located within the area of analysis.

10.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- San Luis Reservoir State Recreation Area Resource Management Plan/ General Plan (as noted above in Section 10.1.2.1, Federal)
- State Scenic Highway Program

10.1.2.3 Regional/Local

The following regional/ local policy is applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Merced County General Plan

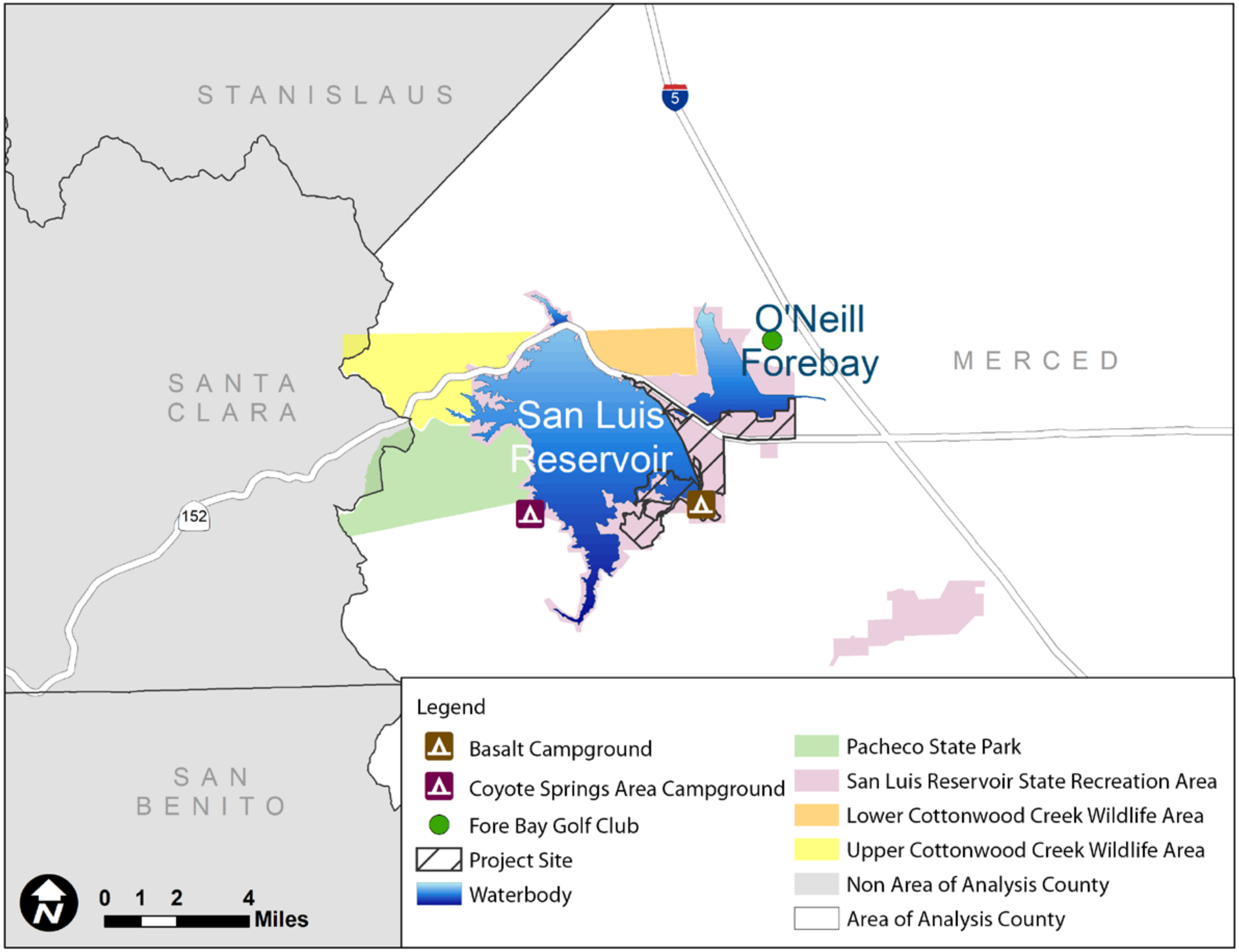


Figure 10-1. Visual Resources Area of Analysis

10.1.3 Existing Conditions

The following section describes the existing visual resources in the project area that have the potential to be affected by implementation of the B.F. Sisk Dam SOD Modification Project alternatives. In order to analyze the importance of an impact on a visual resource, it is necessary to classify the value of that visual resource. This environmental assessment relied on the United States Department of Agriculture (USDA), Forest Service Scenery Management System (SMS) to classify the visual resources in the project area.

The SMS process for analysis of visual resources takes the landscape character that defines the unique biological and physical elements of a landscape and uses Scenic Attractiveness classes to determine the relative scenic value of these lands. Scenic attractiveness is important for indicating the intrinsic scenic beauty of a landscape. It helps determine landscapes that are important for scenic beauty, based on commonly held perceptions of the beauty of landform, vegetation pattern, composition, surface water characteristics, and land use patterns.

The three classes of Scenic Attractiveness that are used in the following description of existing conditions in the project area are:

- **Class A, Distinctive –** Areas where landform, vegetation patterns, water characteristics, and cultural features combine to provide unusual, unique, or outstanding scenic quality. These landscapes have strong positive attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.

- **Class B, Typical –** Areas where landform, vegetation patterns, water characteristics, and cultural features combine to provide ordinary or common scenic quality. These landscapes have generally positive, yet common, attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance. Normally they would form the basic matrix within the ecological unit.

- **Class C, Indistinctive -** Areas where landform, vegetation patterns, water characteristics, and cultural land use have low scenic quality. Often water and rockform of any consequence are missing in class C landscapes. These landscapes have weak or missing attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.

Using the SMS, the determination and measure of Scenic Attractiveness is formed through the combination of valued landscape elements such as landform, water characteristics, vegetation, and cultural features. The USDA defines these as the following:

- Landform Patterns and Features: Includes characteristic landforms, rock features, and their juxtaposition to one another.
- Surface Water Characteristics: The relative occurrence and distinguishing characteristics of rivers, streams, lakes, and wetlands. Includes features such as waterfalls and coastal areas.
- Vegetation Patterns: Relative occurrence and distinguishing characteristics of potential vegetative communities and the patterns formed by them.
- Land Use Patterns and Cultural Features: Visible elements of historic and present land use which contribute to the image and sense of place.

In addition to scenic attractiveness, the SMS uses Landscape Visibility to develop a meaningful measurement of the relative importance and sensitivity or what is seen and perceived in the landscape. Landscape visibility is defined as a function of many essential, interconnected considerations, including, the context of viewers, duration of the view, degree of discernable detail, seasonal variations, and the number of viewers.

Because visual sensitivity as well as judgments of visual quality and viewer response is dependent on a number of conditions, they tend to be subjective in nature. For example, visual sensitivity and importance is high for constituents viewing portions of the landscape from travelways and use areas as these areas are valued for their scenic quality, aesthetic values, and landscape merits (USDA, Forest Service 1995). In order to develop meaningful conclusions from the subjective nature of visual resource analysis, the SMS uses Concern Levels to measure the degree of public importance placed on landscapes viewed from travelways (linear concentrations of public-viewing, including highways, trails, commercial flight paths, and waterways) and use areas (spots that receive concentrated public-viewing use) (USDA, Forest Service 1995). Concern levels are divided into three categories that rank interest in scenery: levels 1 (high), 2 (moderate), and 3 (low). The level of concern assigned to a visual resource is further influenced by whether the travelway and use area are defined as primary (national and/or regionally important locations largely associated with recreation and tourism use), and secondary (locally important locations associated with all types of use including recreation and tourism).

The following section describes the existing conditions and representative value classifications of visual resources in the project area.

10.1.3.1 San Luis Reservoir

The San Luis Reservoir is located in the hills of the western San Joaquin Valley near historic Pacheco Pass. With a recreation area of 23,551 acres, the San Luis Reservoir State Recreation Area (SRA) provides boating, fishing, boardsailing, camping, and picnicking. In the spring, the reservoir area offers wildflower viewing opportunities. Figures 10-2 and 10-3 show the reservoir from different angles. Figure 10-3 shows the Gianelli Intake in the background.

Source: Photograph taken by Stacy Porter, CDM Smith 2008.

Figure 10-2. San Luis Reservoir

Source: Photograph taken by Stacy Porter, CDM Smith 2008.

Figure 10-3. San Luis Reservoir and Gianelli Intake Facility

A visitor center at the Romero Overlook (Figures 10-4 and 10-5) offers information on the reservoir and provides telescopes for viewing the area around the reservoir. The visitor center, a Class A visual resource, is located high above the reservoir and provides expansive views to the east, west, and south (United States Department of the Interior, Bureau of Reclamation [Reclamation] and the California Department of Parks and Recreation [CDPR] 2013). The reservoir typically has Class A and B visual resources.

At full capacity, the reservoir has a surface elevation of 545 feet above mean sea level and a surface area of approximately 13,000 acres. The majority of the area surrounding the reservoir is a rural landscape of open space. Predominant vegetation communities include annual grassland, valley foothill riparian, and blue oak woodland. Areas of native and non-native trees, near the boat launch and the campground, create a noticeable contrast to the surrounding low-lying grassland vegetation.

Source: Photograph taken by Stacy Porter, CDM Smith 2008.

Figure 10-4. Romero Outlook Visitors Center

Source: Photograph taken by Stacy Porter, CDM Smith 2008.

Figure 10-5. Views from the Romero Outlook Visitors Center

Developed areas surrounding the reservoir include roads, reservoir facilities, and infrastructure (including State Route [SR] 152, the B.F. Sisk Dam, auxiliary facilities, parking areas, and recreation facilities). Other facilities include the boat launch, campgrounds, parking, and day-use picnic area (Reclamation and CDPR 2013). Views from these use areas at the reservoir can be classified as Class A visual resources.

Visitors also come to the reservoir area to experience the two wildlife areas, the San Luis Reservoir National Wildlife Area (a Federally designated park), and the O'Neill Forebay Wildlife Area (a State designated park). Additional areas of visual importance surrounding the reservoir include Pacheco State Park and the Cottonwood Wildlife Areas to the northeast and northwest of the reservoir (Reclamation and CDPR 2013). Water resources and wildlife parks can be classified as Class A and B visual resources.

Overall, the area around the reservoir offers open scenic vistas of undeveloped land and open water. These scenic qualities are enhanced by the surrounding undeveloped landscape consisting of "open grassland, expansive vistas of the rolling terrain and the adjacent Diablo range" (Reclamation and CDPR 2013). Most shoreline areas allow for uninterrupted views of the open water from the three nearby reservoirs (San Louis Reservoir, O'Neill Forebay, and Los Banos Reservoir). The views from the north and south plateaus at the Los Banos Reservoir provide a vista opportunity of the water and adjacent landscape. The *San Luis SRA Regional Management Plan/General Plan* notes that future plans for facilities and landscape features should consider the open, uninterrupted nature of the landscape (Reclamation and CDPR 2013). While there are developed areas around the reservoir (as noted above), the overall layout and configuration of the built structures is "clustered in succinct areas, reducing the sense of sprawl and visual clutter" (Reclamation and CDPR 2013). Additionally, many of the engineered built structures contribute to the understanding of the site as a water storage and distribution facility in those areas.

State designated scenic highways include SR 152 from the Santa Clara County line to the junction with Interstate 5. The route passes through Upper Cottonwood Wildlife Area and around the northern end of the reservoir. As it curves around through the Lower Cottonwood Wildlife Area, towards O'Neill Forebay and its intersection with Interstate 5, SR 152 passes by the Romero Overlook and visitor center.

The mountainous terrain through which this portion of SR 152 passes is mostly undeveloped. After Pacheco Pass as the road approaches the reservoir, grassland vegetation begins to dominate the landscape. Expansive views of the San Luis Reservoir and the Central Valley (in the distance) can be seen travelling west on SR 152, nearing the reservoir. Views from this route can be classified as Class A visual resources.

Major viewer groups at the reservoir and reservoir facilities are the travelers on SR 152, recreationists at the reservoir and Romero Outlook Visitor Center, and facility staff members. SR 152 carries both recreational and non-recreational travelers. Therefore, the visual sensitivity and viewer concern level along this portion of SR 152 within the project area would be considered moderate. Recreationists at the reservoir and the Romero Outlook Visitor Center have high visual sensitivity because of the recreational nature of the area. Employees do not generally view the project area for extended periods of time because they are focused on work activities, and they often live outside the vicinity of their working environment. Therefore, workers would have Low to Moderate sensitivity to visual changes in the environment.

Table 10-1 outlines the scenic value classifications at San Luis Reservoir.

Table 10-1. Scenic Value Classification: San Luis Reservoir

Region	Scenic Attractiveness[1]	Concern Levels[2]	Travelways and Use Areas
San Luis Reservoir	Class A	Recreationist – 1 Non-Recreational Travelers – 2 Area Workers – 2/3	Primary

Key:
[1] Scenic Attractiveness: Class A - Distinctive, Class B - Typical, Class C - Indistinctive
[2] Concern Levels: 1 = High, 2 = Moderate, 3 = Low

10.2 Environmental Consequences/Environmental Impacts

Following sections describe the environmental consequences and impacts to existing visual resources and resource values associated with each alternative.

Impacts to visual resources are determined relative to existing conditions (for the California Environmental Quality Act [CEQA]) and the No Action/No Project (for National Environmental Policy Act [NEPA]). However, as described below, the No Action/No Project Alternative would be very similar to existing conditions because visual resources are not anticipated to experience substantive changes in the area of analysis. Therefore, the analysis compares the impacts of the action alternatives only to the impacts of the No Action/No Project Alternative.

10.2.1 Assessment Methods

Assessment of visual resources; their value and importance to viewers in the study area; and, the potential impacts to these resources from implementation of the project alternatives was accomplished through the use of the Forest Service's SMS, outlined in *Landscape Aesthetics: A Handbook for Scenery Management, Agriculture Handbook Number 701* (USDA, Forest Service 1995). The SMS is used to categorize the visual resources within the project area and to analyze the significance of potential impacts to these resources from the implementation of the project alternatives. Applicable to both national forest land and land outside national forests in the United States and other parts of the world, the SMS establishes common terminology; consistent procedures for inventory, analysis, and synthesis; standards and guidelines for scenery management; and, techniques for monitoring. Specific classification techniques are described in Section 10.1.3, above.

In assessing the environmental consequences that could result from implementation of the project alternatives, the type/class of visual resource affected, the duration and extent of the impact on that resource, the location, and the people who would see the impacted visual resource were considered.

Reservoirs are generally Class A or B visual resources when their water surface elevations are near to or at their maximum. An adverse visual effect to reservoirs would occur if surface water elevation levels decreased to a level such that shoreline riparian vegetation were reduced or the "bathtub" ring was substantially larger than under the existing conditions or the No Action/No Project Alternative.

10.2.2 Significance Criteria

The significance criteria described below were developed consistent with the CEQA Guidelines to determine the significance of potential impacts on visual resources that could result from implementation of the project. Impacts on visual resources would be considered potentially significant if the project would:

- Have a substantial adverse effect on a scenic vista (areas with Scenic Attractiveness Class A or Class B classifications are considered scenic vistas);
- Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings, within a State scenic highway corridor;
- Substantially degrade the existing visual character or quality of the site and its surroundings;
- Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.

The significance criteria described above apply to areas where visual resources could be affected by the project.

10.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative includes the most likely future conditions in the absence of the project. The Future No Action Baseline would provide no direct remedy to the problems associated with the B.F. Sisk Dam. The dam would continue to be susceptible to liquefaction and a reduction of the crest elevation caused by seismic loading and the seismic risk would remain unchanged. The potential for dam failure would also remain.

Implementation of the No Action/No Project Alternative could damage scenic resources or substantially degrade the existing visual character or quality of the site (including State scenic highways) and its surroundings. Under this No Action/No Project Alternative, there would be no construction or changes to existing operations in the study area. **There would be no impact.**

10.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

Construction activities and staging of construction materials could have short-term adverse effects on Class A and Class B visual resources, existing visual character of the area, and may create light glare in the reservoir region. Construction actions are limited to revegetation of the reservoir rim between the maximum pool elevation and the proposed maximum restricted reservoir water surface planned with the Reservoir Restriction Alternative. Construction actions would begin in spring to early summer and last 1.5 years. These actions would include application of a green hydroseed mixture along the rim of the reservoir. The presence of the green hydroseed mixture along the reservoir rim would be visually contrasting to the surrounding seasonally brown vegetation. However, within approximately 5 to 10 days of application, seeds begin to germinate and within a season, vegetation will grow replacing the green hydroseed mixture. **Therefore, short-term, construction-related adverse impacts to visual resources would be less than significant.**

Construction activities could substantially damage scenic resources within a State scenic highway. As stated above, construction activities are limited to revegetation of the reservoir rim. Although the presence of the green hydroseed mixture would contrast from the surrounding seasonally brown vegetation, seeds begin to germinate quickly post-application, with vegetation replacing the green hydroseed mixture within a season. No upgrades to SR 152 are proposed. **There would be a less than significant impact to scenic resources within a designated State scenic highway as a result of the Reservoir Restriction Alternative.**

Under the Reservoir Restriction Alternative, operational changes at the San Luis Reservoir could affect visual resources. Operational changes at the San Luis Reservoir under the Reservoir Restriction Alternative would consist of reducing maximum surface elevation in San Luis Reservoir 55 feet, from the current maximum elevation of 544 feet to a new maximum elevation of 489 feet. This would permanently reduce the maximum capacity of the reservoir from 2,027,840 acre-feet (AF) to 1,383,000 AF.

Storage at San Luis Reservoir is highly variable throughout the year as the reservoir refills in the fall and winter months and releases water in spring and summer to meet Central Valley Project and State Water Project water demands. Currently, the reservoir rarely reaches the current maximum capacity of 2,027,840 AF. Under the Reservoir Restriction Alternative these same seasonal fluctuations would occur, resulting in similar visual impacts. In addition, implementation of this alternative would include revegetation of the reservoir rim through the process of hydroseeding. In the long-term, revegetation efforts will ensure visual integrity of the reservoir. Due to the implementation of revegetation actions, a reduction in reservoir surface water levels would not significantly affect the reservoirs visual resources. **The Reservoir Restriction Alternative would have a less than significant effect on visual resources from operational changes at the San Luis Reservoir.**

10.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

Construction activities and staging of construction materials could have short-term adverse effects on Class A and Class B visual resources and existing visual character of the area. Possible impacts would come from construction activities including the staging and removal of construction equipment. Two stockpile and staging areas would be established at B.F. Sisk Dam, a 1,000-acre area located south of Gianelli Intake Facility off of Basalt Road and a 120-acre area north of Gianelli Intake Facility off of Gonzaga Road. The construction activities associated with the Alternative 3 shear key and without shear key options, as discussed in Chapter 2, Project Description, would introduce considerable heavy equipment and associated vehicles into the viewshed of the reservoir. This equipment and construction material would be temporarily visible to motorists using adjacent public roadways (including SR 152), the Romero Outlook Visitors Center, and open space areas, such as the Cottonwood Creek Wildlife Area and portions of Pacheco State Park. The contractor would implement fugitive dust control measures as described in Chapter 7, Air Quality, which would reduce visible dust and emissions at the site.

Construction activities would include blasting at Basalt Use Area, which would take place from 6:00 a.m. to 6:00 p.m., seven days per week, for the entire duration of construction. Blasting activities would affect the visual integrity of the area, by changing the visual contour of the blasting area. However, Basalt Use Area will be closed to the public for the full duration of construction, restricting views of the blasting site and reducing the visual impact.

Construction activities for this alternative are estimated to take 8 to 10 years. With the addition of the shear key option, construction is expected to last approximately 10 to 12 years. As was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend this construction schedule to 20 years. With the exclusion of blasting, work would be performed 24 hours a day, seven days per week. Construction activities are expected to generate up to 59 large deliveries to the site or waste material transports offsite per day, in addition to commuting construction personnel.

Recreation use for boating on the reservoir would be supported through the use of the boat launch at Dinosaur Point, but would be limited to areas away from B.F. Sisk Dam for the full duration of construction. Background views of the reservoir from more distant locations like public roadways (including SR 152), the Romero Outlook Visitors Center, and open space areas, such as the Cottonwood Creek Wildlife Area and portions of Pacheco State Park, would have added visual distraction in the short-term given the introduction of construction equipment and construction traffic. Background views of B.F. Sisk Dam from these same locations would also be impacted with the introduction disturbed earth on the dam face and crest. However, the panoramic nature of background views from these distant static viewing locations and the speed of motorists passing the dam site from adjacent roadways would reduce the overall influence of the short-term visual distraction during daytime hours, generated by construction activities from the B.F. Sisk Dam crest raise. **Therefore, this would be a less than significant impact to visual resources.**

Construction activities and staging of construction materials could create light glare in the reservoir region. Proposed nighttime construction activities will result in nighttime construction lighting. Lights in the construction area would have a negative impact on nighttime views in the project area. Construction lighting will be removed after construction activities are completed and no new permanent source of lighting would be installed. The introduction of construction lighting to support nighttime work would, however, add a more substantial visual distraction to the landscape with new stationary lighting sources at staging areas and on the dam embankment as well as mobile lighting sources on construction equipment and vehicles traversing the site given the contrast from the otherwise low light condition in the surrounding landscape. **Therefore, the use of construction lighting during development of the B.F. Sisk Dam Crest Raise Alternative would generate a significant impact on nighttime visual quality in the study area.**

Implementation of Mitigation Measure VIS-1, described in Section 10.4, would reduce the severity of this individual effect on nighttime light by adding shielding to lighting in use at the construction sites to minimize visual impacts in the study area from nightime construction actions at B. F. Sisk Dam. **With the implementation of Mitigation Measure VIS-1, this short-term impact would be less than significant.**

Construction activities could substantially damage scenic resources within a State scenic highway. The access route to the two main staging areas would be SR 152 to Basalt Road. No improvements to this access route will be necessary to accommodate the trucks and other heavy equipment anticipated during construction.

As was noted above, the introduction of construction equipment and vehicles, construction lighting, and the introduction of disturbed earth on the dam face and crest could introduce new visual distraction to views from SR 152 B.F. Sisk Dam. Background views of B.F. Sisk Dam from these same locations would also be impacted with the introduction of visual distractions including construction equipment travelling to and from the blasting site at Basalt Hill within the Basalt Use Area. As was noted above, the distance separating motorists from the construction areas at the B.F. Sisk Dam face, nearby staging areas and the distant Basalt Hill to motorists using SR 152 along with the speed that those motorists would both limit the magnitude of any impact on those viewers' scenic experience.

In the long-term, as is indicated in Figures 10-6 and 10-7, the addition of the 12 foot crest raise and downstream berm would generate a small multiple year change to the color and texture of the dam face's appearance for motorists using SR-152, however given the scale of the overall dam face and the relative similarity in color of the new embankment material in comparison to the existing embankments appearance would limit the magnitude of this change to the resource's overall aesthetic quality. Over time, any change in the perceived color and texture of the dam face would fade and return to pre-project condition. **Therefore, this would be a less than significant impact to scenic resources within a State scenic highway.**

Figure 10-6. Existing View of B.F. Sisk Dam from State Route 152

Figure 10-7. View of B.F. Sisk Dam After Construction of the Crest Raise Alternative

Under the Crest Raise Alternative, structural changes to B.F. Sisk Dam as well as operational changes at the San Luis Reservoir could affect visual resources. In the long-term, changes to scenic quality generated by the construction activities at B.F. Sisk Dam in the foreground for recreation users at San Luis Reservoir and in the background from vistas along public roadways (including SR 152), at the Romero Outlook Visitors Center, and open space areas, such as the Cottonwood Creek Wildlife Area and portions of Pacheco State Park would be anticipated to return to their current quality level. The contrast generated by introduction of new visual massing with the new 12 foot crest raise and downstream berm would as was noted above be anticipated to fade over time as new embankment materials are reduced in tone through weathering driven primarily by sun exposure. Figure 10-6 shows the existing views of B.F. Sisk Dam from SR 152 and Figure 10-7 shows the approximate change to B.F. Sisk Dam after construction of the Crest Raise Alternative. Changes to the visual landscape at Basalt Use Area would also be addressed through the contouring of the site to match surrounding slope and adjacent visual quality.

Following completion of construction of the Crest Raise Alternative, storage operations at San Luis Reservoir will continue consistent with the existing configuration and no long-term change in storage capacity would be generated at the reservoir. Given the anticipated return to pre-project conditions with natural weathering of the new embankment and berm material added to the dam face, **the long-term effect on visual resources from the Crest Raise Alternative would be less than significant**.

10.3 Comparative Analysis of Alternatives

Table 10-2 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 10-2 are NEPA impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 10-2. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Have a substantial adverse effect on a scenic vista (areas with Scenic Attractiveness Class A or Class B classifications are considered scenic vistas).	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Substantially degrade the existing visual character or quality of the site and its surroundings.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	VIS-1	LTS
Substantially damage scenic resources within a State scenic highway corridor.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Operational changes at the San Luis Reservoir could affect visual resources.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: LTS = less than significant; NI = no impact; None = no feasible mitigation identified and/or required; S = significant; SU = Significant and Unavoidable

10.4 Mitigation Measures

Mitigation Measure VIS-1. To reduce visual intrusion from light sources, Reclamation shall require the contractors to implement measures to reduce light and glare while meeting minimum safety and security standards. Light reduction measures must include: directing lighting downward to prevent spillover onto nearby areas, utilization of lighting fixtures with directional shielding to focus on areas being lit, and a construction requirement that all lighting in areas not under active construction be shut off. To reduce the amount of glare, building finishes shall be subdued and earth-toned. Onsite mechanical equipment roofing materials, and any exposed vents or flashings must be constructed of non-glare finishes that minimizes reflectivity.

10.5 Significant Unavoidable Impacts

None of the action alternatives would result in a significant unavoidable impacts to visual resources.

Chapter 11 Noise and Vibration

This chapter presents the existing noise and vibration conditions in the area of analysis and discusses potential noise and vibration effects from the proposed alternatives.

11.1 Affected Environment/Environmental Setting

This section presents a framework for understanding noise and vibration levels and their potential impacts; an overview of the regulatory setting in relation to noise and vibration in the area of analysis; and a description of existing noise and vibration levels and sensitive receptors with the potential to be affected by the action alternatives.

11.1.1 Noise and Vibration Terminology

11.1.1.1 Noise

Noise can be generally defined as unwanted sound. Sound, traveling in the form of waves from a source, is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level (referred to as sound level) is the most common descriptor used to characterize the loudness of an ambient sound level. It is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the frequency/sound power level spectrum. The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. Consequently, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear’s decreased sensitivity to low and extremely high frequencies and greater sensitivity to mid-range frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted dB (dBA). Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in Table 11-1.

Table 11-1. Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noise urban area, daytime		
Gas lawnmower, 100 feet	70	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quite suburban nighttime		
	30	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

Source: California Department of Transportation (Caltrans) 2013a.
Key: dBA = A-weighted decibel scale; mph = miles per hour

A key concept in evaluating potential noise impacts is the perceived effect of incremental increase in existing noise levels. Table 11-2 presents the effect of increasing noise levels. For example, the table shows that an increase of 3 dBA is barely perceptible, an increase of 5 dBA is noticeable, and that a 10 dBA increase would be perceived by someone to be a doubling of noise.

Table 11-2. Decibel Changes, Loudness, and Energy Loss

Sound Level Change (dBA)	Relative Loudness/ Impact	Acoustical Energy Gain (%)
0	Reference	0
+3	Barely Perceptible Change	50
+5	Noticeable Change	67
+10	Twice as Loud	90
+20	Four Times as Loud	99

Source: Federal Highway Administration (FHWA) 2011.
Key: dBA = A-weighted decibel scale

Noise analyses and regulations use the following terms:

- **L_{eq}: Equivalent energy level** - A-weighted sound level corresponding to a steady-state sound level that contains the same total energy as a varying signal over a given sample period. This is typically computed over 1-, 8-, and 24-hour sample periods.

- **L_{dn}: Day-night average level** - the energy average sound level for a 24-hour day determined after the addition of a 10 dBA penalty to all noise events occurring at night between 10 p.m. and 7 a.m. This is a useful measure for community noise impact because people in their homes are much more sensitive to noise at night when they are relaxing or sleeping than they are in the daytime.

- **L_{max}: Maximum noise level** - representing the highest sound level measured for a given period.

- **L_{min}: Minimum noise level** - representing the lowest sound level measured for a given period.

- **L_x: Statistical noise descriptor** – the noise level exceeded X% of a specified time period. For example, L_{10} indicates the noise level that is exceeded 10% of the time during a given period.

- **CNEL: Community Noise Equivalent Level** - a 24-hour average L_{eq} that includes the addition of five dBA to sound levels from 7 p.m. to 10 p.m. and an addition of 10 dBA to sound levels from 10 p.m. to 7 a.m. The CNEL is commonly used in California instead of the L_{dn}.

Noise effects on humans can range from annoyance to physical discomfort and harm. Sleeping patterns, speech communication, mental acuity, and heart and breathing rates can all be disturbed by noise. Perception of the noise is affected by its pitch, loudness, and character.

Sound levels from isolated point sources of noise typically decrease by about 6 dBA for every doubling of distance from the noise source. When the noise source is a continuous line, such as vehicle traffic on a highway, sound levels decrease by about 3 dBA for every doubling of distance. Noise levels can also be affected by several factors other than the distance from the noise source. Topographic features and structural barriers that absorb, reflect, or scatter sound waves can affect the reduction of noise levels. Atmospheric conditions (wind speed and direction, humidity levels, and temperatures) and the presence of dense vegetation can also affect the degree to which sound is attenuated over distance.

11.1.1.2 Vibration

Vibration refers to groundborne noise and perceptible motion. The most common impacts from groundborne vibration include annoyance, movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, disruption of vibration-sensitive operations or activities, and triggering of landslides. Vibrations caused by construction can be interpreted as energy transmitted in waves through the soil mass. These energy waves generally dissipate with distance from the vibration source, due to spreading of the energy and frictional losses. Thus, groundborne vibrations from most construction activities very rarely reach the levels that can damage structures but can achieve the perceptible ranges in buildings very close to construction sites (Federal Transit Authority [FTA] 2006).

In extreme cases, vibration can cause damage to buildings or equipment. In most circumstances, common ground-induced vibrations related to roadway traffic and construction activities pose no threat to buildings or structures, with the occasional exception of blasting and sheet pile-driving during construction. In order to assess the potential for structural damage associated with vibration, the vibratory ground motion in the vicinity of the affected structure is measured in terms of peak particle velocity (PPV) in the vertical and horizontal directions, typically in units of inches per second (in/sec). The PPV is defined as the maximum instantaneous peak of the vibration signal. California Department of Transportation (Caltrans) estimates that frequent generation of vibration at levels exceeding 0.3 in/sec can damage older residential structures and cause annoyance to humans (Caltrans 2013b).

Annoyance from vibration often occurs when the vibration exceeds the threshold of perception. A vibration level that causes annoyance would be well below the damage threshold for normal buildings. Generally, groundborne vibration does not provoke adverse human reaction to those who are outdoors as the effects associated with the shaking of building are absent.

Construction activities can either result in continuous or single-impact (transient) vibration impacts. Typical equipment or activities that could result in continuous vibration impacts include excavation equipment, traffic, vibratory pile drivers, and vibratory compaction equipment; examples of transient vibration sources include blasting and drop balls. Some construction activities, like jackhammers or impact pile drivers, can continually generate single transient events at a high frequency; however, for evaluation purposes, these equipment would be regarded as having frequent or continuous vibration impacts.

11.1.2 Area of Analysis

The area of analysis for noise encompasses the zone around San Luis Reservoir potentially effected by construction and restoration actions. Figure 11-1 illustrates the area of analysis.

11.1.3 Regulatory Setting

This section describes the applicable noise and vibration laws, rules, regulations and policies at the Federal, State, county and local level.

11.1.3.1 Federal

In the past, the United States Environmental Protection Agency (USEPA) coordinated all Federal noise control activities through its Office of Noise Abatement and Control. However, in 1981, Congress concluded that noise issues were best handled at the State or local government level. As a result, the USEPA phased out the office's funding in 1982 as part of a shift in Federal noise control policy to transfer the primary responsibility of regulating noise to State and local governments. However, the Noise Control Act of 1972 and the Quiet Communities Act of 1978 were not rescinded by Congress and remain in effect today, although essentially unfunded. Additionally, Title IV – Noise Pollution, of the Clean Air Act provides guidance to State and local entities in establishing appropriate noise control standards.

11.1.3.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Buildings Standards Code
- Noise Element Guidelines
- California State Parks Guidelines

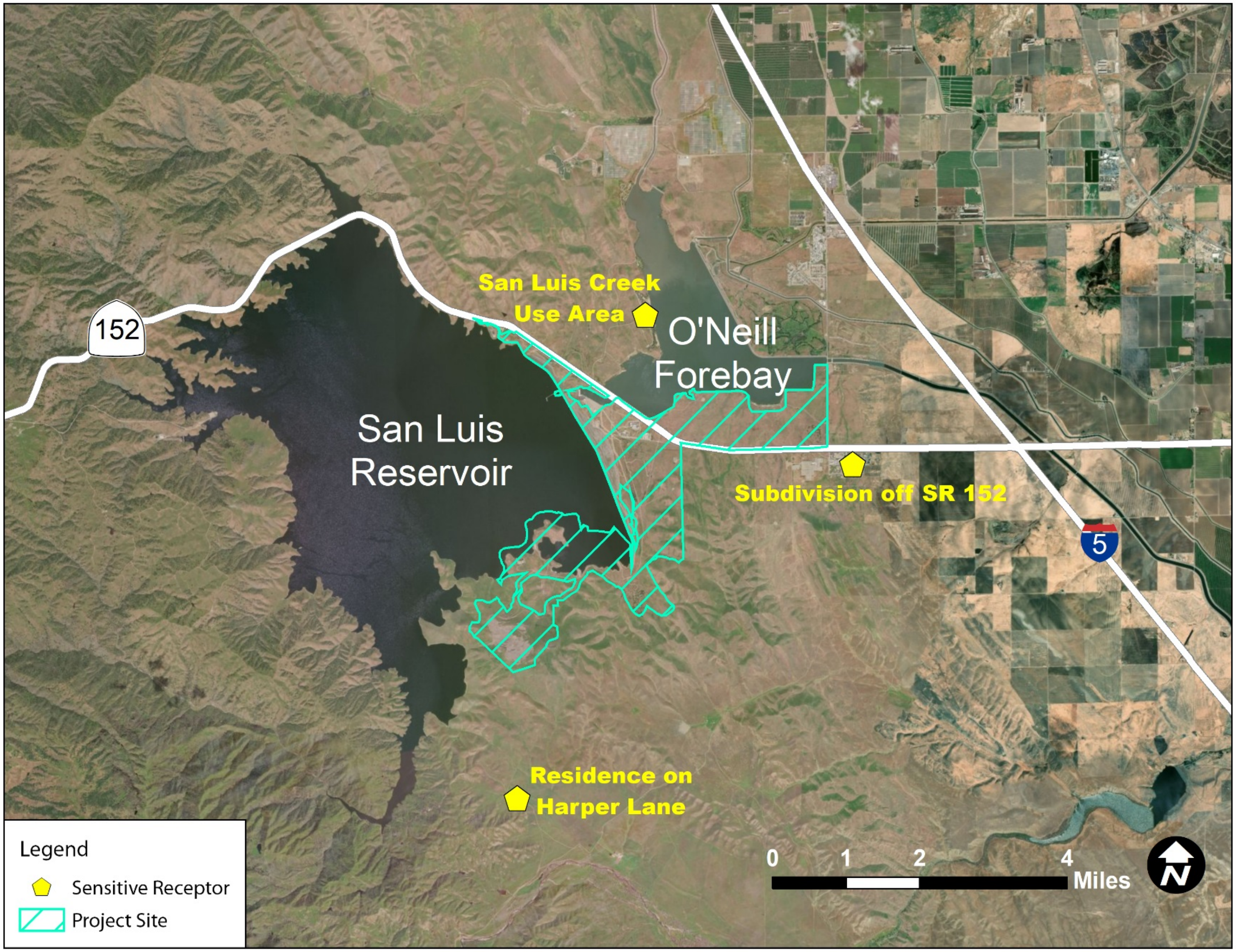


Figure 11-1. Noise and Vibration Area of Analysis

11.1.3.3 County/Local

The following county/local laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Merced County Code
- Merced County General Plan

11.1.4 Existing Conditions

The *San Luis Reservoir Resource State Recreation Area Final Resource Management Plan/General Plan and Final Environmental Impact Statement/Environmental Impact Report* (United States Department of the Interior, Bureau of Reclamation [Reclamation] and California Department of Parks and Recreation [CDPR] 2013) identifies noise-sensitive land uses around the reservoir. The Basalt Use Area would be closed during construction and are not included as noise-sensitive receptors in this analysis. Additionally, the Operations and Maintenance facilities for the Department of Water Resources (DWR) and the Gianelli Pumping Plant were not included as noise-sensitive receptors because they are onsite workers and are covered by Occupational Safety and Health Administration (OSHA) noise regulations to protect workers from excessive noise exposure. The receptors analyzed include:

- Romero Visitor Center (located along State Route [SR 152] west of the Gonzaga Road entrance).

- San Luis Wildlife Area (managed by the Department of Fish and Wildlife, located at the western edge of the Reservoir, north of Pacheco State Park), this area is designated for hiking, bird watching, and hunting. There are no developed facilities in this area.

- O’Neill Forebay Wildlife Area (located northeast of the O’Neill Forebay), this area is used for hunting and passive recreation.

- San Luis Creek Use Area (located on the north side of SR 152, west of O’Neill Forebay), this area is the most developed within the project area and contains group and recreational vehicle camping, a swimming beach, boat launch site, and picnic areas.

- Medeiros Use Area (located on the south side of the O’Neill Forebay and north of SR 152) this area is predominantly used for windsurfing and camping.

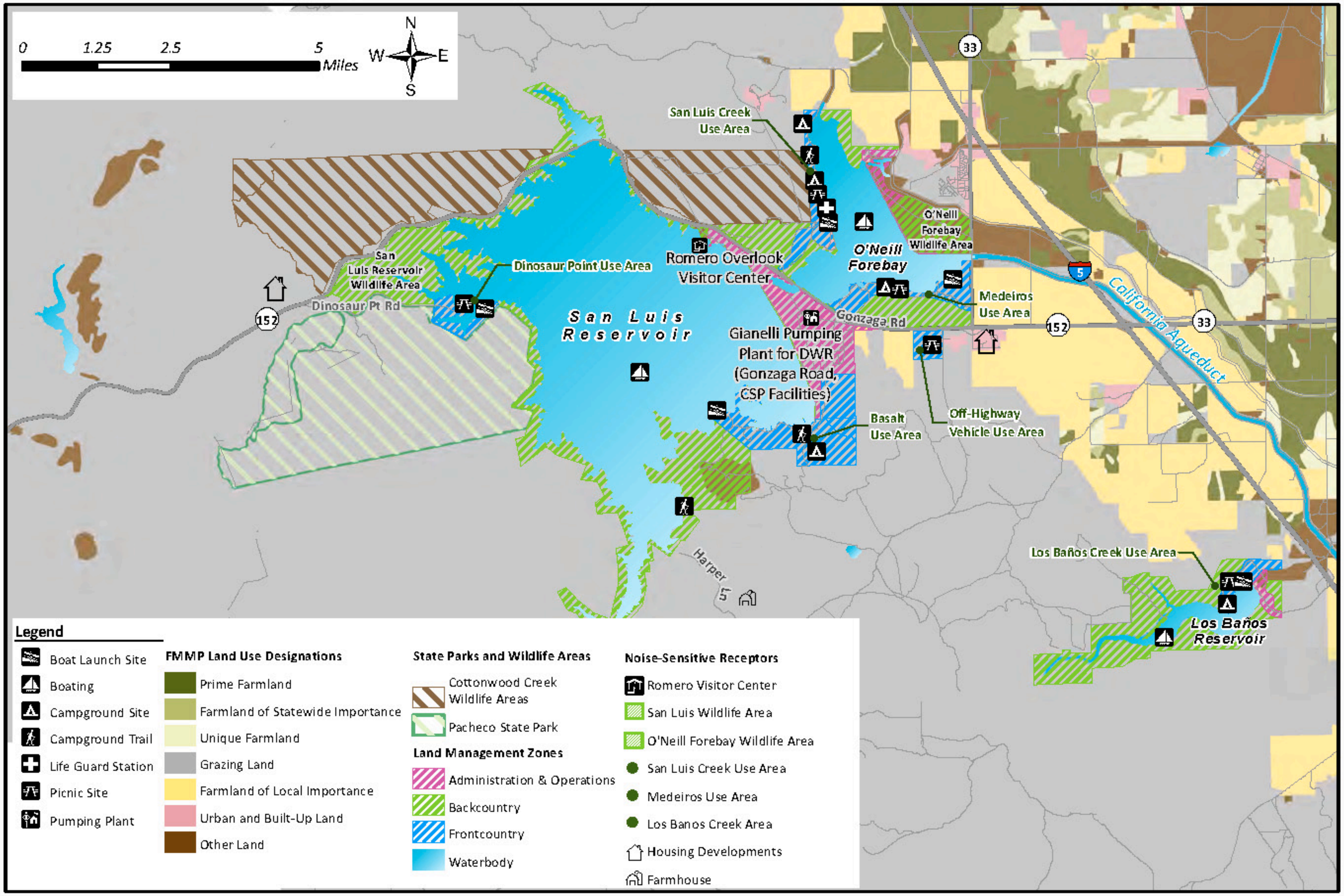
- Los Banos Creek Use Area (located southeast of the San Luis Reservoir approximately one and a half miles west of Interstate 5), this area contains flood management facilities, hiking trails, camping, and picnic areas, among other recreational uses.

Land uses surrounding San Luis Reservoir consist mainly of publicly owned parkland and wildlife areas maintained and managed by the State of California. Several campgrounds and day-use picnic areas present along the shores of the reservoir and forebay are relatively close to areas where construction activities would take place under some project alternatives; however, Basalt Use Area and Medeiros Use Area would be closed for the duration of construction. San Luis Creek Use Area is approximately 1.5 miles east of the proposed construction area and will be open during the full duration of construction. The residences nearest potential construction sites at San Luis Reservoir include a subdivision of homes off SR 152 southeast of O'Neill Forebay, and a farmhouse located approximately one mile southeast of the reservoir along Harper Lane. Northeast of O'Neill Forebay, housing tracts face SR 33, which would be a travel route for workers and haul trucks. Figure 11-2 depicts these noise-sensitive land uses around San Luis Reservoir.

Noise sources currently existing in the area of analysis are of three general types: agricultural noise, general stationary noise, and general mobile noise. No major sources of vibration are known to exist in the area of the San Luis Reservoir.

Farm operations produce noise from a variety of sources. These include heavy equipment for plowing and harvesting, dairy equipment, crop-spraying aircraft, wind turbines for frost protection, on-site processing equipment, and irrigation water pumps. In addition to affecting the farmers and farm laborers, agricultural noise also affects those living in or near agricultural areas.

General stationary noises (i.e., those emanating from fixed locations) are associated with a variety of land uses. Stationary sources include air conditioning units, power tools, motors, generators, appliances, and manufacturing and industrial facilities. Noise-sensitive receptors may have stationary noise sources at their locations.



Source: Reclamation and CDPR 2013

Figure 11-2. Noise-Sensitive Land Uses Near San Luis Reservoir

General mobile noise sources include vehicles, aircraft, and trains. Mobile noise is usually temporary and variable, but can be intense and annoying because of its abruptness and intensity. In urban areas, these mobile sources contribute to the ambient noise.

The noise evaluation presented in Table 11-3 summarizes average ambient noise levels for various land uses. Land use surrounding the project area is classified as rural residential with a Daytime L_{eq} of 40 dBA, as presented below.

Table 11-3. Average Ambient Noise Levels for Various Land Uses

Land Use Description	Average Ldn (dBA)	Daytime Leq (dBA)	Nighttime Leq (dBA)
Wilderness	35	35	25
Rural Residential	40	40	30
Quiet Suburban Residential	50	50	40
Normal Suburban Residential	55	55	45
Urban Residential	60	60	50
Noisy Urban Residential	65	65	55
Very Noisy Urban Residential	70	70	60

Source: USEPA 1974

11.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts associated with each alternative.

11.2.1 Assessment Methods

The focus of this analysis is on potential temporary construction and long-term impacts to local noise-sensitive receptor sites located near the proposed alternatives. Off-site vehicle trip assumptions are consistent with those used in Chapter 12, Traffic and Transportation, and construction and operational activities are consistent with those used in Chapter 7, Air Quality, and Chapter 8, Greenhouse Gas Emissions.

Appendix F, Noise and Vibration Calculations, presents details on the methods and results of noise modeling conducted for this Environmental Impact Statement/Environmental Impact Report. The noise level at nearby sensitive receptors during the construction of each alternative was calculated by (1) attenuating the construction sound level for distance to the receptor and (2) logarithmically adding the attenuated construction noise source level to the ambient noise level. Construction noise was predicted using the equations and guiding principles from the FHWA Roadway Construction Noise Model (RCNM). The RCNM database provides maximum noise levels for various pieces of construction equipment at a reference distance of 50 feet. The types of construction equipment that would be used during the construction of each alternative, the percentage of time that the equipment would operate at full power (usage factor) during an hour and each piece's maximum noise level are presented in Table 11-4. For the Reservoir Restriction, construction equipment is anticipated to operate only during weekdays and during daylight hours. For the Crest Raise Alternative, construction activities, excluding blasting, would occur 24 hours a day, seven days per week, 12 months per year throughout the entire duration of the project.

Table 11-4. Construction Equipment Types and Noise Levels

Equipment Type	Usage Factor	L_{max} at 50 Feet
All Other Equipment Greater than 5 hp	50%	85
Auger Drill Rig	20%	84
Compactor (ground)	20%	83
Concrete Mixer Truck	40%	79
Concrete Pump Truck	20%	81
Concrete Saw	20%	90
Crane	16%	81
Dozer	40%	82
Drill Rig Truck	20%	79
Dump Truck	40%	76
Excavator	40%	81
Flat Bed Truck	40%	74
Front End Loader	40%	79
Generator	50%	81
Grader	40%	85
Roller	20%	80
Scraper	40%	84
Slurry Trenching Machine	50%	80

Source: FHWA 2006.

Key: hp = horsepower; L_{max} = maximum noise level measured during a monitoring period

11.2.2 Significance Criteria

The significance criteria described below were developed consistent with the California Environmental Quality Act (CEQA) Guidelines (applicable to this project) to determine the significance of potential impacts on noise that would result from implementation of the project. Impacts on noise would be considered potentially significant if the project would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

The evaluation of impacts under the first bullet is based primarily on compatibility with the noise standards set forth in Section 11.1.3.

Project construction and operation that produce vibration levels that exceed 0.3 in/sec would be significant (Caltrans 2013b). This criterion was used to evaluate the second bullet.

For the purpose of this analysis, a substantial increase in noise will be considered a greater than 10 dBA increase in the 1-hour L_{eq} during the daytime hours (7 a.m. to 10 p.m.) or by 5 dBA or more during the nighttime hours (10 p.m. to 7 a.m.) at the receptor from onsite construction or operations. The criterion above was based on the Merced County Code thresholds as well as published studies on vibration effects. A 10 dBA increase in noise level is perceived as a doubling of noise (FHWA 2011).

The significance criteria described above apply to the noise receptors that could be affected by the project. Changes in noise are determined relative to existing conditions and the No Action/No Project Alternative.

11.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative could increase ambient noise levels and expose sensitive receptors to excessive groundborne vibration or excessive noise levels. The No Action/No Project Alternative includes the most likely future conditions in the absence of the project. This analysis assumes that ambient noise levels under the No Action/No Project Alternative would be the same as existing conditions. Neither construction-related activities nor increased operational activities would occur. **The No Action/No Project Alternative would result in no impact on noise.**

11.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

Construction and operation of the Reservoir Restriction Alternative could increase ambient noise levels and expose sensitive receptors to excessive groundborne vibration or excessive noise levels. The Reservoir Restriction Alternative includes limiting the storage of the reservoir by restricting the maximum water height. Construction actions are limited to revegetation of the reservoir rim between the maximum pool elevation and the proposed maximum restricted reservoir water surface planned with the Reservoir Restriction Alternative. Daytime construction actions would begin in spring to early summer and last 1.5 years. These actions would include operation of a single bulldozer approximately five feet upslope from the new maximum surface elevation in areas where necessary to establish a temporary surface to support truck based application of a green hydroseed mixture along the rim of the reservoir. These construction actions are not anticipated to produce noise above existing levels generated by traffic on nearby roadways and motor boat operation on the reservoir. Operation of the restricted reservoir would have no impact on noise or vibration. **Construction activities associated with the Reservoir Restriction Alternative would result in a temporary and less than significant impacts on noise.**

11.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

Construction associated with the Crest Raise Alternative could expose sensitive receptors to noise levels in excess of standards established in the local general plan or noise ordinance. All construction activities associated with the Crest Raise Alternative would occur within Merced County. While the Merced County Code (Section 10.60.030) sets specific sound level limitations for the county, the noise ordinance specifically exempts construction activities between 7 a.m. and 6 p.m. Operation of construction equipment in or adjacent to urbanized areas between 6 p.m. and 7 a.m. is prohibited unless it does not result in noise levels exceeding the background level by 10 dBA between 6 p.m. and 10 p.m. and by 5 dBA between 10 p.m. and 7 a.m. Construction activities, excluding blasting, would occur 24 hours a day throughout the entire duration of the project. There will be two 10-hour shifts plus a 3-hour long maintenance period. Nighttime construction would utilize approximately two-thirds of the workers and equipment as compared to the daytime shift. A conveyor option is being analyzed to transport materials from Borrow Area 6, by O'Neill Forebay, to the staging area. If the conveyor option is utilized, the conveyor system would be operated during the daytime 7 a.m. to 6 p.m. exempt period. Blasting at Basalt Hill to generate materials for the rock blanket used as a top layer of the new embankment would occur only from 6 a.m. to 6 p.m., seven days per week, 12 months per year for the entire duration of the project. Periodic noise from blasting could be heard up to four times a day, with the duration of each blast expected to last less than five seconds. Installation of the two temporary traffic signals under the Crest Raise Alternative (discussed in Chapter 2, Project Description) would occur between 7 a.m. and 6 p.m., when construction equipment noise is exempt.

Table 11-5 summarizes the total daytime unmitigated L_{eq} and total nighttime unmitigated L_{eq} that would occur at the nearest sensitive receptor from each construction area. Detailed calculations are provided in Appendix F, Noise and Vibration Calculations. Noise levels at San Luis Creek Use Area and the

Subdivision off SR 152 would exceed the daytime significance criterion of 10 dBA increase and the nighttime significance criteria of 5 dBA increase, for both the shear key and without shear key options. Note that this calculation does not consider terrain between the noise source and the receptor, however this would not likely reduce line-of-sight noise levels due to the lack of terrain between, and the close proximity to, the Subdivision off SR 152 and Borrow Area 6. **This impact would be significant.**

Table 11-5. Maximum 1-Hour Daytime and Nighttime Construction Phase L_{eq} (dBA) Increase Over No Action/No Project Alternative – Crest Raise Alternative

Sensitive Receptor	Total Noise Level[1] (dBA)	Increased Noise Level (dBA)	Significant?
Without Shear Key Option- Daytime			
Residence on Harper Lane	42	2	No
San Luis Creek Use Area	57	17	Yes
Subdivision off SR 152	51	11	Yes
With Shear Key Option- Daytime			
Residence on Harper Lane	42	2	No
San Luis Creek Use Area	57	17	Yes
Subdivision off SR 152	51/ 52*	11/ 12*	Yes
Without Shear Key Option- Nighttime			
Residence on Harper Lane	31	1	No
San Luis Creek Use Area	42	12	Yes
Subdivision off SR 152	37	7	No
With Shear Key Option- Nighttime			
Residence on Harper Lane	32	2	No
San Luis Creek Use Area	46	16	Yes
Subdivision off SR 152	41	11	Yes

Note:
[1] Ambient (background) noise level during existing conditions equal to 40 dBA during the day and 30 dBA at night.
* =increased dBA level if conveyor option was utilized
Key: dBA = A-weighted decibel scale

Implementation of Mitigation Measure NOISE-1 would help to address increases in noise levels from construction and implementation of Mitigation Measure NOISE-2 would reduce blasting-related impacts. Implementation of Mitigation Measure NOISE-3 would monitor noise levels and ensure all feasible measures to reduce impacts are utilized. Under Mitigation Measure NOISE-1, methods to reduce noise from construction sources, such as requirements for the equipping of all construction equipment with the most effective locally available commercial mufflers or other noise attenuation devices, and limits on the time that construction equipment can be operated in areas that would significantly impact the Subdivision off of SR 152 would be implemented to help reduce the noise levels generated. The limits on construction equipment operation near the subdivision, violation of the Merced County Code (Section

10.60.030) limits on noise level adjacent to an urbanized area can be avoided. However, these actions would not provide a noise level reduction necessary at the San Luis Creek Use Area to avoid a significant impact under this significance criterion. Furthermore, given the proximity of San Luis Creek Use Area and the Subdivision off SR 152 to and the magnitude of widely dispersed construction activity proposed to the southwest across the embankment, as well as to the south at Borrow Area 6, no additional mitigation to reduce these impacts has been identified. The Lead Agencies evaluated other potential mitigation measures including the development of permanent or semi-permanent sound barriers at the sensitive receptors to isolate them from the noise sources but determined that given the large construction area across which noise will be generated would net be feasible given their incompatibility with uses at the receptors including the San Luis Creek Use Area that would create a fixed barrier between the campsites and the O'Neill Forebay. Given the social and environmental limits on implementing other potential options to offset this impact no feasible additional mitigation (California Environmental Quality Act § 21061.1) has been identified to further reduce these impacts to a less than significant level. **Noise impacts associated with construction of the Crest Raise Alternative, for both the shear key and without shear key options, would exceed the sound level limitations of the Merced County Code and would remain significant and unavoidable after implementation of Mitigation Measure NOISE-1, NOISE-2, and NOISE-3.**

Construction associated with the Crest Raise Alternative could expose sensitive receptors to excessive groundborne vibration or groundborne noise. Construction activities associated with these alternatives could generate vibration. Construction equipment such as dozers and rollers would generate vibrations that could result in groundborne noise or vibration that may affect nearby structures and sensitive receptors. In addition, as discussed previously, blasting would take place at Basalt Hill to obtain materials for the embankment. Merced County Code (Section 18.41.090) states that no use shall create any disturbing ground vibration based on typical human reaction beyond the boundaries of the site.

Construction activities would occur in three areas around the reservoir: Basalt Hill, Borrow Area 6, and B.F. Sisk Dam. The closest sensitive receptors to the center point of the closest construction area are identified below (see Figure 11-1 for receptor locations):

- Residence on Harper Lane (16,400 feet)
- San Luis Creek Use Area (5,600 feet)
- Subdivision off SR 152 (8,250 feet)

Table 11-6 summarizes the peak day maximum PPV (in/sec) at sensitive receptors for the Crest Raise Alternative without the shear key and with the shear key options. Detailed calculations are provided in Appendix F, Noise and Vibration Calculations.

Table 11-6. Peak Day Maximum PPV at Sensitive Receptors

Sensitive Receptor	Maximum PPV (in/sec)	Significant?
Without Shear Key Option		
Residence on Harper Lane	0.003138	No
San Luis Creek Use Area	0.015729	No
Subdivision off SR 152	0.008796	No
With Shear Key Option		
Residence on Harper Lane	0.003160	No
San Luis Creek Use Area	0.015836	No
Subdivision off SR 152	0.008856	No

Key: in/sec= inches per second; PPV= peak particle velocity

The PPV for construction activities would not exceed the significance threshold of 0.3 in/sec. No long-term project operations would occur that could generate vibrations or groundborne noise, or otherwise expose persons to such impacts. **Groundborne vibration impacts associated with construction of the Crest Raise Alternative would be less than significant.**

Construction associated with and operation of the Crest Raise Alternative could result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. Construction impacts on ambient noise levels generated by the Crest Raise Alternative would not result in permanent increases in ambient noise levels. The alternative would raise the crest of B.F. Sisk Dam but it would not change its operation, and would not result in long-term operational noise impacts. **There would be no impact associated with permanent operational noise associated with the Crest Raise Alternative.**

Construction associated with the Crest Raise Alternative could cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Noise from construction equipment would occur throughout the construction phase of the Crest Raise Alternative. These noise levels would be located in areas that are surrounded by existing sources of noise like traffic noise, boats, and overhead aircraft. Noise levels would vary depending on the construction phasing and specific pieces of equipment in use at any given time. As was noted in Chapter 2, Project Description, the Basalt Use Area and Medeiros Use Area would be closed during the full duration of construction of the Crest Raise Alternative. Recreation use for boating on the reservoir would be supported through the use of the boat launch at Dinosaur Point, but would be limited to areas away from B.F. Sisk Dam for the full duration of construction.

As described earlier and shown in Table 11-5, construction noise from heavy equipment and blasting activities would exceed the daytime significance criterion of 10 dBA and nighttime significance criteria of 5 dBA for both the shear key and without shear key options at the San Luis Creek Use Area and the Subdivision off SR 152. Detailed calculations are provided in Appendix F, Noise and Vibration Calculations.

Construction-related traffic noise sources would include construction worker vehicles, visitor vehicles, material delivery trucks and off-hauling of materials. According to the traffic analysis, the volume of construction-related traffic generated by these sources would be low in relation to existing traffic volumes. Because of the logarithmic nature of noise, a doubling of traffic would result in a 3 dBA increase in noise levels, which would be barely perceptible to the human ear. Traffic would need to be increased at least three times for increased noise to be readily perceived (5 dBA) and at least nine times to double the noise levels (10 dBA). As discussed in Chapter 12, Traffic and Transportation, existing traffic on the local road (Basalt Road) is limited with less than 200 cars per day on each road (Bureau of Reclamation and CDPR 2013). Even though traffic would be distributed throughout the day, traffic would increase along Basalt Road by a large percentage for both the shear key option and without shear key option. This would substantially increase the equivalent noise level on this road by more than 10 dBA, representing a doubling of noise levels experienced at the San Luis Creek Use Area and the Subdivision off SR 152 and a significant impact. Detailed calculations are provided in Appendix F, Noise and Vibration Calculations. **Noise impacts would be significant because of construction-related traffic increases.**

Implementation of Mitigation Measures NOISE-1 and NOISE-2 would manage noise impacts, but because of the large construction areas and the long distances between the construction site and the receptor, conventional methods to reduce noise sources, like constructing barriers, would not be feasible and would not provide a substantial reduction in noise levels. Implementation of Mitigation Measure NOISE-3 would monitor noise levels and ensure all feasible measures to reduce impacts are utilized. **Noise impacts associated with construction of the Crest Raise Alternative shear key and without shear key options would remain significant and unavoidable after implementation of Mitigation Measures NOISE-1, NOISE-2 and NOISE-3.**

Operational sources located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, could expose people residing or working in the project area to excessive noise levels. San Luis Reservoir is not located within two miles of a public or private land-based airport, but the San Luis Reservoir Seaplane Base, owned by the California Department of Water Resources, allows water landings of planes on the reservoir. Approximately 25 aircraft operations per year take place at the reservoir (Airport-Data 2013). Implementation of the Crest Raise Alternative would not change the frequency or intensity of these existing seaplane base and there would be no new permanent residents near the reservoir that would be affected by the plane noise. Furthermore, because of the limited aircraft operations and the size of the reservoir, construction workers on site would not be exposed to excessive noise levels. **Noise impacts associated with operating the crest raised B.F. Sisk Dam within an airport land use plan would be less than significant.**

11.3 Comparative Analysis of Alternatives

Table 11-7 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 11-7 are National Environmental Policy Act (NEPA) impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 11-7. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities could expose sensitive receptors to noise levels in excess of standards established in the local general plan or noise ordinance.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	NOISE-1: Noise Control Plan; NOISE-2: Blasting Plan; NOISE-3: Noise Monitoring Program	SU
Construction activities could expose sensitive receptors to excessive groundborne vibration or groundborne noise.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities and operation could result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Construction activities could cause a substantial temporary or periodic increase in ambient noise levels in	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
the project vicinity above levels existing without the project.	Alternative 3 - Crest Raise	S	NOISE-1: Noise Control Plan; NOISE-2: Blasting Plan; NOISE-3: Noise Monitoring Program	SU
Operational sources located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport could expose people residing or working in the project area to excessive noise levels.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: LTS = less than significant; None = no mitigation required; SU = significant and unavoidable; NI = no impact; S = significant; -- = not required per CEQA Guidelines

11.4 Mitigation Measures

The following mitigation measures would reduce the severity of the noise impacts.

NOISE-1: Noise Control Plan. A Noise Control Plan (NCP) will be developed by the construction contractor prior to the start of any construction activities to address increased noise levels as a result of the proposed project and alternatives. The NCP will identify the procedures for predicting construction noise levels at sensitive receptors and will describe the reduction measures required to minimize construction noise. The noise mitigation measures in the NCP will include, but are not limited to:

- Appropriate level of sound attenuation will be used or constructed to minimize noise levels by at least 3 dBA. Potential sound attenuation measures could include, but are not limited to stationary equipment and stockpiles, or otherwise placed between the source(s) of construction noise and noise-sensitive receptors, as appropriate. The feasible measures will be determined by the construction contractor based on an initial evaluation of each construction site.

- Contractor will be responsible for maintaining equipment in best possible working condition and outfitting construction equipment with the most effective locally available commercial mufflers or other noise attenuation devices;

- When feasible, the loudest construction activities will be conducted during Merced County construction noise exempt hours, between 7 a.m. and 6 p.m.;
- Operation of construction equipment between the hours between 6 p.m. and 10 p.m. will be prohibited within 9,100 feet of the Subdivision off SR 152. During the hours between 10 p.m. and 6 a.m. the operation of construction equipment will be prohibited within 9,550 feet of the Subdivision off SR 152.
- Shutting down equipment that are queued or not in use for 5 minutes or more;
- Pre-construction meeting with contractors and project managers to confirm that noise mitigation procedures are in place;
- Signs shall be posted at the construction sites that include permitted construction days and hours, a day and evening contact number for the job site, and a contact number in the event of problems;
- The public will be kept informed of the construction hours and days;
- List contact information for complaints and respond to noise complaints; and
- An on-site complaint and enforcement manager shall respond to and track complaints and questions related to noise.

NOISE-2: Blasting Plan. A Blasting Plan for construction shall be prepared and followed that includes the following:

- Identification of blast officer;
- Scaled drawings of blast locations, and neighboring buildings, streets, or other locations which could be inhabited;
- Blasting notification procedures, lead times, and list of those notified. Public notification to potentially affected vibration and nuisance noise receptors describing the expected extent and duration of the blasting;
- Description of means for transportation and on-site storage and security of explosives in accordance with local, State and Federal regulations;
- Minimum acceptable weather conditions for blasting and safety provisions for potential stray current (if electric detonation);
- Traffic control standards and traffic safety measures (if applicable);

- Required personal protective equipment;
- Minimum standoff distances and description of blast impact zones and procedures for clearing and controlling access to blast danger;
- Procedures for handling, setting, wiring, and firing explosives; and procedures for handling misfires per Federal code;
- Type and quantity of explosives and description of detonation device.
- Methods of matting or covering of blast area to prevent flyrock and excessive air blast pressure;
- Description of blast vibration and air blast monitoring programs;
- Dust control measures in compliance with applicable air pollution control regulations (to interface with general construction dust control plan);
- Emergency Action Plan to provide emergency telephone numbers and
- directions to medical facilities. Procedures for action in the event of injury;
- Material Safety Data Sheets for each explosive or other hazardous materials to be used;
- Evidence of licensing, experience, qualifications of blasters, and description of insurance for the blasting work
- A sound attenuation plan shall be prepared outlining sound control measures that would include the use of blasting mats or sound walls;
- If vibration results in damage to any nearby structures or utilities, or scenic rock faces, blasting shall immediately cease. The stability of segmental retaining walls, existing slopes, creek canals, etc. shall be monitored and any evidence of instability due to blasting operations shall result in immediate termination of blasting;
- Explosive materials shall be delivered in specially built vehicles marked with United Nations (UN) hazardous materials placards. Explosives and detonators shall be delivered in separate vehicles or be separated in compartments meeting Department of Transportation (DOT) rules within the same vehicle. Vehicles shall have at least two ten-pound Class-A fire extinguishers and all sides of the vehicles display placards displaying the UN Standard hazard code for the onboard explosive materials. Drivers shall have commercial driver

licenses (CDL) with Hazmat endorsements, and drivers shall carry bill-of-lading papers detailing the exact quantities and code dates of transported explosives or detonators;

- The contractor must comply with U.S. Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) table-of-distance requirements (Code of Federal Regulations [CFR] 27, U.S. Department of Justice, Alcohol, Tobacco, Firearms and Explosives Division Part 555) that restrict explosive quantities based on distance from occupied buildings and public roadways. Employees must also comply with the security requirements of the Safe Explosives Act (Title XI, Subtitle C of Public Law 107-296, Interim Final Rule), implemented in March 2003. These requirements require background checks for all persons that use, handle or have access to explosive materials; and responsible persons on a now required Federal explosives license must submit photographs and fingerprints with the application to ATF.

NOISE-3: Noise Monitoring Program. A pre-construction noise survey will be completed during daytime and nighttime periods at multiple locations across the project area, including identified sensitive receptors, to establish background noise levels at those times. During construction, noise will be periodically monitored at these locations to assess any increases in noise levels that exceed the local noise ordinances. If noise levels are recorded exceeding the background noise level by 10 dBA between 6 p.m. and 10 p.m. or by 5 dBA between 10 p.m. and 7 a.m. or if noise complaints are received, an investigation will be conducted to determine the source of the noise. After the investigation, noise will be reduced using all feasible measures, including mitigation at the receiver impacted by the noise. Potential mitigation at the receiver would include building envelope improvements and acoustical window treatments.

All mitigation requirements will be included in bid documents and construction contracts.

11.5 Significant Unavoidable Impacts

The Crest Raise Alternative would have significant and unavoidable effects associated with short-term and temporary construction activities. Construction activities associated with the Crest Raise Alternative would exceed the local noise ordinances, resulting in a significant and unavoidable impact. These construction impacts associated with the Crest Raise Alternative would also contribute to and result in significant cumulative noise and vibration impacts, as analyzed in Chapter 27, Cumulative Impacts. Given the magnitude of the other cumulative project's construction actions and the extensive mitigation measures already proposed, no additional feasible mitigation measures were identified that could further reduce the contribution to this significant cumulative effect.

Chapter 12
Traffic and Transportation

This chapter presents the existing conditions found in the transportation system within the area of analysis and discusses potential effects on traffic and transportation from the proposed alternatives.

12.1 Affected Environment/Environmental Setting

This section provides an overview of the regulatory setting associated with traffic and transportation and provides a description of the roadways with the potential to be affected by the action alternatives.

12.1.1 Area of Analysis

The area of analysis for traffic and transportation includes roadways in Merced County. Within the county, roads in cities and towns could also be affected by the action alternatives including the cities of Gustine and Los Banos, and the unincorporated community of Santa Nella.

12.1.2 Regulatory Setting

Federal statutes specify the procedure the Department of Transportation must follow in setting policy regarding the placement of utility facilities within the freeway rights-of-way that received Federal assistance. These include Federal interstate freeways and United States highways, most state routes, and certain local roads. The Federal Highway Administration (FHWA) regulations require each state to develop its own policy regarding the accommodation of utility facilities within freeway-rights-of-way. Once FHWA has approved a state’s policy, the state can approve any proposed utility installation without referral to FHWA, unless it does not conform to the federally approved policy.

The State laws and regulations that are available in the following document are applicable to the B.F. Sisk Dam Safety of Dams Modification Project (Project) and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Department of Transportation (Caltrans) Guide for the Preparation of Traffic Impact Studies.

The local laws and regulations that are available in the following documents are applicable to the Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- City of Gustine General Plan
- City of Los Banos General Plan

- Merced County General Plan
- Regional Transportation Plan/Sustainable Communities Strategy for Merced County

12.1.3 Existing Conditions

The following section describes the existing transportation network in the area of analysis. The area of analysis for traffic and transportation will focus on the San Luis Reservoir Region, since this is the only area that is expected to be affected by the planned construction activities associated with the action alternatives.

12.1.3.1 San Luis Reservoir Region

The roadway network surrounding the proposed construction site is exhibited in Figure 12-1.

12.1.3.1.1 Regional Access Routes

The following freeways and highways provide regional access to the San Luis Reservoir Region.

- Interstate 5 (I-5) is a major multi-lane interstate freeway running north-south, about three miles east of B.F. Sisk Dam. I-5 traverses all of the west coast states, providing international access to Canada to the north and Mexico to the south. In the project vicinity, the Merced County General Plan classifies I-5 as a Freeway. It provides direct access from the project area to the City of Stockton, approximately 50 miles to the north, and the Los Angeles metropolitan area, approximately 250 miles to the south. This freeway would be used for regional access by construction vehicles and workers from north and south of the San Luis Reservoir Region.

- State Route 152 (SR 152), also known as the Pacheco Pass Highway, is a four-lane highway about 115 miles long. It connects SR 1 in Watsonville to SR 99 near Chowchilla. In the project vicinity, the Merced County General Plan classifies SR 152 as a Principal Arterial. This highway would be used for regional and local access by construction vehicles and workers to the San Luis Reservoir Region, since it connects with US 101, runs east-west north of the dam, and continues west past I-5 through Los Banos and Dos Palos.

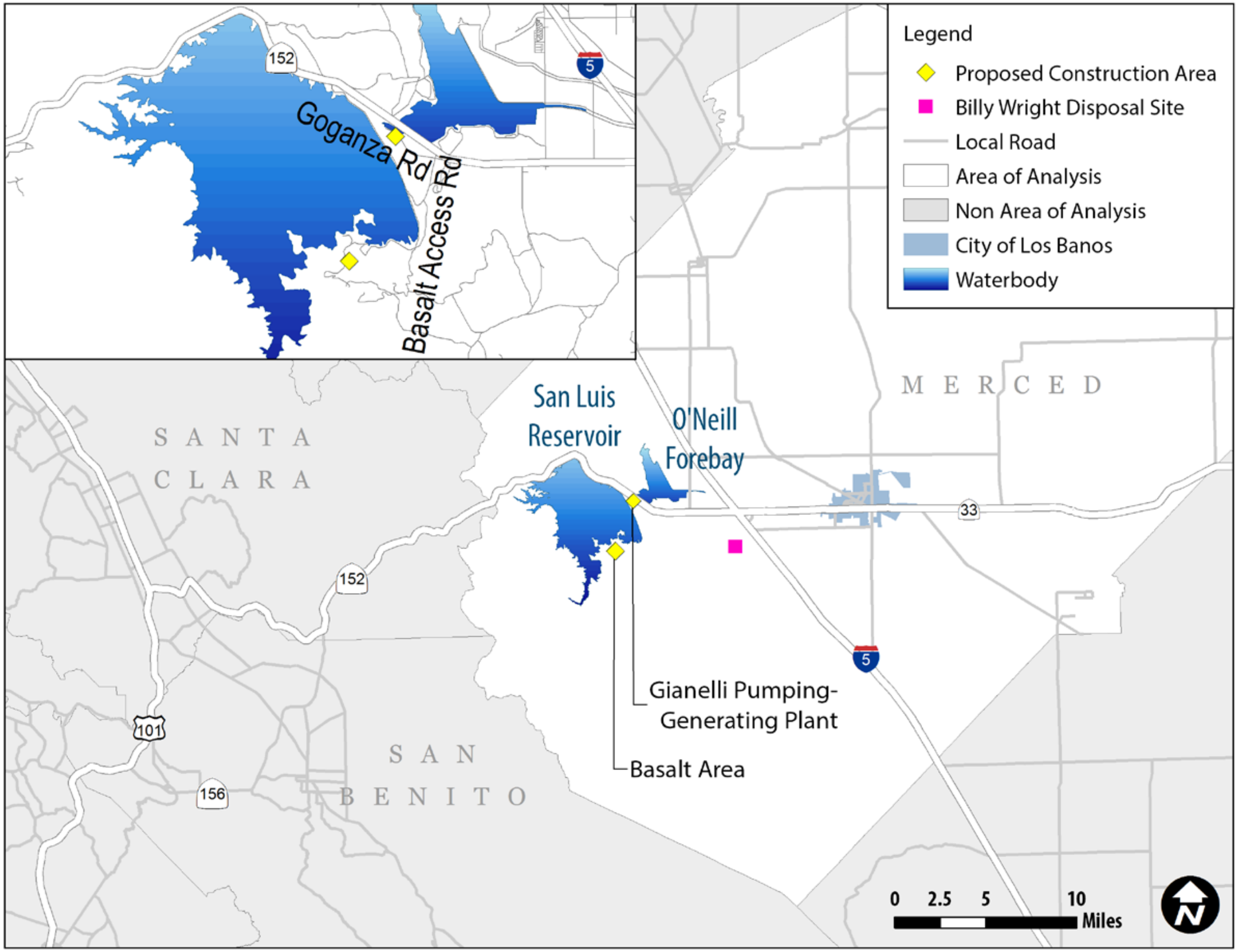


Figure 12-1. Area of Analysis

- State Route 33 (SR 33) is a north-south highway running about a mile east of B.F. Sisk Dam. North of SR 152, it runs parallel to I-5 and provides direct access to the City of Gustine. For about 23 miles to the east of B.F. Sisk Dam, SR 33 is a shared highway with SR 152. It then runs to the south as a rural highway for approximately 50 miles, providing access to the Cities of Dos Palos, South Dos Palos, Firebaugh, and Mendota, and terminating at I-5 in Fresno County. In the project vicinity, the Merced County General Plan classifies it as a Principal Arterial. This highway would be used for regional and local access by construction vehicles and personnel to the San Luis Reservoir Region from the north and east.

Table 12-1 and 12-2 provide summaries of existing operating conditions of study highway segments under daily and peak hour conditions, respectively. Traffic counts along the study highway segments were obtained from 2016 Traffic Volumes on California State Highways, Caltrans, since these are the latest traffic counts available at the time of analysis. LOS values for highway segments located within the Merced County were identified using the LOS criteria provided in Tables 2 through 5 of Appendix G2, Traffic and Transportation Appendix.

Table 12-1. Existing Highway Operations

Highway	Junction	Jurisdiction	Lanes	Road Type	2016 AADT[1, 2]	Highest LOS[2]
I-5	SR 152	Merced County	4	Rural Freeway	32,000	B
SR 152	I-5	Merced County	4	Rural Freeway	30,700	B
SR 152	SR 33	Merced County	4	Rural Freeway	29,100	B
SR 33	I-5 West Junction	Merced County	2	Rural Non-Freeway Isolated Stops	14,200	F

Key:
AADT – Annual Average Daily Traffic Volumes, LOS – Level of Service
Notes:
[1] Source: 2016 Traffic Volumes on California State Highways, Caltrans (Appendix G1, 2016 Traffic Volumes on California State Highways).
[2] At a junction, a highway segment will have two different AADT values – one for the upstream portion of the junction and one for the downstream portion. For conservative purposes, the higher value of the study highway segments located immediately upstream and downstream of the junction was used for analysis.

Table 12-2. Existing Highway Operations – Peak Hour Conditions

Highway	Location	AM Peak Hour		PM Peak Hour	
		Volume[1]	LOS[2]	Volume[1]	LOS[2]
Northbound I-5	South of SR 152	2,050	C	2,150	C
Southbound I-5	South of SR 152	1,700	C	1,100	B
Eastbound SR 152	West of I-5	1,200	B	1,950	C
Westbound SR 152	West of I-5	1,550	B	950	A
Eastbound SR 152	West of SR 33	200	A	1,850	C
Westbound SR 152	West of SR 33	1,550	B	650	A
Northbound SR 33	Between I-5 and SR 152	550	D	650	E
Southbound SR 33	Between I-5 and SR 152	350	D	300	D

Key:
LOS – Level of Service
Notes:
[1] Source: 2016 Traffic Volumes on California State Highways, Caltrans (Appendix G1, 2016 Traffic Volumes on California State Highways).
[2] LOS criteria for freeways and two-lane highways provided in Tables 2 and 3 of Appendix G2 was used to identify LOS values.

Most of the study highway segments operate at LOS D or better under existing conditions during both the AM and PM peak hours. The only study highway segment that operates at LOS D or worse is northbound SR 33, between I-5 and SR 152; this segment operates at LOS E during the PM peak hour.

12.1.3.1.2 Local Access Routes

Basalt Road is the major local access route located near B.F. Sisk Dam.

- Basalt Road is a two-lane rural non-freeway road that runs along the edge of B.F. Sisk Dam on the southeast side. Basalt Road provides direct access from SR 152 to the Basalt Use Area.

Peak daily traffic along Basalt Road between July 2007 and June 2008 is summarized in Table 12-3. Basalt Road is rural in character and is primarily used for recreational activities; also, there have been no recent developments in its neighborhood that would increase traffic along Basalt Road. As such, current traffic conditions along Basalt Road are expected to be similar to 2007/2008 conditions.

Table 12-3. Existing Local Roadway Operations

Parameter	Basalt Road
Road Type	Rural Non-Freeway Isolated Stops
Number of Lanes	2
Average Maximum Daily Trips	191
Level of Service	B

Source: United States Department of the Interior, Bureau of Reclamation (Reclamation) and California Department of Parks and Recreation (CDPR) 2013

12.1.3.1.3 Public Transportation

Public transportation in the San Luis Reservoir Region includes the Merced Area Regional Transit System (MARTS) and Greyhound-Trailways bus lines. These two transit services do not stop at B.F. Sisk Dam.

12.1.3.1.4 Pedestrian/Bicycle Facilities

The San Luis Reservoir Region is located in the unincorporated area of Merced County which has very low pedestrian and bicycle activity. Currently, there are no dedicated bicycle paths, lanes, or routes in the San Luis Reservoir Region. Also, there are no dedicated pedestrian facilities.

12.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts associated with each of the project alternatives.

12.2.1 Assessment Methods

This section describes the assessment methods used to analyze potential traffic and transportation impacts of the alternatives, including the No Action/No Project Alternative.

12.2.1.1 Traffic Flow Effects

The project alternatives would cause traffic increases during the construction phase. This impact assessment analyzes the increase in traffic that would occur during construction of project alternatives based on changes to the LOS values. LOS standards provided for various jurisdictions in Table 28-1, in Chapter 28, Consultation, Coordination, and Compliance, would be used to identify traffic impacts. Construction of the Reservoir Restriction Alternative would occur from 6 a.m. to 6 p.m., five days a week, 12 months a year, and will also avoid Federal holidays. Construction trips are a combination of truck and personnel trips. Truck trips will be distributed throughout the day (though they may not be evenly distributed), while personnel trips would occur before and after construction each day. Since construction would occur between 6 a.m. and 6 p.m., inbound personnel trips would occur before 6 a.m. and outbound personnel trips would occur after 6 p.m. There could be a change of work shift between 6 a.m. and 6 p.m., during the mid-day period.

Construction of Crest Raise Alternative would occur 24-hours per day, seven days a week, 12 months a year. Similar to the Reservoir Restriction Alternative, truck trips will be distributed throughout the day (though they may not be evenly distributed), while personnel trips would occur at the construction shift changes each day. The 24-hour construction schedule would be supported by two shifts of construction and maintenance, transitioning at 6 a.m. and 6 p.m., with inbound and outbound personnel trips occurring at each shift change.

Usually, peak traffic hours are from 7 to 9 a.m. and from 4 to 6:30 p.m. So, for both alternatives the only trips that are likely to occur during the peak traffic hours are the truck trips during the morning peak hour and the inbound and outbound personnel trips during the evening peak hour. For study roadways, LOS value was determined using their AADT value, physical characteristics (e.g., number of lanes), and their location (e.g., urban, suburban, rural). Under the Crest Raise Alternative, temporary traffic signals would be installed at the current left turn crossing on SR 152 at Basalt Road and at the access road to Romero Visitor Center for the duration of the project. For these two intersections LOS value was determined using the average delay for the intersection. The LOS criteria based on peak hour performance metrics (average vehicle density for freeway segments, percent time-spent-following for two-lane highway segments, average delay for unsignalized and signalized intersections) and the AADT value are provided in Appendix G2, Traffic and Transportation Appendix.

For study roadways, Highway Capacity Software (version 7) was utilized to analyze potential changes to traffic conditions. For intersections, Synchro (version 10) was utilized to analyze potential changes to traffic conditions with the placement of temporary signals at the junctions of Basalt Road and SR 152, and the junction of the Romero Visitor Center access road and SR 152 during construction of the alternatives to facilitate left turns across SR 152 by construction traffic.

Since the San Luis Reservoir Region is rural in area, background traffic growth is expected to be minimal and traffic volumes at most of the study roadway segments under 2020 conditions, when construction is expected to begin, are anticipated to remain similar to those under existing conditions. However, to be conservative, background traffic in the San Luis Reservoir Region was assumed to increase between existing and 2020 conditions at 0.5 percent annually for highways. For Basalt Road, traffic volumes are expected to remain the same, since Basalt Road is primarily used for recreational activities and no near-term traffic-increasing developments are expected in its neighborhood.

For each project alternative, construction data (including the number of construction trucks, construction truck routes and schedule, number of workers, and worker traffic routes and schedule) were used to identify anticipated short-term construction-related and long-term operations-related trip generation. These additional short-term and long-term trips were assigned to roadways located near the San Luis Reservoir Region to determine traffic operations under various project alternatives. Roadway volumes, additional construction-related trips, and adjacent land use were used to develop turning movement volumes for the two intersections. When signalized, the intersections are assumed to operate under actuated control, responding to the presence of vehicles at the intersection. Using the traffic operations' assessment methods mentioned above and the LOS standards of significance summarized in Table 28-1, in Chapter 28, Consultation, Coordination, and Compliance, potential transportation impacts to neighboring roadways were determined for each project alternative.

12.2.1.2 Traffic Safety Effects

Traffic safety effects were analyzed by identifying potential hazardous areas (areas where slow moving traffic would need to merge with fast moving traffic) or roads/intersections that were not designed to adequately handle the proposed construction traffic. Safety hazards include blind corners or turnouts and sharp turns or areas where slow construction traffic might conflict with high roadway speed limits.

12.2.1.3 Public Transit Effects

Any potential routes where increases in construction traffic would conflict with existing public transit routes and their operations were analyzed.

12.2.2 Significance Criteria

The significance criteria described below were developed consistent with the CEQA Guidelines to determine the significance of potential impacts on traffic and transportation that could result from implementation of the project. Impacts on traffic and transportation would be considered potentially significant if the project would:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and relevant components of the circulation system, including streets, highways and freeways, and mass transit.
- Conflict with an applicable congestion management program, including, but not limited to LOS standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities.
- Increase traffic substantially in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections).
- Exceed, either individually or cumulatively, a LOS standard established by the county congestion management agency for designated roads or highways.
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
- Result in inadequate emergency access.

The significance criteria described above apply to all transportation systems that could be affected by the project.

12.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative would not implement the Project, would not implement any construction activities, and would have no impact on existing and future “no build” traffic volumes or air traffic patterns. The existing and future conditions would not experience an increase in traffic flow, safety, or other transportation effects aside from that of normal background growth due to other unrelated development projects as well as, general population, job and household growth in the area. There would be no change to reduce the risk of dam failure. In the event of dam failure, traffic and transportation would be disrupted by flooding. **Implementation of the No Action/No Project Alternative would have no impact on traffic and transportation.**

12.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

Construction of the Reservoir Restriction Alternative would occur at B.F. Sisk Dam. As such, the discussion of traffic and transportation related impacts will focus on the San Luis Reservoir Region. Construction of the Reservoir Restriction Alternative would begin in 2020 and would last about 18 months.

12.2.4.1 Construction

12.2.4.1.1 Traffic Flow Effects

Construction of the Reservoir Restriction Alternative could cause temporary increases in traffic and could result in temporary degradation of roadway LOS in the area of analysis during the construction period. During the construction of the Reservoir Restriction Alternative, a maximum of 20 personnel and 5 trucks would access the project site daily. This would result in 40 construction personnel trips and 10 construction truck trips for a total of 50 construction-related trips per day. For construction workers, it was assumed that they would originate from the City of Los Banos in the east. This assumption was based on proximity to labor populations in Los Banos. Materials are assumed to originate from Los Banos and other locations along I-5. Construction trips were applied to neighboring roadways in the San Luis Reservoir Region that are anticipated to support construction worker trips, material deliveries, and disposal. Additionally, as explained earlier in Section 12.2.1.1 – Traffic Flow Effects, because the construction starting and ending times do not completely overlap with the peak traffic hours, the only construction-related trips that are likely to occur during the peak traffic hours are the truck trips during the morning peak hour and the outbound personnel trips during the evening peak hour. It was assumed that all of the truck trips would be distributed during the first half of the construction period, i.e., between 6 a.m. and 12 p.m., while the construction personnel trips would occur inbound before 6 a.m. and outbound after 6 p.m.

Trip generation and distribution of construction traffic for the Reservoir Restriction Alternative are summarized in Table 12-4.

Table 12-4. Reservoir Restriction Alternative Trip Generation

Type of Trip	Time Period			
	AM Peak Hour[1]	PM Peak Hour[1]	Off-Peak Hours	Total Daily
Construction Truck Trip	3	0	7	10
Construction Personnel Trip	0	20	20	40
Total Construction-Related Trip	3	20	27	50

Note:
[1] Typically, AM and PM peak hours occur for two hours between 7 and 9 a.m. and two and a half hours between 4 and 6:30 p.m., respectively.

The construction of the Reservoir Restriction Alternative would begin in 2020, so transportation impacts were evaluated under 2020 conditions. Roadway operations during the construction of the Reservoir Restriction Alternative are summarized in Tables 12-5 and 12-6. Construction-related trips would not change the LOS of any of the study roadway segments.

Table 12-5. Daily Roadway Operations – Reservoir Restriction Alternative

Roadway	2020 AADT	2020 LOS	Maximum Daily Truck Trips	Maximum Daily Worker Trips	Total AADT During Construction	LOS during Construction	LOS Change
I-5 at SR 152	32,600	B	6	10	32,616	B	No Change
SR 152 at I-5	31,300	B	4	20	31,324	B	No Change
SR 152 at SR 33	29,700	B	10	40	29,750	B	No Change
SR 33 at I-5	14,500	F	4	10	14,514	F	No Change
Basalt Road	191	B	10	40	241	B	No Change

Note:
LOS criteria per daily volumes of roadways provided in Table 6 of Appendix G2 was used to identify LOS values.

Table 12-6. Peak Hour Roadway Operations – Reservoir Restriction Alternative

Roadway	Location	2020 Volume	2020 LOS	Maximum Truck Trips	Maximum Worker Trips	Total Volume During Construction	LOS during Construction	LOS Change
AM Peak Hour								
Northbound I-5	South of SR 152	2,100	C	3	0	2,103	C	No Change
Southbound I-5	South of SR 152	1,750	C	3	0	1,753	C	No Change
Eastbound SR 152	West of I-5	1,200	B	2	0	1,202	B	No Change
Westbound SR 152	West of I-5	1,600	B	2	0	1,602	B	No Change
Eastbound SR 152	West of SR 33	200	A	5	0	205	A	No Change
Westbound SR 152	West of SR 33	1,600	B	5	0	1,605	B	No Change
Northbound SR 33	Between I-5 and SR 152	550	D	2	0	552	D	No Change
Southbound SR 33	Between I-5 and SR 152	350	D	2	0	352	D	No Change
PM Peak Hour								
Northbound I-5	South of SR 152	2,200	C	0	0	2,200	C	No Change
Southbound I-5	South of SR 152	1,100	B	0	5	1,105	B	No Change
Eastbound SR 152	West of I-5	2,000	C	0	10	2,010	C	No Change
Westbound SR 152	West of I-5	950	A	0	0	950	A	No Change
Eastbound SR 152	West of SR 33	1,900	C	0	20	1,920	C	No Change
Westbound SR 152	West of SR 33	650	A	0	0	650	A	No Change
Northbound SR 33	Between I-5 and SR 152	650	E	0	5	655	E	No Change
Southbound SR 33	Between I-5 and SR 152	300	D	0	0	300	D	No Change

Note:
LOS criteria for freeways andtwo-lane highways provided in Tables 2 and 3 of Appendix G2 were used to identify LOS values.

Construction of the Reservoir Restriction Alternative and associated increases in traffic would not conflict with applicable policies that establish roadway performance standards and would not result in a substantial increase in traffic that would substantially exceed the existing traffic load and roadway capacity. Construction traffic during implementation of the Reservoir Restriction Alternative would not result in any roadway LOS degradation. **Therefore, the construction activities associated with the Reservoir Restriction Alternative would have temporary and less than significant impacts.**

12.2.4.1.2 Traffic Safety Effects

Construction activities associated with the Reservoir Restriction Alternative could increase traffic hazards due to a design feature or incompatible use. A temporary access road would be constructed to allow hydroseeding equipment access to the reservoir rim. The access road would then be removed after the hydroseeding actions are completed. The presence of construction equipment and increased construction personnel vehicle trips would increase hazards at dangerous intersections. These effects would occur at individual work sites and along routes where slow moving construction traffic may conflict with passenger vehicles traveling at a higher speed. Some areas that have been identified as hazardous include the junction of Basalt Road and SR 152, and the junction of the Romero Visitor Center access road and SR 152 given the likelihood of interaction between slow moving construction traffic making left turns from SR 152 onto these roadways crossing two lanes carrying faster moving passenger vehicle traffic. Posted speed limits are 25 miles per hour (mph) on Basalt Road and 65 mph on SR 152. **Therefore, construction of the Reservoir Restriction Alternative would result in significant impacts to traffic safety. Implementation of Mitigation Measure TR-1, discussed in Section 12.4, would reduce this impact to a less than significant level.**

12.2.4.1.3 Public Transit and Non-Motorized Transportation Effects

Construction of the Reservoir Restriction Alternative could cause reductions in capacity, availability or performance of public transit and non-motorized transportation, or conflict with any programs regarding public transit, bicycle, or pedestrian facilities. As described under existing conditions, the San Luis Reservoir Region has very low pedestrian and bicycle activity, with no dedicated facilities to serve non-motorized traffic. Also, none of the transit services stop at B.F. Sisk Dam. Therefore, construction activities associated with the Reservoir Restriction Alternative would not cause any interruptions to public transit or non-motorized traffic.

Additionally, construction of the Reservoir Restriction Alternative is not expected to generate any new demands on public transit and non-motorized services in the area of analysis that would cause reductions in service levels. The Reservoir Restriction Alternative would also not conflict with any public transit, bicycle, or pedestrian facility programs in the study area. However, slow-moving construction traffic would have temporary, minor impacts on speeds of non-auto modes, especially transit. **Therefore, construction of the**

Reservoir Restriction Alternative would have less than significant impact on public transit and non-motorized services and performance.

12.2.4.1.4 Emergency Access

Construction of the Reservoir Restriction Alternative could result in inadequate emergency access. For dam safety and public visitor safety reasons, Reclamation, DWR and CDPR personnel must be able to access areas around the reservoir and dam at all times. Construction traffic including workers accessing the site, deliveries to the site, waste disposal from the site, and the movement of large construction equipment on site have the potential to limit or slow emergency access to the reservoir and dam. **Therefore, the construction of the Reservoir Restriction Alternative would have a significant impact to emergency access. Implementation of Mitigation Measure TR-1, discussed in Section 12.4, would reduce this impact to a less than significant level.**

12.2.4.2 Operations

12.2.4.2.1 Traffic Flow, Traffic Safety, Public Transit, Non-Motorized Transportation, and Emergency Access Effects

Operations and maintenance activities of the Reservoir Restriction Alternative could result in negative cumulative effects to roadway LOS, traffic safety, and the operations and performance of public transit and non-motorized transportation. Post-construction, the Reservoir Restriction Alternative would not have any additional operations and maintenance (O&M) personnel in the San Luis Reservoir Region. **Therefore, operation of the Reservoir Restriction Alternative would have no impacts to traffic flow, traffic safety, public transit, non-motorized transportation, and emergency access.**

12.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

As mentioned earlier, the study area for traffic and transportation will focus on areas that are expected to be affected by the planned construction activities associated with the action alternatives. Construction of the Crest Raise Alternative would occur at B.F. Sisk Dam. As such, the discussion of traffic and transportation related impacts will focus on the San Luis Reservoir Region.

Construction of the Crest Raise Alternative would begin in 2020 and would last about 8 to 10 years. With the addition of the shear key option, construction is expected to last approximately 10 to 12 years. As was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend this construction schedule to 20 years.

12.2.5.1 Construction

12.2.5.1.1 Traffic Flow Effects

Construction of the Crest Raise Alternative could cause temporary increases in traffic and could result in temporary degradation of roadway LOS in the area of analysis during the construction period. During the construction of the Crest Raise Alternative, a maximum of 75 personnel and 59 trucks would access the project site daily. This would result in up to 150 construction personnel trips and 118 construction truck trips for a total of 268 construction-related trips per day. For construction workers, it was assumed that they would originate from the City of Los Banos in the east. This assumption was based on proximity to labor populations in Los Banos. Materials are assumed to originate from Los Banos and other locations along I-5. Construction trips were applied to neighboring roadways in the San Luis Reservoir Region that are anticipated to support construction worker trips, material deliveries, and disposal. For the Crest Raise Alternative, it was assumed that all of the truck trips would be distributed throughout of the 24-hour construction period. The construction personnel trips would occur inbound before 6 a.m. and 6 p.m. and outbound after 6 a.m. and 6 p.m. Trip generation and distribution of construction traffic for the Crest Raise Alternative are summarized in Table 12-7.

Table 12-7. Crest Raise Alternative Trip Generation

	Time Period			
Type of Trip	AM Peak Hour[1]	PM Peak Hour[1]	Off-Peak Hours	Total Daily
Construction Truck Trip	20	20	78	118
Construction Personnel Trip	25	75	50	150
Total Construction-Related Trip	45	75	148	268

Note:
[1] Typically, AM and PM peak hours occur for two hours between 7 and 9 a.m. and two and a half hours between 4 and 6:30 p.m., respectively.

The construction of the Crest Raise Alternative would begin in 2020, so transportation impacts associated with the Crest Raise Alternative were evaluated under 2020 conditions. Since the daily construction-related traffic accessing the project site would remain the same during the construction phase, transportation and traffic impacts associated with the construction of the Crest Raise Alternative are expected to remain similar for the 8 to 12-year duration of construction. Roadway operations during the construction of the Crest Raise Alternative are summarized in Tables 12-8 and 12-9. Table 12-9 includes intersection operations at the two locations on CA SR 152 where signals will be in place during construction to facilitate left turns across the highway by haul trucks and workers accessing the site. The installation of the signal would include the trenching of anchors, pouring concrete bases, and crane installation of the signals, which would result in a short-term traffic impact at those intersections for approximately 2 days.

Construction-related trips would not change the LOS of any of the study roadway segments in Merced County when compared against AADT or peak traffic hour thresholds. Of these roadways, Basalt Road would experience the largest percentage increase. This would include half of the construction personnel traffic accessing the site during the morning and evening peak commute hours 7 to 9 a.m. and from 4 to 6:30 p.m., while construction truck traffic would be distributed throughout the day. As indicated in Table 12-8, the projected increase in AADT value would however be less than 1,900 vehicles, which is the threshold value for a rural, two-lane non-freeway road with isolated stops operating at LOS B. As such, Basalt Road would continue to operate at LOS B.

Construction of the Crest Raise Alternative and associated increases in traffic would not conflict with applicable policies that establish roadway performance standards and would not result in a substantial increase in traffic that would substantially exceed the existing traffic load and roadway capacity. Construction traffic during implementation of the Crest Raise Alternative would not result in any roadway LOS degradation. **Therefore, the construction activities associated with the Crest Raise Alternative would have temporary and less than significant impacts.**

Table 12-8. Daily Roadway Operations – Crest Raise Alternative

Roadway	2020 AADT	2020 LOS	Maximum Daily Truck Trips	Maximum Daily Worker Trips	Total AADT During Construction	LOS during Construction	LOS Change
I-5 at SR 152	32,600	B	45	50	32,695	B	No Change
SR 152 at I-5	31,300	B	28	50	31,378	B	No Change
SR 152 at SR 33	29,700	B	118	150	29,968	B	No Change
SR 33 at I-5	14,500	F	45	50	14,595	F	No Change
Basalt Road	191	B	118	150	459	B	No Change

Table 12-9. Peak Hour Roadway/Intersection Operations – Crest Raise Alternative

Roadway/ Intersection	Location	2020 Volume	2020 LOS	Maximum Truck Trips	Maximum Worker Trips	Total Volume During Construction	LOS during Construction	LOS Change
AM Peak Hour								
Northbound I-5	South of SR 152	2,100	C	4	0	2,104	C	No Change
Southbound I-5	South of SR 152	1,750	C	4	8	1,762	C	No Change
Eastbound SR 152	West of I-5	1,200	B	6	17	1,223	B	No Change
Westbound SR 152	West of I-5	1,600	B	6	0	1,606	B	No Change
Eastbound SR 152	West of SR 33	200	A	10	25	235	A	No Change
Westbound SR 152	West of SR 33	1,600	B	10	0	1,610	B	No Change
Northbound SR 33	Between I-5 and SR 152	550	D	4	8	562	D	No Change
Southbound SR 33	Between I-5 and SR 152	350	D	4	0	354	D	No Change
SR 152/Basalt Road	SR 152 & Basalt Road		A*				A**	No Change
SR 152/Visitors Center	SR 152 & Visitors Center turnoff		A*				A**	No Change
PM Peak Hour								
Northbound I-5	South of SR 152	2,200	C	4	7	2,211	C	No Change
Southbound I-5	South of SR 152	1,100	B	4	13	1,117	B	No Change
Eastbound SR 152	West of I-5	2,000	C	6	25	2,0231	C	No Change
Westbound SR 152	West of I-5	950	A	6	13	969	A	No Change
Eastbound SR 152	West of SR 33	1,900	C	10	50	1,960	C	No Change
Westbound SR 152	West of SR 33	650	A	10	25	685	A	No Change
Northbound SR 33	Between I-5 and SR 152	650	E	4	13	667	E	No Change
Southbound SR 33	Between I-5 and SR 152	300	D	4	7	311	D	No Change
SR 152/Basalt Road	SR 152 & Basalt Road		A*				A**	No Change
SR 152/Visitors Center	SR 152 & Visitors Center turnoff		A*				A**	No Change

Note:
LOS criteria for freeways, two-lane highways, unsignalized and signalized intersections provided in Tables 2, 3, 4 and 5 of Appendix G2 were used to identify LOS values.
* LOS at unsignalized intersections based on average delay for all approaches instead of side-street only.
** LOS at signalized intersections based on average delay for all approaches.

12.2.5.1.2 Traffic Safety Effects

Construction activities associated with the Crest Raise Alternative could increase traffic hazards due to a design feature or incompatible use. Haul and access roads would be constructed consistent with the 2009 Reclamation Safety and Health Standards, as amended. New roads would be cleared and existing roads would be improved and would be either paved or treated to prevent dust. Roads would be approximately 30 feet wide with approximately 100 feet of clearance to accommodate construction equipment.

The presence of construction equipment and increased construction personnel vehicle trips would increase hazards at dangerous intersections. These effects would occur at individual work sites and along routes where slow moving construction traffic may conflict with passenger vehicles traveling at a higher speed. Some areas that have been identified as hazardous include the junctions of Basalt Road and SR 152, and the junction of the Romero Visitor Center access road and SR 152 given the likelihood of interaction between slow moving construction traffic making left turns from SR 152 onto these roadways crossing two lanes carrying faster moving passenger vehicle traffic. Posted speed limits are 25 mph on Basalt Road and 65 mph on SR 152. To reduce the potential for adverse traffic safety interactions between this construction truck and worker traffic and other vehicle traffic, as was described in Chapter 2, Project Description, temporary traffic signals would be installed at these two intersections for use during the 8 to 12-year construction schedule. These temporary traffic signals would reduce the potential for traffic safety impacts from the use of area roadways by construction traffic and other vehicle traffic at these two intersections, but additional construction traffic management actions are required. **Therefore, construction of the Crest Raise Alternative would result in significant impacts to traffic safety. Implementation of Mitigation Measure TR-1, discussed in Section 12.4, would reduce this impact to a less than significant level.**

12.2.5.1.3 Public Transit and Non-Motorized Transportation Effects

Construction of the Crest Raise Alternative could cause reductions in capacity, availability or performance of public transit and non-motorized transportation, or conflict with any programs regarding public transit, bicycle, or pedestrian facilities. As described under existing conditions, the San Luis Reservoir Region has very low pedestrian and bicycle activity, with no dedicated facilities to serve non-motorized traffic. Also, none of the transit services stop at B.F. Sisk Dam. Therefore, construction activities associated with the Crest Raise Alternative would not cause any interruptions to public transit or non-motorized traffic.

Additionally, construction of the Crest Raise Alternative is not expected to generate any new demands on public transit and non-motorized services in the area of analysis that would cause reductions in service levels. The Crest Raise Alternative would also not conflict with any public transit, bicycle, or pedestrian facility programs in the study area. However, slow-moving construction traffic could have temporary, minor impacts on speeds of non-auto modes, especially transit. **Therefore, construction of the Crest Raise Alternative would have less than significant impact on public transit and non-motorized services and performance.**

12.2.5.1.4 Emergency Access

Construction of the Crest Raise Alternative could result in inadequate emergency access. For dam safety and public visitor safety reasons, Reclamation, DWR and CDPR personnel must be able to access areas around the reservoir and dam at all times. Construction traffic including workers accessing the site, deliveries to the site, waste disposal from the site, and the movement of large construction equipment on site have the potential to limit or slow emergency access to the reservoir and dam. **Therefore, the construction of the Crest Raise Alternative would have a significant impact to emergency access., Implementation of Mitigation Measure TR-1, discussed in Section 12.4, would reduce this impact to a less than significant level.**

12.2.5.2 Operations

12.2.5.2.1 Traffic Flow, Traffic Safety, Public Transit, Non-Motorized Transportation, and Emergency Access Effects

Operations and maintenance activities of the Crest Raise Alternative could result in negative cumulative effects to roadway LOS, traffic safety, and the operations and performance of public transit and non-motorized transportation. Post-construction, the Crest Raise Alternative would not have any additional operations and maintenance (O&M) personnel in the San Luis Reservoir Region. **Therefore, operation of the Crest Raise Alternative would have no impacts to traffic flow, traffic safety, public transit, non-motorized transportation, and emergency access.**

12.3 Comparative Analysis of Alternatives

Table 12-10 lists the effects of each action alternative and compares them to existing conditions and No Action/No Project Alternative. The impacts listed in Table 12-10 are NEPA as well as CEQA impacts, but they are judged for significance under CEQA guidelines only.

Table 12-10. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities would cause a temporary increase in traffic and could result in substantial degradation of roadway LOS in the area of analysis.	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could increase traffic hazards due to a design feature or incompatible use.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	TR-1: Develop a Temporary Traffic Control Plan	LTS
	Alternative 3 - Crest Raise	S	TR-1: Develop a Temporary Traffic Control Plan	LTS
Construction activities could cause reductions in capacity, availability, or performance of public transit and non-motorized transportation, or conflict with any programs regarding public transit, bicycle, or pedestrian facilities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could result in inadequate emergency access.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	TR-1: Develop a Temporary Traffic Control Plan	LTS
	Alternative 3 - Crest Raise	S	TR-1: Develop a Temporary Traffic Control Plan	LTS
Operations and maintenance activities could cause increases in traffic and could result in substantial degradation of roadway LOS in the area of analysis.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations and maintenance activities could increase traffic hazards due to a design feature or incompatible use.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Operations and maintenance activities could cause substantial reductions in capacity, availability or performance of public transit and non-motorized transportation, or conflict with any programs regarding public transit, bicycle, or pedestrian facilities	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations and maintenance activities could result in inadequate emergency access.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI

Key: LTS – Less than Significant; NI – No impact; None – No mitigation required; S – Significant; SU – Significant and Unavoidable

12.4 Mitigation Measures

The following mitigation measures would reduce the severity of traffic and transportation impacts.

TR-1: Develop a Temporary Traffic Control Plan. The following construction management actions will be documented in a temporary traffic control plan developed by the contractor as a requirement that will be included in its construction contract. The temporary traffic control plan will be submitted for Caltrans review and approval during the Encroachment Permit process. Construction contractors shall install signage at intersections identified as dangerous in accordance with the California Manual on Uniform Traffic Control Devices guidelines warning motorists of slow moving construction traffic and lane closures, including SR 152, Basalt Road, and the Romero Visitor Center access road. Signage shall also be posted at these intersections one month in advance to allow motorists time to plan for delays or alternate routes. Construction contractors shall implement dust abatement and perform proper construction traffic management actions, including signage warning motorists of construction activity and traffic controls like flaggers or temporary traffic lights where construction equipment will be entering roadways, to reduce conflicts during periods of high traffic volume in and around each construction site and to avoid conflicts with emergency responders entering and existing the area during an emergency.

In addition to the temporary traffic control plan, prior to the initiation of any construction actions, construction contractors shall develop and adhere to a health and safety plan outlining all applicable Occupational Safety and Health Administration requirements, important traffic safety plans including identification of emergency access routes in and through construction areas that would will need to be kept clear at all times during construction. The health and safety plan shall include coordination with emergency service personnel to ensure adequate mitigation for all impacts.

12.5 Significant Unavoidable Impacts

None of the action alternatives would result in significant unavoidable impacts to traffic and transportation.

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Chapter 13
Hazards and Hazardous Materials

This chapter describes potential hazards and hazardous materials[1] present within the area of analysis, and presents an analysis of potential hazards, including the potential for wildfire and conflict with local airports, and hazardous materials impacts from the project alternatives. Potential impacts with other hazards including, flood, seismic and landslide risk are analyzed in Chapter 9, Flood Protection, and Chapter 25, Geology, Seismicity, and Soils.

13.1 Affected Environment/Environmental Setting

A description of the locations with the potential to be affected by the action alternatives and an overview of the regulatory setting associated with hazards and hazardous materials are presented in this section. The area of analysis is defined as the area that could be affected by the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project), which is the San Luis Reservoir State Recreation Area (SRA).

13.1.1 Area of Analysis

The San Luis Reservoir SRA is within western Merced County directly west of the unincorporated community of Santa Nella in the foothills of the Diablo Range. It is accessible from Interstate Route 5 (I-5), then either State Route (SR) 33 to SR 152 from the east; or via SR 152 from the west. The San Luis Reservoir SRA includes San Luis Reservoir, O'Neill Forebay, Los Banos Reservoir, and adjacent lands. Los Banos Reservoir is a separate area not connected to San Luis Reservoir (United States Department of the Interior, Bureau of Reclamation [Reclamation] and California Department of Parks and Recreation [CDPR] 2013); therefore, it is not included in the area of analysis because no construction work is proposed there. The key areas affected by the project within San Luis Reservoir SRA would be B. F. Sisk Dam, the Basalt Hill Borrow Area and Borrow Area 6.

[1] The California Health and Safety Code defines a hazardous material as "any material that because of its quantity, concentration, or physical or chemical characteristics poses a significant present or potential hazard to human health and safety, or the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, radioactive materials, and any material which a handler or the administrating agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment" (Health and Safety Code Section 25501).

13.1.2 Regulatory Setting

13.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Resource Conservation and Recovery Act

13.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Hazardous Waste Control Act
- California Environmental Protection Agency Unified Program
- California Occupational Safety and Health Administration Standards
- State Water Resource Control Board Hazardous Waste Programs

13.1.2.3 Regional and Local

The following Regional and Local laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Department of Water Resources, San Luis Field Division
- Merced County Office of Environmental Services

13.1.3 Existing Conditions

The following section describes potentially hazardous conditions and hazardous materials sites within the area of analysis. Hazardous materials sites were identified using the EnviroStor Database managed by the California Department of Toxic Substances Control (DTSC) (DTSC 2017) and the GeoTracker Database managed by the State Water Resources Control Board (SWRCB) (SWRCB 2017).

13.1.3.1 San Luis Reservoir

San Luis Reservoir is not located within 2 miles of a public or private land-based airport. However, the San Luis Reservoir Seaplane Base allows water landings of planes on the reservoir. Approximately 25 aircraft operations per year take place at the reservoir. No overnight mooring of seaplanes is allowed and landing must be at least 500 feet from shore. Notices to Airmen (NOTAMs) are provided as needed from the Seaplane Base. Federal Aviation Administration Information listed on Airport-Data describes the elevation of San Luis Reservoir to be 544 feet and that elevations may change due to seasonal conditions and can be as low as 340 feet (Airport-Data 2013).

The project area is surrounded by wildlands and the potential for a wildfire in this area does exist which could affect neighboring urbanized areas of Santa Nella. The current *2030 Merced County General Plan, Background Report* includes a map of Fire Hazard Severity Zones. Much of the undeveloped and rural area surrounding San Luis Reservoir SRA is designated within a Moderate or High fire severity zone and is within the State Responsibility Area, which is protected by CalFire. In addition, the Merced County Fire Department provides primary response services to urban fires in unincorporated Merced County Local Responsibility Areas. In recognition of the severity of wildland fire hazards, the State has enacted legislation that requires local jurisdictions to adopt minimum standards, such as road standards for access, identification of infrastructure and buildings, private water supply reserves, fuel breaks and greenbelts, defensible space perimeters around structures, and specific building requirements to increase protection and improve fire prevention and response services (Merced County 2013).

The closest school to San Luis Reservoir SRA is Romero Elementary School on West Luis Road in Santa Nella. This school is located approximately 1.5 miles east of O’Neill Forebay and is within the Gustine Unified School District (Gustine Unified School District 2017).

Table 13-1 lists active or unresolved hazardous materials sites within five miles of the B.F. Sisk Dam. One active hazardous materials site was discovered within the San Luis Reservoir SRA under California Department of General Services management. This listed site consists of soil and groundwater contamination from a leaking underground storage tank (LUST) containing gasoline. The status of the site is open and remediation of soil and groundwater occurred under the supervision of Merced County until September 2009. Central Valley Regional Water Quality Control Board (RWQCB) has issued a request to California Department of General Services to continue with monitoring and the installation of additional monitoring wells to assess the extent of soil and groundwater contamination still present (Central Valley RWQCB 2016). Four open hazardous materials sites are within five miles of the B.F. Sisk Dam. The Anderson’s Pea Soup LUST cleanup site on SR 33 is contaminated with diesel and gasoline. The Anderson’s Pea Soup site is open with a completed site assessment and interim remedial action. Santa Nella Parcel 41, formerly known as Central Valley Pipelines, is located on Santa Nella Road. Santa Nella Parcel 41 is open and currently under remediation for crude oil contamination. The Forebay Chevron site located on Gonzaga Road and is open with a completed site assessment.

There are five sites with permitted underground storage tanks (USTs) listed along SR 33 and two permitted UST sites near the intersection of SR 153 and SR 33 within five miles of B.F. Sisk Dam.

Table 13-1. Active Hazardous Materials Sites and Permitted Facilities near B.F. Sisk Dam

Haz. Mat Site Name/ Database ID Number	Haz. Mat Site Location/Distance from B.F. Sisk Dam	Regulatory Agency	Contaminant of Concern	Cleanup Status
San Luis Reservoir SRA Geotracker LUST Cleanup Site (T0604700256)	31426 Gonzaga Rd Gustine/0.0 miles	Central Valley RWQCB	gasoline	Open – Site Assessment as of 3/27/2015
Anderson's Pea Soup Geotracker LUST Cleanup Site (T0604711623)	12411 S Highway 33/4.8 miles	Central Valley RWQCB	diesel, gasoline	Open – Assessment & Interim Remedial Action
Santa Nella Parcel 41, Former Central Valley Pipelines Geotracker Cleanup Program Site (T10000005154)	Santa Nella Rd. Santa Nella/3.6 miles	Central Valley RWQCB	crude oil	Open – Remediation as of 3/11/2016
Forebay Chevron Geotracker LUST Cleanup Site (T10000005867)	29860 Gonzaga Rd. Santa Nella/0.0 miles	Central Valley RWQCB	benzene, diesel, ethylbenzene, gasoline, MTBE/TBA/ other fuel oxygenates, naphthalene, petroleum hydrocarbons	Open – Site Assessment as of 4/28/2014
Chevron Station #92513 Geotracker Permitted UST (FA0000808)	12801 Hwy 33 Santa Nella/4.1 miles	Merced County	N/A	N/A
Santa Nella Travel Center. Geotracker Permitted UST (FA0003674)	12310 Hwy 33 Santa Nella/4.6 miles	Merced County	N/A	N/A
7-Eleven Inc. Store # 37973 Geotracker Permitted UST (FA0000626)	12845 Hwy 33 Santa Nella/4.2 miles	Merced County	N/A	N/A
Arco AM/PM/Pennywise Travel Center Geotracker Permitted UST (FA0004571)	12185 Hwy 33 Gustine/4.6 miles	Merced County	N/A	N/A
Rotten Robbie #59 Geotracker Permitted UST (FA0000757)	12860 Hwy 33 Santa Nella/4.2 miles	Merced County	N/A	N/A
Forebay Unocal Geotracker Permitted UST (FA0005654)	28960 Gonzaga Rd. Santa Nella/1.0 mile	Merced County	N/A	N/A
Santa Nella Petro Geotracker Permitted UST (FA0001926)	28991 Gonzaga Rd. Santa Nella/3.0 miles	Merced County	N/A	N/A

Source: SWRCB 2017 and DTSC 2017
Key:
Hwy = Highway
LUST = Leaking Underground Storage Tank
SRA = State Recreation Area
RWQCB = Regional Water Quality Control Board

Emergency evacuation routes within the study and surrounding areas for the State Responsibility Area include freeways, arterials and major/minor collector roads in the County. State highways would be the primary routes including I-5, SR 33 and SR 152. All roads leading to I-5 and the State Routes would also be evacuation routes out of the State Responsibility Area (Merced County 2013). Fire protection and emergency medical response at the State Responsibility Area are provided by CalFire's station south of Gonzaga Road and east of the State Responsibility Area Administrative Offices. Park rangers and lifeguards are also trained for emergency medical response.

13.2 Environmental Consequences/Environmental Impacts

These sections describe the hazards and hazardous materials environmental consequences/environmental impacts associated with each alternative.

13.2.1 Assessment Methods

This section describes the assessment methods used to analyze potential hazards and hazardous materials effects of the alternatives, including the No Action/No Project Alternative. In general, the following evaluation is qualitative, focusing on two types of impacts associated with hazards and hazardous materials: 1) the potential to encounter hazardous materials, including contaminated soil and/or groundwater, at existing active hazardous materials sites near proposed construction; and 2) accidental release of hazardous materials during construction and operations, including accidental release of hazardous materials (e.g., fuels, oils, etc.) during transportation to and from sites related to construction and operations. Both short-term impacts during construction and long-term impacts of operations are analyzed.

The locations of existing hazardous materials sites in relation to proposed construction areas and operating facilities were considered when determining the potential for encountering contaminated soil and/or groundwater which could result in a release of hazardous materials and a potential threat to public health and safety.

Potential construction activity impacts to San Luis Seaplane operations at the San Luis Reservoir are also analyzed. The proximity of proposed facilities and construction work areas to wildlands was considered in the analysis for the risk of wildland fires. Emergency evacuation plans for the various State and local emergency management jurisdictions were researched to determine if the project would conflict with emergency evacuation procedures and construction controls and mitigation measures were identified where necessary.

There are no schools within one-quarter mile of proposed construction activities. California Environmental Quality Act (CEQA) Guideline 15186 states that one-quarter of a mile is the threshold for the proximity of school to construction sites to warrant further impact analysis. Therefore, no further analysis of potential hazards associated with construction and operations near schools is conducted.

13.2.2 Significance Criteria

The significance criteria described below were developed consistent with the CEQA Guidelines to determine the significance of potential impacts related to hazards and hazardous materials that could result from implementation of the project. Hazards and hazardous materials impacts would be considered potentially significant if the project would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government code Section 65962.5 and, as a result would it create a significant hazard to the public or the environment;
- Result in a safety hazard for people residing or working in the project area for a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport;
- Result in a safety hazard for people residing within the project area for a project within the vicinity of a private airstrip;
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

The significance criteria described above apply to areas where hazards exist and where hazardous materials could be released and cause safety risks to the public, construction workers or employees operating facilities.

13.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative includes the most likely future conditions in the absence of the project. Under the No Action/No Project Alternative, there would be no construction and no impacts related to hazards and hazardous materials. No changes to the types or extent of the hazards are underway that would change the character of hazards or hazardous materials in the future. **Therefore, there would be no impact related to hazards and hazardous materials under the No Action/No Project Alternative.**

13.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 – Reservoir Restriction Alternative

Under the Reservoir Restriction Alternative, there would be some construction of a temporary access road and placement of vegetation around the entire reservoir rim between the current maximum water surface elevation at 544 feet and the proposed restriction elevation of 489 feet. Project construction would not be located near any known hazardous sites and would not require extensive excavation and would therefore, be unlikely to encounter any hazardous materials during construction.

During construction activities, the transport, use, or disposal of hazardous materials could increase the risk of exposure from hazardous materials to the public and construction workers at San Luis Reservoir. Some hazardous materials that would be used onsite during vegetation placement work and temporary access construction may include motor oil, gasoline, and diesel fuel. The Stormwater Pollution Prevention Plan (SWPPP) described in Chapter 4, Water Quality, which is required by the RWQCB for approval of a General Construction Permit through the National Pollutant Discharge Elimination System (NPDES) program, would require the following safety measures and best management practices (BMPs) to be implemented when transporting, storing, or using hazardous materials. All hazardous materials would be secured and stored in an area away from drainage paths and workers would be instructed to follow guidelines outlined within the SWPPP when using hazardous materials. All construction equipment would be serviced in a specific, stabilized area to prevent spills of fluids, oils, or lubricants. This area would consist of clean gravel pads with an impervious liner underneath. All hazardous materials not needed for the operation of the facilities would be removed after the construction is completed. The SWPPP would also describe actions to prevent a release of hazardous materials and procedures in case of an accidental spill or release of hazardous materials during dredging and other work within the reservoir. All spills would be reported to the RWQCB and the contractor would be required to implement procedures and response protocols for immediate cleanup (per the permit and SWPPP). These procedures may include placement of sandbags, gravel, or other approved features to prevent material from entering surface waters. **Therefore, the Reservoir Restriction Alternative would have a less than significant impact related to hazards and hazardous materials due to the use and transport of hazardous materials during construction.**

Construction activities within San Luis Reservoir could conflict with seaplane maneuvers on San Luis Reservoir and operations at the San Luis Reservoir Seaplane Base, resulting in safety hazards for pilots and people working and residing in the area. The construction of the Reservoir Restriction Alternative would place construction equipment at locations along the San Luis Reservoir rim throughout the 1.5 year construction schedule. Hydroseeding and temporary road building activities along the San Luis Reservoir rim would rely on low truck based hydroseeding equipment and other construction equipment all under

25 feet in height. This activity along the reservoir rim would not limit pilots ability to land on the approximately three mile wide (at its narrowest) reservoir surface. These activities would not prevent the use of the reservoir by the seaplane base. **Construction of the project would have a less than less than significant impact on operations at the San Luis Reservoir Seaplane Base.**

Operational changes from implementation of the Project could limit the area available for Seaplane landing resulting in safety hazards for pilots and the public. Changes in operation of the surface water elevations (max. 489 feet) at the reservoir would still be within existing operating range (max. 544 feet to low point 340 feet) described by the Federal Aviation Administration (FAA). **Therefore, there would be no impact to safety and landing area capacity at the San Luis Reservoir Seaplane Base.**

During construction activities at San Luis Reservoir, use of Basalt Road and SR 152 for site access could temporarily interfere with an emergency response plan or emergency evacuation plan for the State Responsibility Area. SR 152 and Basalt Road would be the main site accesses for trucks, equipment and construction worker access to San Luis Reservoir during hydroseeding activities. SR 152 is the main access route into the San Luis Reservoir SRA from both the east and west and would be the main evacuation route from the park in case of an emergency. As a result, the use of SR 152 and Basalt Road for construction site access could temporarily conflict with emergency response and evacuation plans for the San Luis Reservoir SRA. **Potential conflicts with emergency vehicles in the form of traffic slowdowns or temporary roadway blockages during construction would be a significant impact.**

Traffic control Mitigation Measure TR-1, described in Chapter 12, Traffic and Transportation, would be required during construction to allow emergency vehicles through work areas as needed according to approved traffic control plans. Construction traffic would be held from using emergency vehicle routes until the emergency had passed. **Therefore, with implementation of traffic control Mitigation Measure TR-1 described in Chapter 12, Traffic and Transportation the impact would be less than significant.**

The use of mechanical equipment during construction could increase the risk of wildfire within the vicinity of the project area. The *2030 Merced County General Plan – Background Report* identified the San Luis Reservoir area as region at moderate or high risk for wildfire. Sparks could be generated while using mechanical equipment, which could cause a wildfire. **This increased fire risk would be significant.** Mitigation measures to be taken during construction to reduce the risk of starting a wildfire are described in Section 13.4 below. These measures include using equipment with spark arrestors during construction and informing workers about the risk of starting a wildfire and how to avoid it; these measures would reduce the increased wildfire risk. **Therefore, during construction of the Reservoir Restriction Alternative, changes to the risk of wildfire would be significant; however, with use of spark arrestors**

on equipment as described in Mitigation Measure HAZ-4 (Section 13.4) impacts would be reduced to less than significant with mitigation.

13.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 – Crest Raise Alternative

During construction activities, the transport, use, or disposal of hazardous materials could increase the risk of exposure from hazardous materials to the public and construction workers at San Luis Reservoir. Under the Crest Raise Alternative, asbestos wrapped corrugated metal pipe from existing toe drains would be removed. DTSC classifies asbestos as hazardous waste if it is “friable,” meaning that is can be reduced to a powder or a dust under hand pressure (DTSC 2003). According to an article published in the *Pipeline and Gas Journal*, asbestos in coatings is never in a friable state and when a pipeline is cut and removed from the ground, the coating is only minimally disturbed (Howell 2011). In addition, with the utilization of a respirator as prescribed standard safety equipment by workers handling asbestos wrapped pipe and given the pipelines locations outdoors, instances of any concentrated exposure are unlikely. Following Environmental Protection Agency regulations under the Resource Conservation and Recovery Act (RCRA) of 1976, as described in Chapter 28, Consultation, Coordination, and Compliance, all potential hazardous waste will be transported from the site to an off-site waste management facility utilizing the Uniform Hazardous Waste Manifest. **Therefore, the Crest Raise Alternative would have a less than significant impact related to hazards and hazardous materials due to the use and transport of hazardous materials during construction.**

During construction activities at B.F. Sisk Dam, there is potential to encounter contaminated soil and/or groundwater, which could result in an accidental release of hazardous materials and pose a threat to the public and the environment. The project would be constructed near an active remediation site within San Luis Reservoir SRA, which would create a hazard to the public or the environment, if contaminated soil and/or groundwater is encountered during construction and released to the environment. The site is within the area of a proposed construction staging area and approximately 830 feet from proposed permanent downstream fill impacts for dam construction. **A significant impact would occur if contaminated soil and/or groundwater was encountered and released during construction.** Ongoing State mandated soil and groundwater monitoring activities at the contaminated site may also be affected. Mitigation Measure HAZ-1, described in Section 13.4, would require that the project contractor prepare a Contaminated Soil/Groundwater Remediation Plan to be implemented if contamination is still present based on available monitoring data or if contaminated soil or groundwater is encountered during construction. Reclamation will contact CDPR and the Central Valley RWQCB to determine whether or not ongoing monitoring of the site is needed during or after construction. **Therefore, during construction of the Crest Raise Alternative changes to the risk of hazardous materials release would be significant; however, with preparation and implementation of a Contaminated**

Soil/Groundwater Remediation Plan and implementation of Mitigation Measure HAZ-1 (Section 13.4) this impact would be less than significant.

Construction activities within San Luis Reservoir could conflict with seaplane maneuvers on San Luis Reservoir and operations at the San Luis Reservoir Seaplane Base, resulting in safety hazards for pilots and people working and residing in the area. The construction of the Crest Raise Alternative would place construction equipment at B. F. Sisk Dam throughout the construction schedule. This would not however prevent the use of other portions of the reservoir from use by the seaplane base.

Construction activities at B.F. Sisk Dam could be a safety hazard to pilots, the general public, and workers within the project area if pilots are unaware of the temporary base closures. Mitigation Measure HAZ-2 would require development of a construction safety plan in accordance with *FAA Advisory Circular 150/5370-2F Operational Safety on Airports During Construction* to coordinate construction activities including: a schedule, coordination of personnel with aviation radios, and notice requirements. Mitigation Measure HAZ-3 would require a NOTAM to be issued by the seaplane base administrator alerting pilots on the construction activities at B. F. Sisk Dam prior to use of any impeding construction equipment and to notify pilots of construction activities.

Construction of the project within the San Luis Reservoir Seaplane Base would have significant public safety and hazard impacts; however, coordination between the project contractor and seaplane base personnel, including issuance of NOTAMs, and elements described in Mitigation Measures HAZ-2 and HAZ-3 (Section 13.4), would reduce impacts to less than significant levels.

During construction activities at San Luis Reservoir, use of Basalt Road and SR 152 for site access could temporarily interfere with an emergency response plan or emergency evacuation plan for the State Responsibility Area. Construction activities under the Crest Raise Alternative would require the use of SR 152 and Basalt Road for construction access. SR 152 is the main access route into the San Luis Reservoir SRA from both the east and west and would be the main evacuation route from the park in case of an emergency. As a result, the use of SR 152 and Basalt Road for construction site access could temporarily conflict with emergency response and evacuation plans for the San Luis Reservoir SRA. **Potential conflicts with emergency vehicles in the form of traffic slowdowns or temporary roadway blockages during construction would be a significant impact.**

Traffic control Mitigation Measure TR-1, described in Chapter 12, Traffic and Transportation, would be required during construction to allow emergency vehicles through work areas as needed according to approved traffic control plans. Construction traffic would be held from using emergency vehicle routes until the emergency had passed. **Therefore, with implementation of traffic control Mitigation Measure TR-1 described in Chapter 12, Traffic and Transportation the impact would be less than significant.**

The use of mechanical equipment during construction could increase the risk of wildfire within the vicinity of the project area. Similar to what is described under the Reservoir Restriction Alternative, sparks could be generated while using mechanical equipment, which could cause a wildfire. **This increased fire risk would be significant.** Mitigation measures to be taken during construction to reduce the risk of starting a wildfire are described in Section 13.4. These measures include using equipment with spark arrestors during construction and informing workers about the risk of starting a wildfire and how to avoid it; these measures would reduce the increased wildfire risk. **Therefore, during construction of the Crest Raise Alternative, changes to the risk of wildfire would be significant; however, with use of spark arrestors on equipment as described in Mitigation Measure HAZ-4 (Section 13.4) impacts would be reduced to less than significant with mitigation.**

13.3 Comparative Analysis of Alternatives

Table 13-2 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 13-2 are National Environmental Policy Act (NEPA) impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 13-2. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
During construction activities, the transport, use or disposal of hazardous materials could increase the risk of exposure from hazardous materials to the public and construction workers.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
During construction activities, there is potential to encounter contaminated soil and/or groundwater, which could result in an accidental release of hazardous materials and pose a threat to the public and the environment.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	HAZ-1: Work with regulating agencies to review existing monitoring data and prepare remediation plan as warranted	LTS

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities at San Luis Reservoir could conflict with seaplane maneuvers on San Luis Reservoir and operations at the San Luis Reservoir Seaplane Base, resulting in safety hazards for pilots and people working and residing in the area.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	S	HAZ-2: Coordination with seaplane base personnel HAZ-3: Issuance of NOTAM	LTS
Operational changes from implementation of the Project could limit the area available for Seaplane landing resulting in safety hazards for pilots and the public.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
During construction activities use of Basalt Road and SR 152 for site access could temporarily interfere with an emergency response plan or emergency evacuation plan for the State Responsibility Area.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	TR-1: Traffic Control and Safety Plan	LTS
	Alternative 3 - Crest Raise	S	TR-1: Traffic Control and Safety Plan	LTS
The use of mechanical equipment during construction could increase the risk of wildfire within the vicinity of the project area.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	HAZ-4: Use of spark arrestors during construction.	LTS
	Alternative 3 - Crest Raise	S	HAZ-4: Use of spark arrestors during construction.	LTS

Key:
LTS = less than significant
NI = no impact
None = no mitigation required
S = significant
-- = not required per CEQA Guidelines

13.4 Mitigation Measures

The following mitigation measures would reduce the severity of the hazard and hazardous materials impacts.

HAZ-1 The construction contractor in coordination with the Lead Agencies shall work with the CDPR and the Central Valley RWQCB to review existing monitoring data of the San Luis Reservoir SRA LUST Cleanup Site to evaluate the potential for interacting with hazardous soil contamination during construction. If the construction contractor and the Lead Agencies (as the responsible party for this potential disturbance) determine that interaction with contaminated soil cannot be avoided and these construction actions could generate a release of this soil to nearby water bodies or elsewhere offsite, the construction contractor shall prepare a Contaminated Soil/Groundwater Remediation Plan. This remediation plan will detail the nature of the contaminants on site, measures required to avoid interaction with these contaminants including if necessary a pre-construction cleanup of the site, and a response action plan in the event of an inadvertent release of contaminated soils from the construction site. This plan will be submitted to the CDPR and the Central Valley RWQCB for review and approval prior to any construction taking place.

In addition, the construction contractor shall also prepare a Spill Prevention and Response Plan for preventing spills and responding to chemical or hazardous substance spills. This plan will include spill prevention management, including employee training, hazardous substance inventory, and spill response equipment. The plan will also include a spill response plan, including evacuation procedures, spill containment and cleanup, and reporting a release.

Finally, the construction contractor shall prepare a Fire Prevention Plan to prevent a fire from occurring. The plan must include (Occupational Safety and Health Administration 2018):

- A list of all major fire hazards, proper handling and storage procedures for hazardous materials, potential ignition sources and their control, and the type of fire protection equipment necessary to control each major hazard.
- Procedures to control accumulations of flammable and combustible waste materials.
- Procedures for regular maintenance of safeguards installed on heat-producing equipment to prevent the accidental ignition of combustible materials.
- The name or job title of employees responsible for maintaining equipment to prevent or control sources of ignition or fires.
- The name or job title of employees responsible for the control of fuel source hazards.

HAZ-2 Construction contracts will include requirements for the contractor to prepare a construction safety plan prior to any construction activities in collaboration with seaplane base personnel to coordinate construction activities including: a schedule, coordination of personnel with aviation radios, and notice requirements. Also, consistent with Mitigation Measure TR-1, the contractor shall coordinate with emergency service personnel to ensure adequate mitigation for all impacts.

HAZ-3 The construction contractor in coordination with the Lead Agencies shall notify the San Luis Seaplane Base administrator when a NOTAM is required to be issued prior to the commencement of construction activities within the seaplane base and when high profile equipment will be used within safety zones.

HAZ-4 The Lead Agencies will include requirements in all construction contracts requiring the use of spark arrestors on all construction equipment. The contract shall also include requirements for the contractor to educate all construction workers about the risk of starting a wildfire and how to avoid it and who to contact in case a wildfire is started. In addition, restrictions shall be placed on smoking and campfires for any personnel utilizing Basalt Campground.

13.5 Significant Unavoidable Impacts

None of the action alternatives would result in significant unavoidable impacts related to hazards and hazardous materials.

Chapter 14
Fisheries Resources

This chapter presents the existing fisheries resources within the area of analysis and discusses potential effects on fish from the proposed alternatives in this Environmental Impact Statement/Environmental Impact Report (EIS/EIR).

14.1 Affected Environment/Environmental Setting

This section provides an overview of the regulatory setting associated with fisheries resources and provides a description of the special-status species that may potentially be affected by the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) alternatives.

This section defines the area of analysis for assessing impacts from the proposed project alternatives. Additionally, a description of the existing fisheries resources conditions of each region identified within the area of analysis is provided, including a discussion of special status fish species with the potential to be affected by the alternatives. Also presented here is an overview of the regulatory setting associated with aquatic biological resources and a description of the habitat types and fish species with the potential to be affected.

Special-status species, for the purpose of this document, are either: 1) protected, or proposed for protection, under the Federal Endangered Species Act (ESA); 2) protected, or proposed for protection, under the California Endangered Species Act (CESA); 3) managed as part of a Federal Fishery Management Plan under the Magnuson-Stevens Fishery Conservation and Management Act; or 4) considered a species of concern by California Department of Fish and Wildlife (CDFW), United States Fish and Wildlife Service (USFWS), and/or National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS). Additionally, both Critical Habitat and Essential Fish Habitat (EFH) are designated within the project area for various special-status fish species. Both of these habitat types are important components in considering potential project-related impacts as part of this assessment.

14.1.1 Area of Analysis

The area of analysis is defined as the area where fisheries resources could be affected by the implementation of the alternatives. Figure 14-1 shows the potential impact area under all alternatives. The area of analysis includes San

Luis Reservoir, Gianelli Pumping-Generating Plant, O'Neill Forebay and the surrounding State Recreation Area (SRA) in Merced County.

The Coordinated Long-Term Operation of the Central Valley Project (CVP) and State Water Project (SWP) is currently subject to the terms and conditions of Biological Opinions (BOs) issued by USFWS (2008) and NMFS (2009). The alternatives under consideration in this EIS/EIR would not support any increases in south-of-Delta exports when compared to both existing conditions and the future No Action/No Project Alternative condition, therefore, the analysis for fisheries resources does not evaluate the potential for effects in the Delta or north-of-Delta regions.

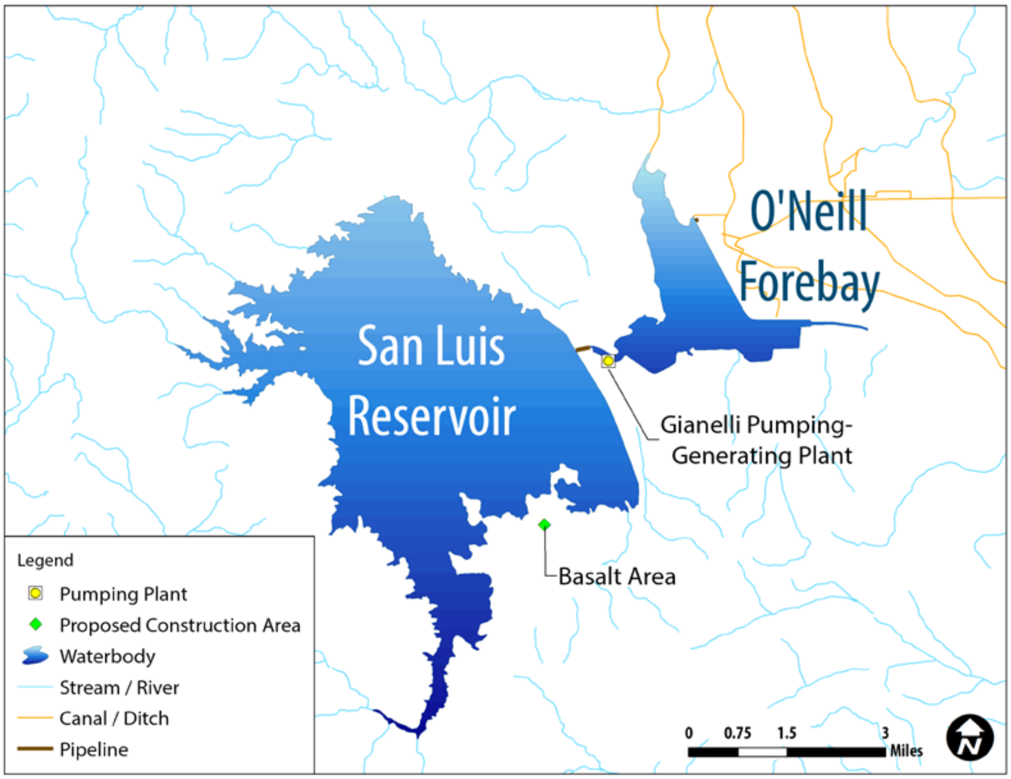

Figure 14-1. Fisheries Resources Area of Analysis – San Luis Reservoir Region

14.1.2 Regulatory Setting

The following section describes the applicable laws, rules, regulations and policies related to fisheries resources.

14.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Federal Endangered Species Act
- Fish and Wildlife Coordination Act
- Federal Clean Water Act
- Magnuson-Stevens Fishery Conservation and Management Act

14.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Endangered Species Act
- California Department of Fish and Wildlife Species Designations

14.1.2.3 Regional/Local

The following regional plan includes policies that are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Merced County General Plan

14.1.3 Existing Conditions

The area of analysis includes the area around San Luis Reservoir that is Federally-owned and leased to the California Department of Parks and Recreation (CDPR).

The San Luis Reservoir is in Merced County in the eastern slopes of the Diablo Range of the California Coast Ranges and is part of the San Luis Reservoir SRA. San Luis Reservoir is a large and intensively managed reservoir that contains of warm water fishes, primarily exported from the Delta.

Recreational fishing is an important use of San Luis Reservoir, which was constructed in 1967 to store water pumped from the Delta for use south of the Delta during the summer and fall months. As such, San Luis Reservoir is an artificial environment and does not support a naturally evolved aquatic community. Although a few native species may still be present, the vast majority of fish species in the reservoir have either been directly introduced or transported into the reservoir via the California Aqueduct and Delta-Mendota Canal (DMC). Although there are fish screens at the CVP and SWP pumps, fish eggs, larvae, small juveniles, and invertebrates can pass through the screens and be transported to San Luis Reservoir. Striped bass are the predominant species in San Luis Reservoir. There are no special-status fish species present in San Luis Reservoir. Other species found in the reservoir include threadfin shad (*Dorosoma petenense*), Sacramento sucker, carp (*Cyprinus carpio*), Sacramento blackfish (*Orthodon microlepidotus*), hitch (*Lavinia exilicauda*), hardhead, white catfish, channel catfish, yellow bullhead (*Ictalurus natalis*), brown bullhead (*Ictalurus nebulosus*), black bullhead (*Ictalurus melas*), mosquitofish (*Gambusia affinis*), Sacramento perch (*Archoplites interruptus*), black crappie (*Pomoxis migromaculatus*), largemouth bass, warmouth (*Lepomis gulosus*), green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), and red-eared sunfish (*Lepomis microlophus*).

14.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts associated with each alternative on special-status fish species.

14.2.1 Assessment Methods

Project-related fisheries resources impacts would fall into two categories: (1) short-term construction-related impacts; and (2) long-term operations-related impacts. Short-term construction-related impacts would be caused by the temporary loss of fish habitat from disturbance and increased sedimentation, and release and exposure of construction-related contaminants. Operational impacts would be triggered by changes in hydrology associated with changes in operations.

14.2.2 Significance Criteria

An environmental document prepared to comply with National Environmental Policy Act (NEPA) must consider the context and intensity of the environmental effects that would be caused by, or result from, the proposed action. Under NEPA, the significance of an effect is used solely to determine whether an EIS must be prepared. An environmental document prepared to comply with California Environmental Quality Act (CEQA) must identify the potentially significant environmental effects of a proposed project. A “[s]ignificant effect of the environment” means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project (State CEQA Guidelines, Section 15382). CEQA also requires that the environmental document propose feasible measures to avoid or substantially reduce significant environmental effects (State CEQA Guidelines, Section 15126.4[a]).

Significance criteria (sometimes called “thresholds of significance”) used in this analysis are based on the checklist presented in Appendix G of the State CEQA Guidelines; factual or scientific information and data; and regulatory standards of Federal, State, and local agencies. These thresholds also encompass the factors taken into account under NEPA to determine the significance of an action in terms of the context and the intensity of its effects.

For the assessment of impacts on fisheries resources, habitat indicators for project operations such as flows and water quality, have been used to evaluate whether the project alternatives would have an adverse effect on the species and/or species' habitat. For example, changes in river flows during certain periods of the year have the potential to affect fish movement, food transport, and habitat quality.

The following significance criteria were developed based on guidance provided by the State CEQA Guidelines, and consider the context and intensity of the environmental effects as required under NEPA. Impacts of an alternative on fisheries and aquatic ecosystems would be significant if project implementation would do any of the following:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by CDFW, USFWS, or NMFS.

- Interfere substantially with the movement of any native resident or migratory fish or aquatic-dependent species or with established native resident or migratory corridors, or impede the use of native nursery sites.

- Conflict with any local policies or ordinances protecting fisheries resources.

- Conflict with the provisions of an adopted habitat conservation plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or State HCP.

14.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative could adversely affect special-status fish species and their habitat, sensitive habitats, fish migration corridors, and conflict with habitat conservation plans or other local plans or policies. Under the No Action/No Project Alternative, there would be no structural or operational changes to the dam. B.F. Sisk Dam would not be improved, and no new structures would be installed to protect the dam from potential seismic failure. No changes to the operation of B.F. Sisk Dam or the storage level of the reservoir would occur and the freeboard for the normal reservoir pool would remain at 10 feet. **Therefore, there would be no impact.**

14.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

14.2.4.1 Construction Impacts

Construction activities could destroy or adversely affect aquatic habitats for special-status fish species. Under the Reservoir Restriction Alternative, vegetation would be placed around the entire reservoir rim between the current maximum water surface elevation 544.0 and the proposed 55 foot restriction elevation of 489.0. The construction duration will be 1.5 years. Construction of the Reservoir Restriction Alternative could result in temporary impacts on aquatic habitats for fish species from hydroseeding activities. However, the San Luis Reservoir is an artificial environment and does not support a naturally evolved aquatic community. Although a few native species may be present and any given time, the vast majority of fish species in the reservoir have either been directly introduced or transported into the reservoir via the California Aqueduct and DMC. **Because special-status fish species are not present in the reservoir, changes in aquatic habitat due to construction activities would have no impact on special-status fish.**

14.2.4.2 Operation Impacts

Operation of the Reservoir Restriction Alternative could result in impacts to special-status fish species and their habitats. The Reservoir Restriction Alternative would limit the storage of the reservoir by restricting the maximum water height. Although a few native species may be present at any given time, the vast majority of fish species in the reservoir have either been directly introduced or transported into the reservoir via the California Aqueduct and DMC. Therefore, it is anticipated that changes to reservoir operations would not impact special-status fish species or their habitat. **There would be no impact on special-status fish from operations under the Reservoir Restriction Alternative.**

Operations could interfere with the movement of any native resident or migratory fish species or with established native resident or migratory corridors or impede the use of native nursery sites. San Luis Reservoir is an artificial environment and does not support a naturally evolved aquatic community. Although a few native species may be present and any given time, the vast majority of fish species in the reservoir have either been directly introduced or transported into the reservoir via the California Aqueduct and DMC. The reservoir dos not provide migratory corridor or nursery sites. **As a result, there would be no impact to the migration or movement of fish species in San Luis Reservoir as a result of operations of the Reservoir Restriction Alternative.**

Operation of the Reservoir Restriction Alternative could result in conflicts with habitat conservation plans, local policies, or ordinances protecting fisheries resources. The Reservoir Restriction Alternative would comply with the policies established in the *San Luis Reservoir SRA Resource Management Plan/ General Plan EIS/EIR* (United States Department of the Interior, Bureau of Reclamation [Reclamation] and CDPR 2013). There are no HCPs or local tree protection ordinances that cover the San Luis Reservoir Region. **Therefore, there would be no impact.**

14.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

14.2.5.1 Construction Impacts

Construction activities could adversely affect aquatic habitats for special-status fish species. Construction of the Crest Raise Alternative could result in temporary impacts on aquatic habitats for fish species from clearing, grading, staging of equipment, and other ground-disturbing activities. However, no special-status fish species are present in the reservoir. Heavy machinery traversing wetland and riparian areas near the San Luis Reservoir shoreline could result in disturbance of sensitive habitats. In addition, hazardous materials associated with construction equipment (e.g., fuel, oil, etc.) could be released to the environment and adversely affect water quality in sensitive habitats.

As was described in Chapter 2, Project Description, construction actions would be completed during periods of the year when San Luis Reservoir is typically drawn down to low levels. Implementation of the shear key option would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, during the period that the berm foundation would be excavated. However, San Luis Reservoir currently experiences a wide range of seasonal lake level fluctuations annually and any habitat currently utilized by fish species would be anticipated to adjust with changing lake levels.

As discussed above, there are no special-status fish species present in San Luis Reservoir. San Luis Reservoir is an artificial environment and does not support a naturally evolved aquatic community. Although a few native species may be present at any given time, the vast majority of fish species in the reservoir have either been directly introduced or transported into the reservoir via the California Aqueduct and DMC. **Because special-status fish species are not present in the reservoir, changes in aquatic habitat due to construction activities would have no impact on special-status fish.**

Construction activities could interfere with the movement of any native resident or migratory fish species or with established native resident or migratory corridors, or impede the use of native nursery sites. As was described above, reservoir operations during construction of the Crest Raise Alternative would not change, but implementation of the shear key option would require limits on the maximum surface elevation in San Luis Reservoir for two seasons. This limit would be within the wide range of seasonal lake level fluctuations currently experienced at San Luis Reservoir. In addition, San Luis Reservoir is an artificial environment and does not support a naturally evolved aquatic community. Although a few native species may be present at any given time, the vast majority of fish species in the reservoir have either been directly introduced or transported into the reservoir via the California Aqueduct and DMC. **As a result, there would be no impact to the migration or movement of fish species in San Luis Reservoir as a result of construction of the Reservoir Restriction Alternative.**

Construction of the Crest Raise Alternative could result in conflicts with habitat conservation plans, local policies, or ordinances protecting fisheries resources. There are no HCPs or local policies that cover the San Luis Reservoir Region. Construction of the Crest Raise Alternative would comply with the policies established in the *San Luis Reservoir SRA Resource Management Plan/ General Plan EIS/EIR* (Reclamation and CDPR 2013). **Therefore, there would be no impact.**

14.2.5.2 Operation Impacts

Operation of a Crest Raise Alternative could result in impacts to special-status fish species and their habitats, movement of resident or migratory species, or conflicts with the provisions of an approved local, regional, or State conservation plans. Under the Crest Raise Alternative, after the completion of construction, operation of San Luis Reservoir will continue consistent with the existing configuration and there would be no long-term change in storage capacity at the reservoir. **Therefore, there would be no impact.**

14.3 Comparative Analysis of Alternatives

Table 14-1 lists the potential impacts of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 14-1 are NEPA impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 14-1. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities around the San Luis Reservoir could destroy or adversely affect aquatic habitats for special-status fish species.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities could interfere with the movement of any native resident or migratory fish species.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Construction activities could conflict with the provisions of an approved local, regional, or State conservation plans.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations could destroy or adversely affect aquatic habitats for special-status fish species.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations could interfere with the movement of any native resident or migratory fish species in San Luis Reservoir.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations could conflict with the provisions of an approved local, regional, or State conservation plans.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI

Key:
LTS = less than significant
NI = no impact
None = no mitigation required
S = significant
-- = not required per CEQA Guidelines

14.4 Mitigation Measures

No significant impacts on fisheries resources were identified for the action alternatives and no mitigation measures have been developed.

14.5 Potentially Significant Unavoidable Impacts

None of the action alternatives would result in potentially significant unavoidable impacts on fisheries resources.

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Chapter 15 Terrestrial Resources

This chapter presents information on the existing terrestrial resources within the area of analysis and discusses potential effects on terrestrial resources from the proposed alternatives.

15.1 Affected Environment/Environmental Setting

This section describes the area of analysis, the regulatory setting associated with terrestrial resources, and the existing environmental setting for terrestrial plant and wildlife species with the potential to be affected by the proposed alternatives. The information in this section is based on multiple survey reports, including the report from a biological resources survey conducted in September 2018, database output, and habitat assessments provided in Appendix I, Biological Resources.

15.1.1 Area of Analysis

The area of analysis is defined as the area where terrestrial resources would be affected by the implementation of the alternatives. The area of analysis for terrestrial resources includes San Luis Reservoir and the construction envelope in Merced County.

15.1.2 Regulatory Setting

15.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Federal Endangered Species Act (ESA)
- Fish and Wildlife Coordination Act (FWCA)
- Migratory Bird Treaty Act (MBTA)
- Bald and Golden Eagle Protection Act (BGEPA)
- Clean Water Act (CWA)
- Executive Order 11990 - Protection of Wetlands

15.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Endangered Species Act (CESA)
- California Fish and Game Code Sections 3500 - 3705, Migratory Bird Protection
- California Fish and Game Code Section 1600, Streambed Alterations

15.1.2.3 Regional/Local

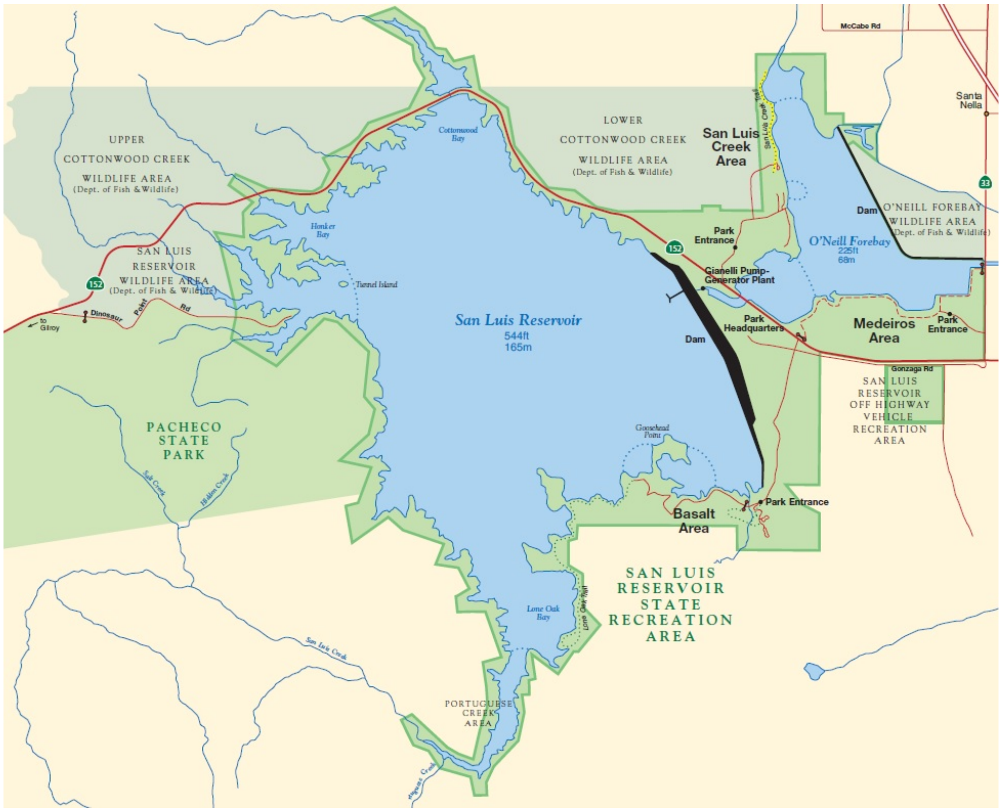
The following local laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Merced County General Plan
- San Luis Reservoir State Recreation Area (SRA) Resource Management Plan/General Plan

15.1.3 Existing Conditions

The following section describes the existing terrestrial resources conditions within the area of analysis. Terrestrial resources would not be affected by the proposed project in the Delta Region, where the Sacramento and San Joaquin Rivers converge because the alternatives under consideration in this EIS/EIR would not support any increases in south-of-Delta exports when compared to both existing conditions and the future No Action/No Project Alternative condition. In addition, with the exception of San Luis Reservoir, the alternatives would not impact water conveyance and storage infrastructure in the south-of-Delta Central Valley Project (CVP) and State Water Project (SWP) service areas. Hence, these areas are not described in the setting for terrestrial resources. The San Luis Reservoir is in Merced County in the eastern slopes of the Diablo Range of the California Coast Ranges and is part of the San Luis Reservoir SRA.

The immediate area surrounding the San Luis Reservoir comprises the Federally-owned, but leased to CDPR, SRA. State parks, wildlife areas, and open cattle pastures occur beyond the immediate area surrounding the San Luis Reservoir (Figure 15-1). State Route (SR) 152 runs along and through the northern portion of the reservoir and between O’Neil Forebay and San Luis Reservoir. Topography in the area consists of steeps hills and valleys, with some rocky cliffs to the west progressing to rolling slopes and grasslands on more flat terrain toward the east.



Source: CDPR 2014

Figure 15-1. Public Land Areas Surrounding the Reservoir.

The Dinosaur Point Use Area is located on the west side of San Luis Reservoir, at the end of Dinosaur Point Road, and contains a boat launch, parking, and picnic area (Figure 15-2). To the north of Dinosaur Point Road is the San Luis Wildlife Area, which is managed by California Department of Fish and Wildlife (CDFW) and is designated for hiking, bird watching, and hunting. South of Dinosaur Point Road is Pacheco State Park.

Source: Photograph taken by Jennifer Jones, CDM Smith 2011

Figure 15-2. San Luis Reservoir Looking Toward Dinosaur Point from Dinosaur Point Road.

The Basalt Campground and Basalt Day Use Area, where staging may occur, are along the southeast side of San Luis Reservoir, to the south of the Gonzaga Road entrance (Figure 15-3). The Basalt Day Use Area contains camping, a picnic area, boat ramp, and parking.

15.1.3.1 Vegetation Communities

15.1.3.1.1 Common Natural Communities

Dominant vegetation communities within the San Luis Reservoir area of analysis and in the surrounding region include valley foothill riparian, annual grassland, chaparral/scrub, purple needlegrass grassland, freshwater emergent wetland, seasonal wetland, and urban/disturbed (Appendix I; United States Department of the Interior, Bureau of Reclamation [Reclamation] and CDPR 2013; Reclamation, 2018) (Figure 15-4).

Source: Photograph taken by Jennifer Jones, CDM Smith 2011

Figure 15-3. Basalt Day Use Area

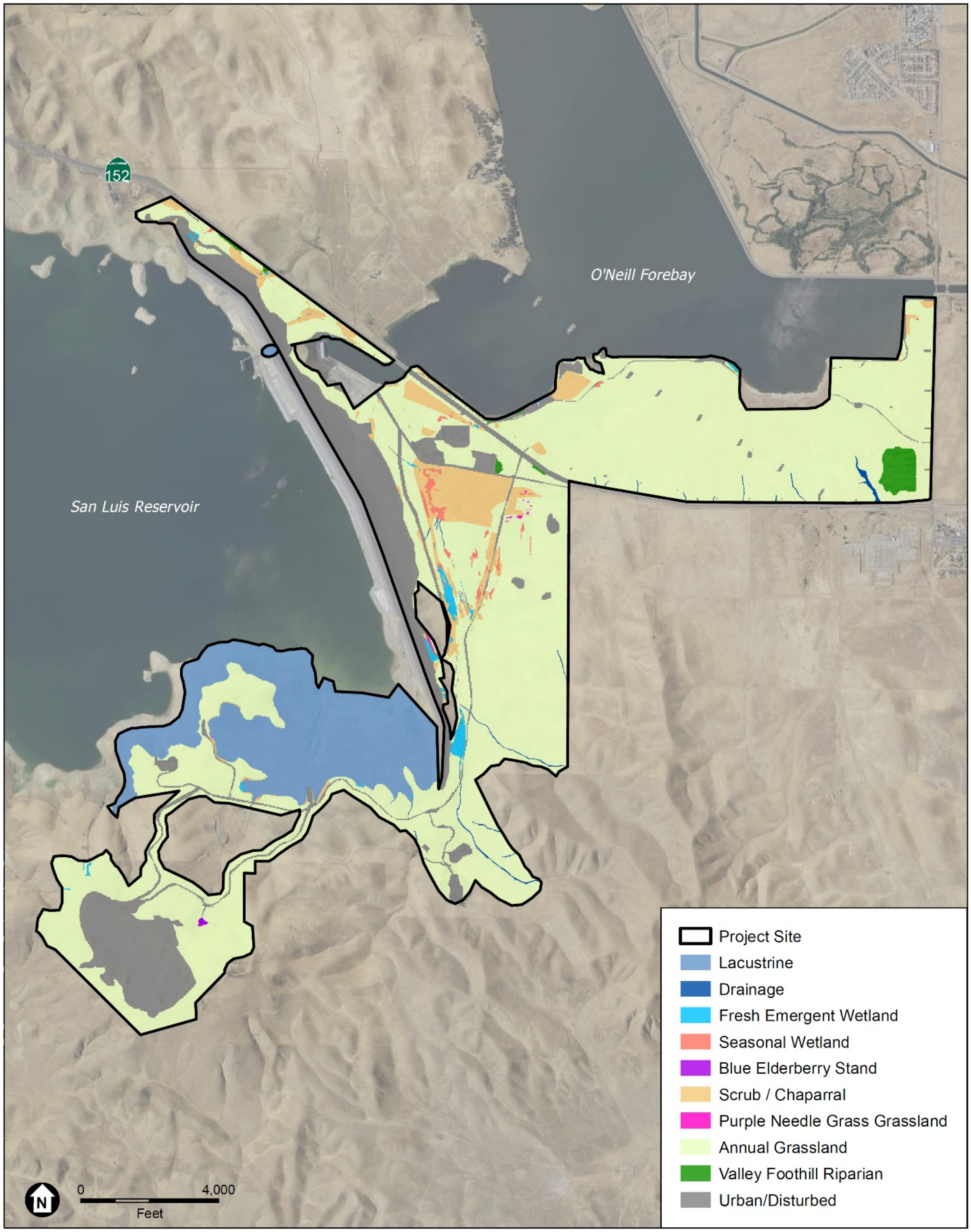


Figure 15-4. Vegetation Communities

Annual Grassland. Annual grassland comprises the majority of terrestrial habitat in the San Luis Reservoir Region and within the area of analysis. Most grassland areas have not been grazed recently and are dominated by tall non-native annual grasses interspersed with shrubs and forbs. Small mammal burrows occur within the annual grassland. Dominant plants observed within the annual grassland during the September 2018 biological surveys include wild oat (*Avena fatua*), ripgut brome, foxtail chess (*Bromus madritensis*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneum*), perennial pepperweed (*Lepidium latifolia*), stinkwort (*Dittrichia graveolens*), and alkali heliotrope (*Heliotropium curassavicum* var. *oculatum*). Isolated or small clusters of oak (*Quercus* sp.), coyote brush (*Baccharis pilularis*), and silverscale saltbush (*Atriplex argentea*) are interspersed throughout the annual grassland.

Purple needlegrass (*Stipa pulchra*) has limited distribution in the project area, occurring in various densities up to an acre in size within annual grasslands (see Section 15.1.3.1.2 Special-Status Natural Communities).

Chaparral/scrub. Chaparral and scrub vegetation is interspersed throughout the annual grassland. Dominant plants observed within the chaparral-scrub include coyote brush, mule fat (*Baccharis salicifolia* ssp. *salicifolia*), black sage (*Salvia mellifera*), tree tobacco (*Nicotiana glauca*), and honey mesquite (*Prosopis glandulosa* var. *torreyana*) (Appendix I).

Urban/Disturbed. Urban/disturbed areas include campgrounds, picnic areas, boat ramps, facilities, roads, and roadsides. The majority of urban/disturbed areas observed during the September 2018 biological surveys contained minimal vegetation. Ruderal vegetation observed includes isolated, self-established mullein (*Verbascum* sp.), turkey mullein (*Croton setigerus*), radish (*Raphanus sativa*), and stinkwort.

In the wetter areas around the reservoir species include broad-leaved pepper-grass, spiny cocklebur (*Xanthium spinosum*), and bristly ox-tongue (*Helminthotheca echioides*). In the drier areas dominant species include yellow star-thistle (*Centaurea solstitialis*), Italian thistle (*Carduus pycnocephalus*), and short-pod mustard (*Hirschfeldia incana*) (Reclamation and CDPR 2013). At the Basalt Campground and Basalt Day Use Area non-native shade trees (e.g., *Eucalyptus* spp. and *Pinus* spp.) have been planted around the camp sites.

15.1.3.1.2 Special-Status Natural Communities

Special-status natural communities are natural communities that are recognized by CDFW because of their dominance of native plant species, limited distribution, or important ecological function and that are tracked in the California Natural Diversity Database (CNDDB).

Purple Needlegrass Grassland. Purple needlegrass (*Stipa pulchra*) grassland occurs in various densities within small to moderate-sized areas (e.g., up to an acre) in limited locations within annual grasslands. Patches with a minimum cover of ten-percent purple needlegrass were identified as this community. Purple needlegrass grassland is considered a special-status natural community that provides important ecological functions by CDFW and that is tracked in California Natural Diversity Database (CNDDB).

Valley Foothill Riparian. Riparian habitat occurs in limited locations at the edge of San Luis Reservoir, including within the area of analysis, with a canopy of black willow (*Salix goodingii*), Fremont cottonwood (*Populus fremontii*), and western sycamore (*Platanus racemosa*), and a shrub understory of mulefat and sandbar willow (*Salix exigua*). Herbaceous understory plants include Bermuda grass (*Cynodon dactylon*), spiny cocklebur, and Italian thistle (Reclamation and CDPR 2013). Dominant plants observed within the valley foothill riparian during the September 2018 biological surveys include the same as identified above, in addition to western goldenrod (*Euthamia occidentalis*), narrow-leaved cattail (*Typha angustifolia*), Mexican rush (*Juncus mexicanus*), and rabbit's foot grass (*Polypogon monspeliensis*). Valley foothill riparian is considered a special-status natural community that provides important ecological functions by CDFW and that is tracked in the California Natural Diversity Database (CNDDB).

Freshwater Emergent Wetland. Wetland vegetation occurs in wet areas along the edges of the San Luis Reservoir below the high water mark (Reclamation 2018). Dominant species include broadleaf cattail (*Typha latifolia*), tule (*Schoenoplectus acutus* ssp. *occidentalis*), crabgrass, knotgrass (*Paspalum distichum*), Mexican rush, water parsley (*Oenanthe sarmentosa*), and water smartweed (*Polygonum punctatum*). Meadow barley (*Hordeum brachyantherum*) and creeping wildrye (*Leymus triticoides*) occur in in adjacent drier areas (Reclamation and CDPR 2013). The National Wetlands Inventory identifies the presence of these wetland communities as freshwater emergent and forested/shrub wetlands around the reservoir (United States Fish and Wildlife Service [USFWS] 2016a). Seasonal wetlands occur within the grassland to the south and east of the San Luis Reservoir. Dominant vegetation observed in small pools during September 2018 biological surveys included eryngium (*Eryngium* sp.) and pillwort (*Pilularia americana*) (Appendix I). Freshwater emergent wetland is a special-status natural community because of its important ecological functions and is subject to regulation by the United States Army Corps of Engineers (USACE) and CDFW.

Seasonal Wetland and Ephemeral Drainage. Seasonal wetlands occur within the grassland around the reservoir in areas of relatively poor drainage (Reclamation, 2018). These areas have saturated soil during the wet season and spring, but are dry in summer, and are dominated by plant species adapted to life in saturated soils (i.e., hydrophytes). Dominant vegetation observed during the September 2018 biological surveys within the seasonal wetlands include rabbit's foot grass, curly dock (*Rumex crispus*), alkali bulrush (*Bolboschoenus maritimus* ssp. *paludosus*), sedge (*Carex* spp.), and narrow-leaved cattail. Dominant plant species may also include hydrophytic grasses such as

Mediterranean barley, and squirreltail fescue (*Festuca bromoides*), and herbaceous species such as broad-leaved pepperweed, heliotrope, and white horehound (*Marrubium vulgare*). Seasonal wetland is a special-status natural community because of its important ecological functions and is subject to regulation by USACE and CDFW.

Ephemeral drainages which convey water during the wet season, but are dry during most of the year, are typically not vegetated with hydrophytic vegetation, but may be considered jurisdictional waters by the USACE and are therefore special-status communities.

15.1.3.2 Wildlife

Grassland habitats in the region support many species of migratory birds and raptors including western meadowlark (*Sturnella neglecta*), savannah sparrow (*Passerculus sandwichensis*), and red-tailed hawk (*Buteo jamaicensis*). Amphibians and reptiles including western fence lizard (*Sceloporus occidentalis*) and common garter snake (*Thamnophis sirtalis*) and mammals including California ground squirrel (*Otospermophilus beecheyi*), striped skunk (*Mephitis mephitis*), bobcat (*Felis rufus*) and coyote (*Canis latrans*) inhabit grasslands.

Scrub/chaparral habitat provides cover for wildlife including desert cottontail (*Sylvilagus audubonii*), western rattlesnake (*Crotalus oreganus*) and coyote.

Seasonal wetlands support wildlife species including: amphibians such as Sierran treefrog (*Pseudacris sierra*); birds including Wilson's warbler (*Wilsonia pusilla*), Swainson's thrush (*Catharus ustulatus*), yellow warbler (*Dendroica petechia brewsteri*), green heron (*Butorides striatus*), and red-shouldered hawk (*Buteo lineatus*); and mammals including raccoon (*Procyon lotor*), gray fox (*Urocyon cinereoargenteus*).

Emergent wetlands are important for foraging and breeding habitat for many species of water birds including: wading birds such as great egret (*Ardea alba*); waterfowl including green-winged teal (*Anas crecca*), mallard, and American coot; shorebirds including killdeer, black-necked stilt (*Himantopus mexicanus*), greater yellowlegs (*Tringa melanoleuca*), and American avocet (*Recurvirostra americana*); and passerines including Brewer's blackbird (*Euphagus cyanocephalus*), red-winged blackbird, brown-headed cowbird (*Molothrus ater*), and American pipit (*Anthus rubescens*) (Santa Clara County 2012).

Developed areas provide limited habitat for wildlife. However, typical bird species that are found in developed areas include American robin (*Turdus migratorius*), mockingbird (*Mimus polyglottos*), American crow (*Corvus brachyrhynchos*), house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), and rock pigeon (*Columba livia*). Other wildlife adapted to living in developed areas include Norway rat (*Rattus norvegicus*), western gray squirrel (*Sciurus niger*), opossum (*Didelphis virginiana*), and raccoon.

15.1.3.3 Special-Status Species

Special-status species are protected pursuant to Federal and/or State endangered species laws or have been designated as species of concern by the CDFW. These species are considered important environmental resources under National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) and impacts to them are analyzed in this chapter. In addition, species that that are not listed by any agency, but that meet the definition of endangered, rare, or threatened in CEQA Guidelines Section 15380(b), are also considered endangered, rare or threatened under CEQA (CEQA Guidelines Section 15380(d)) and are also designated special-status species in this document.

For purposes of this EIS/EIR, special-status species include:

- Plant and wildlife species that are identified as rare, threatened, or endangered under the Federal or State endangered species acts
- Species that are candidates for listing under either Federal or State law
- Species designated by CDFW as species of special concern
- Species protected by the Federal Migratory Bird Treaty Act (16 United States Code [USC] Sections 703–711)
- Species identified under Fish and Game Code as fully protected (Section 3511)
- Bald and golden eagles protected by the Federal Bald and Golden Eagle Protection Act (16 USC 668)
- Species on California Native Plant Society (CNPS) Lists 1 and 2, i.e., identified by California Rare Plant Ranks (CRPR) 1A, 1B, 2A, and 2B,[1] and other species that may be considered endangered, rare or threatened pursuant to the criteria in the CEQA Guidelines (CEQA Guidelines 15380(d))
- The CDFW-managed tule elk is additionally included in the analysis at San Luis Reservoir for the purposes of examining wildlife movement under CEQA

[1] CRPR 1A: plants presumed extirpated in California and either rare or extinct elsewhere;1B = plants rare, threatened, or endangered in California and elsewhere; 2A: plants presumed extirpated in California but common elsewhere; 2B: plants rare, threatened, or endangered in California but more common elsewhere.

The following information pertaining to the natural resources of the region was reviewed to determine the occurrence of special-status plant and wildlife species in the area of analysis:

- USFWS official lists of Federally listed species that may occur or could potentially be affected by activities within the San Luis Reservoir Region (USFWS 2018).
- CDFW CNDDB list of special-status natural communities and special-status species occurrences (CDFW 2017).

Table 15-1 identifies regionally occurring special-status species including common and scientific names for each species, regulatory status (Federal, State, local, CNPS), habitat descriptions, and potential for occurrence for each of the alternative. Species with the potential to occur include those observed during the surveys and those with the potential to occur based on presence of habitat.

San Luis Reservoir Region: A 10-mile radius CNDDB record search[2] was conducted to obtain regionally occurring special-status species documented in the vicinity of the San Luis Reservoir (Figure 15-5). The CNDDB provides the best available data on the occurrence of special-status species, but it is not an exhaustive nor comprehensive inventory of all rare species and natural communities statewide. In addition, an official species list of Federally listed species that may occur or could potentially be affected by activities within this location was obtained from the USFWS (USFWS 2016b). These species are provided in Table 15-1.

[2] CNDDB provides spatial occurrence data for special-status species and natural communities but its contents are dependent on field verification and user submission of data.

Table 15-1. Special-Status Terrestrial Species and Potential to Occur in the San Luis Reservoir Region

Common Name	Scientific Name	Status	Habitat Requirements	Potential to Occur within the San Luis Reservoir Region[1]
Invertebrates				
Vernal pool fairy shrimp	*Branchinecta lynchi*	FT	Found in ephemeral wetland habitats and vernal pools within sandstone, alkaline soils, and alluvial fan terraces, within annual grassland.	Moderate Potential. Alkali pools and seasonal wetlands that provide suitable habitat for this species were identified east of the dam and north of DWR's administrative buildings (see Figure 15-5). No CNDDB occurrences in the San Luis Reservoir Region.
Vernal pool tadpole shrimp	*Lepidurus packardi*	FE	Found in a wide variety of ephemeral wetland habitats.	Moderate Potential. Alkali pools and seasonal wetlands provide suitable habitat for this species east of the dam and north of DWR's administrative buildings (see Figure 15-5). No CNDDB occurrences are reported in the San Luis Reservoir Region.
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT	Occurs only in the Central Valley of California, in association with blue elderberry (*Sambucus nigra* ssp. *caerulea*). Prefers to lay eggs in elderberry stems 2-8 inches in diameter; some preference shown for "stressed" elderberries.	High Potential. Stands of elderberry bushes observed near the Basalt Quarry may support this species; project area is within known range. CNDDB occurrence along Los Banos Creek, over 5 miles southeast of San Luis Reservoir.
Amphibians				
California tiger salamander Central California Distinct Population Segment	*Ambystoma californiense*	FT, ST Critical Habitat	Need underground refuges, especially ground squirrel burrows for upland aestivation within grassland and vernal pools or other seasonal water sources for breeding.	Moderate Potential. Suitable breeding habitat was identified at a single location near Basalt Quarry, and is of poor quality (Appendix I). CNDDB occurrences along Los Banos Creek, southeast of San Luis Reservoir, and approximately 2.5 miles southeast of Basalt Area and campground. Critical habitat occurs within the western portion of the San Luis Reservoir.
Foothill yellow-legged frog	*Rana boylii*	FC/SC	Partly-shaded, shallow perennial and intermittent streams and riffles with a rocky substrate in a variety of habitats. Need at least some cobble-sized substrate for egg-laying. Rarely encountered far from permanent water sources.	Not Present. Although CNDDB records occur along permanent streams to the south, no permanent streams occur within the reservoir area. CNDDB occurrences along Los Banos Creek, southeast and southwest of San Luis Reservoir.

Common Name	Scientific Name	Status	Habitat Requirements	Potential to Occur within the San Luis Reservoir Region[1]
California red-legged frog	*Rana draytonii*	FT, CSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to aestivation habitat.	Present. Breeding population at Willow Spring Pond near the Basalt Quarry access road; breeding habitat is present northwest of Basalt Hill. The grassland and riparian provide upland overland movement corridors for CRLF. CNDDB records of this species occur 6 miles east and 5 miles south of the project area.
Reptiles				
Western pond turtle	*Actinemys marmorata*	CSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation. Need basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	Unlikely. The San Luis Reservoir provides aquatic habitat for this species, but no surrounding aquatic habitat is present. This species is unlikely to be encountered (Appendix I). CNDDB occurrences in Pacheco State Park. Observed in the Portuguese Creek Area of San Luis Reservoir in 2004.
Blunt-nosed leopard lizard	*Gambelia sila*	FE, SE	Sparsely vegetated alkali and desert scrub habitats, in areas of low topographic relief. Seeks cover in mammal burrows, under shrubs or structures such as fence posts; does not excavate burrows. This species is known from the extreme northwest Santa Barbara County and western Kern County north to southern Merced County.	Unlikely. The San Luis Reservoir Region occurs outside of the known extant geographic range for this species. The current species' range is restricted to areas south of San Luis Reservoir (1993 observation south of Los Banos Creek Reservoir). A population in the vicinity of the B.F. Sisk Dam reported in the 1930s is likely extirpated.
Coast horned lizard	*Phrynosoma blainvillii*	CSC	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects are required.	Moderate Potential. The grassland provides suitable habitat for this species and the project area is within its range, but it has not been observed in surveys at the site. No CNDDB occurrences are present in the San Luis Reservoir Region.
San Joaquin whipsnake	*Masticophis flagellum ruddocki*	CSC	Open, dry habitats with little or no tree cover. Found in valley grassland and saltbush scrub in the San Joaquin Valley. Needs mammal burrows for refuge and oviposition sites.	High Potential. The grassland and scrub/chaparral provide suitable habitat for this species. CNDDB occurrence to the southeast of San Luis Reservoir.

Common Name	Scientific Name	Status	Habitat Requirements	Potential to Occur within the San Luis Reservoir Region[1]
Giant garter snake	*Thamnophis gigas*	FT	Found in agricultural wetlands, irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands. Absent from large rivers; waters with introduced, predatory fish and wetlands with sand, gravel, or rock substrates.	Unlikely. The San Luis Reservoir contains predatory fish, which preclude this species from being present. CNDDB occurrence to the east of I-5.
Birds				
Bald eagle	*Haliaeetus leucocephalus*	BGEPA, SE, CFP	Requires large bodies of water, or free flowing rivers with abundant fish, and adjacent snags or other perches.	Present. Bald eagles over-winter in small numbers, but are not known to nest in the vicinity. Bald eagles were observed flying in the project area during 2018 surveys (Appendix I). No CNDDB nesting occurrences in the San Luis Reservoir Region.
California condor	*Gymnogyps californianus*	FE, CE	Nests in caves on cliff faces in mountains up to 6,000 feet. Found in California's southern coastal ranges from Big Sur to Ventura County, east through the Transverse Range and southern Sierra Nevada.	Moderate Potential. Nesting habitat is not present, foraging habitat is present within the San Luis Reservoir Region. Nearest CNDDB occurrence is 33 miles from the San Luis Reservoir Region.
Golden eagle	*Aquila chrysaetos*	BGEPA	Needs open terrain for hunting; grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats.	High Potential. Nesting is presumed around San Luis Reservoir. CNDDB occurrence near the San Luis Reservoir.
Northern harrier	*Circus cyaneus*	CSC	Coastal salt and fresh-water marsh. Nest and forage in grasslands, from salt grass in desert sink to mountain cienagas. Nests on ground in shrubby vegetation, usually at marsh edge.	Present. Suitable grassland nesting and foraging habitat onsite. This species was observed during the 2002 survey. CNDDB occurrences near San Luis Reservoir.
Swainson's hawk	*Buteo swainsoni*	ST	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands.	Present. Annual grassland and seasonal wetland provide foraging habitat, and suitable nesting habitat is present in the region. CNDDB occurrences near O'Neill Forebay. Observed during 2003 and 2016 field surveys; known to nest in the area.
Tricolored blackbird	*Agelaius tricolor*	SC	Highly colonial species, most numerous in Central Valley and vicinity. Requires open water, protected nesting substrate, and foraging area with insect prey within a few km of the colony.	High Potential. The annual grassland provides foraging habitat and the riparian vegetation and cattail marsh along south end of San Luis Reservoir near B.F. Sisk Dam provide nesting habitat.

Common Name	Scientific Name	Status	Habitat Requirements	Potential to Occur within the San Luis Reservoir Region[1]
Western burrowing owl	*Athene cunicularia*	CSC	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation.	Present. The annual grassland, scrub/chaparral, and pasture lands provide habitat for this species. CNDDB occurrences east of the San Luis Reservoir. Observed east of reservoir in cattle pastures in 2016 (ESA 2016). Likely to occur in small numbers during winter and the nesting season.
White-tailed kite	*Elanus leucurus*	CFP	Coastal and valley lowlands; undisturbed, open grasslands, meadows, farmlands and emergent wetlands.	High Potential. The trees surrounding the San Luis Reservoir Region provide nesting habitat. No CNDDB occurrences in the vicinity. Likely nests nearby based on observances at San Luis Reservoir from 2000-2004.
Mammals				
American badger	*Taxidea taxus*	CSC	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	Present. Observed near intersection of Basalt Road and Gonzaga Road; badger remains also found below B.F. Sisk dam. The project area scrub/chaparral and grassland provide habitat for this species. CNDDB occurrences within the San Luis Reservoir Region.
Fresno kangaroo rat	*Dipodomys nitratoides exilis*	FE	Found in grassland/ and chaparral. Known from Fresno, Kings, and Madera counties.	Unlikely. The San Luis Reservoir Region occurs outside of the known extant geographic range for this species. No CNDDB occurrences in the San Luis Reservoir Region.
Giant kangaroo rat	*Dipodomys ingens*	FE	Found in grassland. Known from Fresno, Kern, San Benito, and San Luis Obispo counties and extirpated from Kings, Merced, and Santa Barbara counties.	Unlikely. The San Luis Reservoir Region occurs outside of the known extant geographic range for this species. No CNDDB occurrences in the San Luis Reservoir Region.
Greater western mastiff bat	*Eumops perotis californicus*	CSC	Many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, chaparral, etc. Roosts in crevices in cliff faces, high buildings, trees, and tunnels.	Moderate Potential. The grassland, scrub/chaparral, and oak woodland provides foraging habitat for this species. No CNDDB occurrences near San Luis Reservoir.

Common Name	Scientific Name	Status	Habitat Requirements	Potential to Occur within the San Luis Reservoir Region[1]
Pallid bat	*Antrozous pallidus*	CSC	Deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	Moderate Potential. The grassland, scrub/chaparral, and oak woodland provides foraging habitat for this species. No CNDDB occurrences near San Luis Reservoir.
Ringtail	*Bassariscus astutus*	CFP	Mixed oak woodland and riparian habitats.	Moderate Potential. The oak woodland, chaparral, and riparian provide habitat for this species. There are no CNDDB occurrences documented for this species.
San Joaquin kit fox	*Vulpes macrotis mutica*	FE, ST	Annual grassland or grassy open stages with scattered shrubby vegetation. Need loose-textured sandy soils for burrowing and suitable prey base.	High Potential. Annual grasslands provide habitat for this species. A kit fox track and many potential dens were reported throughout the project boundary referenced in the 2009 survey (Appendix I). CNDDB occurrences near San Luis Reservoir. Few documented occurrences in recent years, suggesting an unstable and possibly declining population.
Townsend's big-eared bat	*Corynorhinus townsendii*	CSC	Throughout California in a wide variety of habitats. Most common in mesic sites.	Moderate Potential. The grassland, scrub/chaparral, and oak woodland provides foraging habitat for this species. No CNDDB occurrences near San Luis Reservoir.
Tule elk	*Cervus elaphus nannodes*	Managed as Big Game Mammal	Grasslands, riparian areas and other habitats that provide brush, trees, shrubs, and herbaceous vegetation as cover.	Present. The riparian and grassland habitats support about 300 elk, which range around the reservoir. Population established on the San Luis National Wildlife Refuge in 1984.
Western red bat	*Lasiurus blossevillii*	CSC	Roosts primarily in trees, less often in shrubs. Roost sites often are in edge habitats adjacent to streams, fields, or urban areas.	Present. Identified during 2018 acoustic surveys near Basalt Quarry; may roost in tree groves within the project area (Appendix I). No CNDDB occurrences near San Luis Reservoir.
Plants				
Arburua Ranch jewelflower	*Streptanthus insignis* ssp. *lyonii*	CRPR 1B.2	Coastal scrub. Serpentine slopes. 230-850m. Blooms March through May.	Unlikely. The San Luis Reservoir Region does not provide habitat. Nearest known occurrence in CNDDB is on slopes along South Fork of Los Banos Creek.

Common Name	Scientific Name	Status	Habitat Requirements	Potential to Occur within the San Luis Reservoir Region[1]
Arcuate bush-mallow	*Malacothamnus arcuatus*	CRPR 1B.2	Chaparral. Gravelly alluvium. 80-355m. Blooms April through September.	Moderate Potential. The chaparral provides habitat. Known in area from single sighting from 1936.
Big-scale balsamroot	*Balsamorhiza macrolepis* var. *macrolepis*	CRPR 1B.2	Chaparral, cismontane woodland, grassland – sometimes on serpentinite and basalt rock outcrops. 90 – 1400m. Blooms March through June.	High Potential. The grassland and oak woodland provide habitat. Nearest known occurrence in CNDDB is in Pacheco State Park on slopes above San Luis Reservoir.
California alkali grass	*Puccinellia simplex*	CRPR 1B.2	Meadows and seeps, chenopod scrub, valley and foothill grasslands, vernal pools; 1-915m. Blooms March through May.	Moderate Potential. The scrub/chaparral and grassland provide habitat. Known from one CNDDB record from 1986 in Los Banos Valley.
Chaparral harebell	*Campanula exigua*	CRPR 1B.2	Chaparral. Rocky sites, usually on serpentine in chaparral. 300-1250m. Blooms May through June.	Moderate Potential. The scrub/chaparral provides habitat. Known in area from single CNDDB sighting before 1950.
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*	CRPR 1B.2	Grassland – alkaline; 1 – 230m. Blooms May through October.	Moderate Potential. The grassland provides habitat. Nearest known CNDDB occurrence is in Pacheco State Park.
Hall's bush-mallow	*Malacothamnus hallii*	CRPR1B.2	Chaparral. Some populations on serpentine. 10-550m. Blooms May through September.	Moderate Potential. The chaparral provides habitat. Nearest known CNDDB occurrence is near Pacheco Pass, in San Luis Wildlife Area. Potential habitat in scrub and mesic grassland habitats along northwestern shore.
Hispid bird's-beak	*Chloropyron mollis* ssp. *hispidum*	CRPR 1B.1	Meadows and seeps, playas, and valley and foothill grasslands with alkaline soil. Blooms June through September.	Moderate Potential. The grassland provides habitat. No CNDDB occurrences near San Luis Reservoir
Hospital Canyon larkspur	*Delphinium californicum* ssp. *interius*	CRPR 1B.2	Chaparral – openings, cismontane woodland, 230 – 1095m. Blooms March through June.	Moderate Potential. The chaparral and oak woodland provide habitat. Known CNDDB occurrence approximately 4 miles north of San Luis Reservoir.

Common Name	Scientific Name	Status	Habitat Requirements	Potential to Occur within the San Luis Reservoir Region[1]
Lemmon's jewelflower	*Caulanthus lemmonii*	CRPR 1B.2	Pinyon-juniper woodland, valley and foothill grassland. Blooms February through May.	Unlikely. The grasslands provide habitat. No CNDDB occurrences near San Luis Reservoir. No suitable habitat within study area.
Lime Ridge navarretia	*Navarretia gowenii*	CRPR 1B.1	In rocky serpentine areas bordering chaparral. Blooms May through June.	Moderate Potential. The chaparral provides habitat. Nearest CNDDB occurrence is approximately 7 miles north of San Luis Reservoir.
Round-leaved filaree	*California macrophyllum*	CRPR 1B.1	Cismontane woodland, grassland – clay soils; 15 – 1200m. Blooms March through May.	Moderate Potential. The grassland and oak woodland provide habitat. Nearest known CNDDB occurrence is at Pacheco State Park.
Shining navarretia	*Navarretia nigelliformis* ssp. *radians*	CRPR 1B.2	Cismontane woodland, valley and foothill grassland, vernal pools. Apparently in grassland, and not necessarily in vernal pools. 200-1000m. Blooms April through July.	Moderate Potential. The oak woodland and grassland provide habitat. Nearest known CNDDB occurrence is in Los Banos Valley in vicinity of Billy Wright Road.
Spiny-sepaled button-celery	*Eryngium spinosepalum*	CRPR 1B.2	Vernal pools, valley and foothill grassland; 80-255 m. Blooms April through June.	Moderate Potential. Alkali pools north of the DWR administrative buildings observed during 2018 surveys could support this species. Nearest occurrence in CNDDB is from seasonal wetland along SR 152 along western shoreline of San Luis Reservoir.

Source: CDFW 2017, Reclamation and CDPR 2013.

[1] Regionally occurring special-status species based on occurrences within 10 miles.

Key:

Federal (U.S. Fish and Wildlife Service):
BEPA = Bald Eagle Protection Act
FE = Listed as Endangered by the Federal Government
FT = Listed as Threatened by the Federal Government
FPE = Proposed for Listing as Endangered
FPT = Proposed for Listing as Threatened
FD = Federal Delisted Species
FC = Candidate for Federal listing

State (California Department of Fish and Wildlife):
SE = Listed as Endangered by the State of California
ST = Listed as Threatened by the State of California
SC = Candidate for State listing
SR = Listed as Rare by the State of California (plants only)
CSC = California species of special concern
CFP = California fully protected species

California Rare Plant Rank:

CRPR 1B – Plants rare, threatened, or endangered in California and elsewhere
0.1 – Seriously threatened
0.2 – Fairly threatened in California

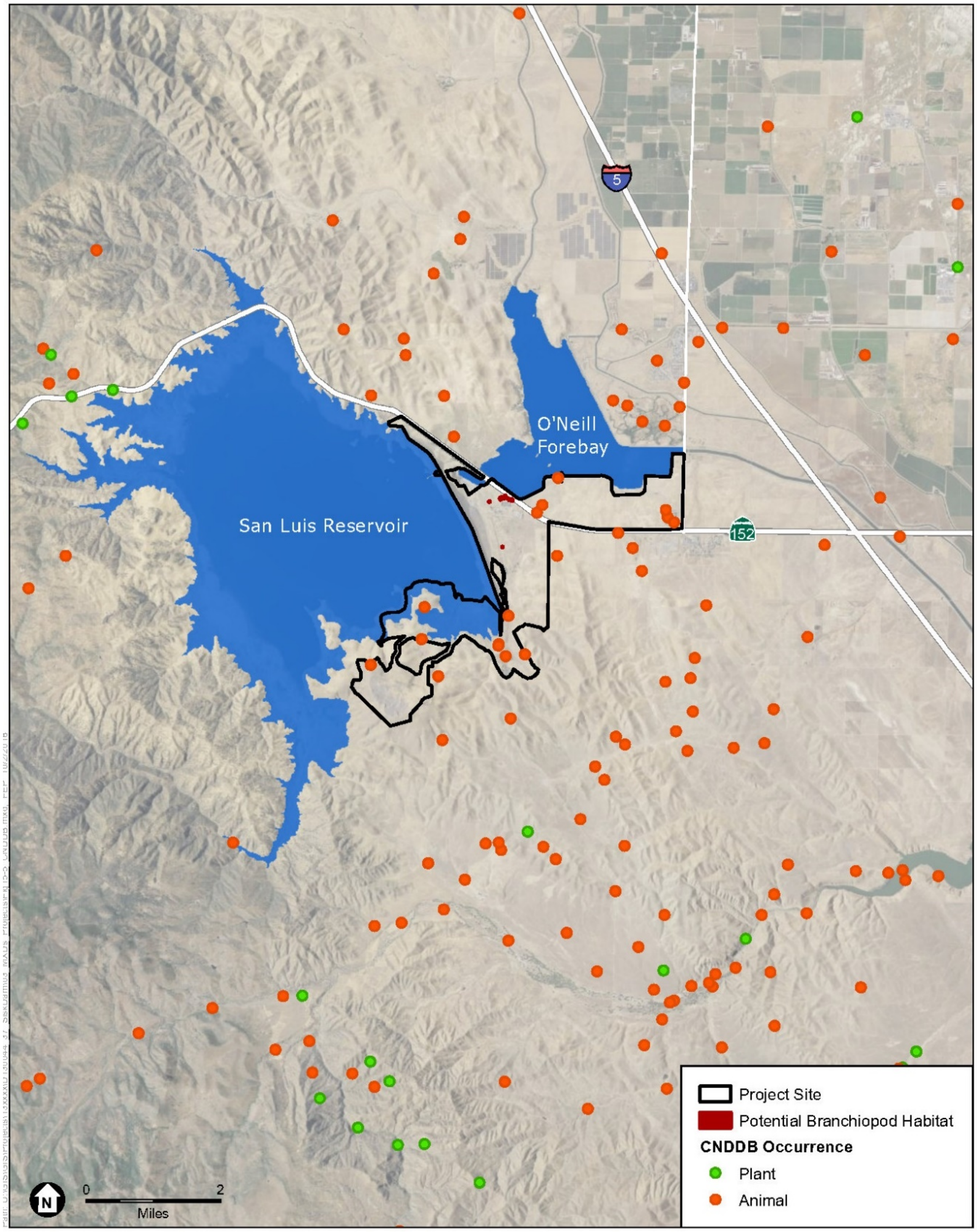


Figure 15-5. CNDDB Occurrences

15.1.4 Special–Status Species Accounts

A brief description of those special-status plant and wildlife species that occur or have the potential to occur within the San Luis Reservoir area of analysis based on local sightings and/or the potential presence of suitable habitat (see Appendix I, Biological Resources Appendix), is provided below. Not all species with potential to occur may be impacted by the project.

15.1.4.1 Invertebrates

15.1.4.1.1 Federal or State Threatened and Endangered Species

Valley Elderberry Longhorn Beetle. The valley elderberry longhorn beetle (VELB) was Federally listed as threatened in 1980 (45 Federal Regulation [FR] 52803). The VELB is dependent on its host plant, elderberry (*Sambucus* spp.), which is a common component of the riparian forests in the Central Valley from Shasta County to Fresno County. The amount and distribution of suitable habitat for the VELB has been reduced by the extensive destruction of California's Central Valley riparian forest that has occurred during the last 150 years due to agricultural and urban development (USFWS 2009). Loss of non-riparian habitat where elderberry occurs (e.g., savanna and grassland adjacent to riparian habitat, oak woodland, mixed chaparral-woodland), and where the beetle has been recorded, suggests further reduction of the beetle's range and increased fragmentation of its upland habitat.

During the 2018 surveys, a large elderberry stand was identified in the project area northwest of Basalt Quarry, numbering greater than 25 shrubs (Appendix I). No VELB activity was noted; however, due to the dense vegetation, not all shrubs were examined. In addition, four smaller stands were noted nearby, comprising a total of about 10 shrubs. A single elderberry shrub was found several feet outside the project area, at the sewage holding ponds located 0.5-mile northeast of the Basalt Campground. Other than these occurrences, elderberry is not present elsewhere in the project area.

The CNDDB includes a VELB occurrence near the San Luis Reservoir, approximately one mile from Los Banos Creek Reservoir. In 1987, two valley elderberry longhorn beetles were collected along Los Banos Creek, approximately 6 miles southeast of San Luis Reservoir (CDFW 2017). In 2014, the USFWS published an expanded historical range for the species, which includes western Merced County. Thus, VELB is assumed present in elderberry shrubs within the area of analysis (USFWS 2014, Appendix I).

Vernal Pool Fairy Shrimp. Vernal pool fairy shrimp was listed as Federally threatened in 1994 (59 FR 48136). Vernal pool fairy shrimp are found in vernal pools, swales, and ephemeral freshwater habitats. This species is most commonly found in grass- or mud-bottomed pools or basalt flow depressional pools in unplowed grasslands. Suitable pools vary in size from very small (215 square feet) to very large (over 25 acres).

Vernal pool fairy shrimp has not been documented within the San Luis Reservoir Region; however, they have potential to occur within pools and seasonal wetlands in the area, which provide suitable habitat for this species. Four pool areas were identified in the 2018 surveys that may support vernal pool fairy shrimp (Appendix I). One alkali pool is located on grasslands near the dam face, and three occur in grasslands north of the DWR administration buildings, between the dam and the forebay. One of these features was mapped as a seasonal wetland in the 2018 wetland delineation and the other three features are non-wetland areas. No vernal pool branchiopod habitat was identified outside of these areas immediately below B.F. Sisk Dam (Appendix I).

Vernal Pool Tadpole Shrimp. Vernal pool tadpole shrimp was listed as Federally endangered in 1994 (59 FR 48136). Vernal pool tadpole shrimp are found in natural and artificial seasonally ponded habitats including vernal pools, swales, ephemeral drainages, stock ponds, reservoirs, ditches, backhoe pits, and ruts caused by vehicular activities. Wetlands range from very small (2 square meters) to very large (356,253 square meters).

Although vernal pool tadpole shrimp is not documented within the San Luis Reservoir Region, they have potential to occur within suitable pools and seasonal wetlands in the area, which provide habitat for this species. Four pool areas were identified that may support vernal pool tadpole shrimp during the 2018 surveys. One alkali pool is located on grasslands near the dam face, and three in grasslands north of the DWR administration buildings. No vernal pool branchiopod habitat was identified outside of the areas immediately below B.F. Sisk Dam (Appendix I).

15.1.4.2 Amphibians

15.1.4.2.1 Federal or State Threatened and Endangered Species

California Tiger Salamander. California tiger salamander Central California Distinct Population Segment (DPS) is a Federal and State-listed threatened species. California tiger salamander was Federally listed as threatened in 2004 (69 FR 47212). California tiger salamanders spend the majority of the year in underground burrows in grassland, savanna, or open woodland habitat. Between December and February, when seasonal ponds begin to fill, adult California tiger salamanders engage in mass migrations to aquatic sites during a few rainy nights and are explosive breeders (Barry and Shaffer 1994). Breeding ponds include shallow ephemeral or semi-permanent pools and ponds. Eggs are laid on submerged stems and leaves. Eggs take approximately two weeks to hatch. California tiger salamander larvae take approximately four months to metamorphose into adults. The breeding ponds need to hold water for a minimum of 4.5 months for California tiger salamander to complete its aquatic life cycle.

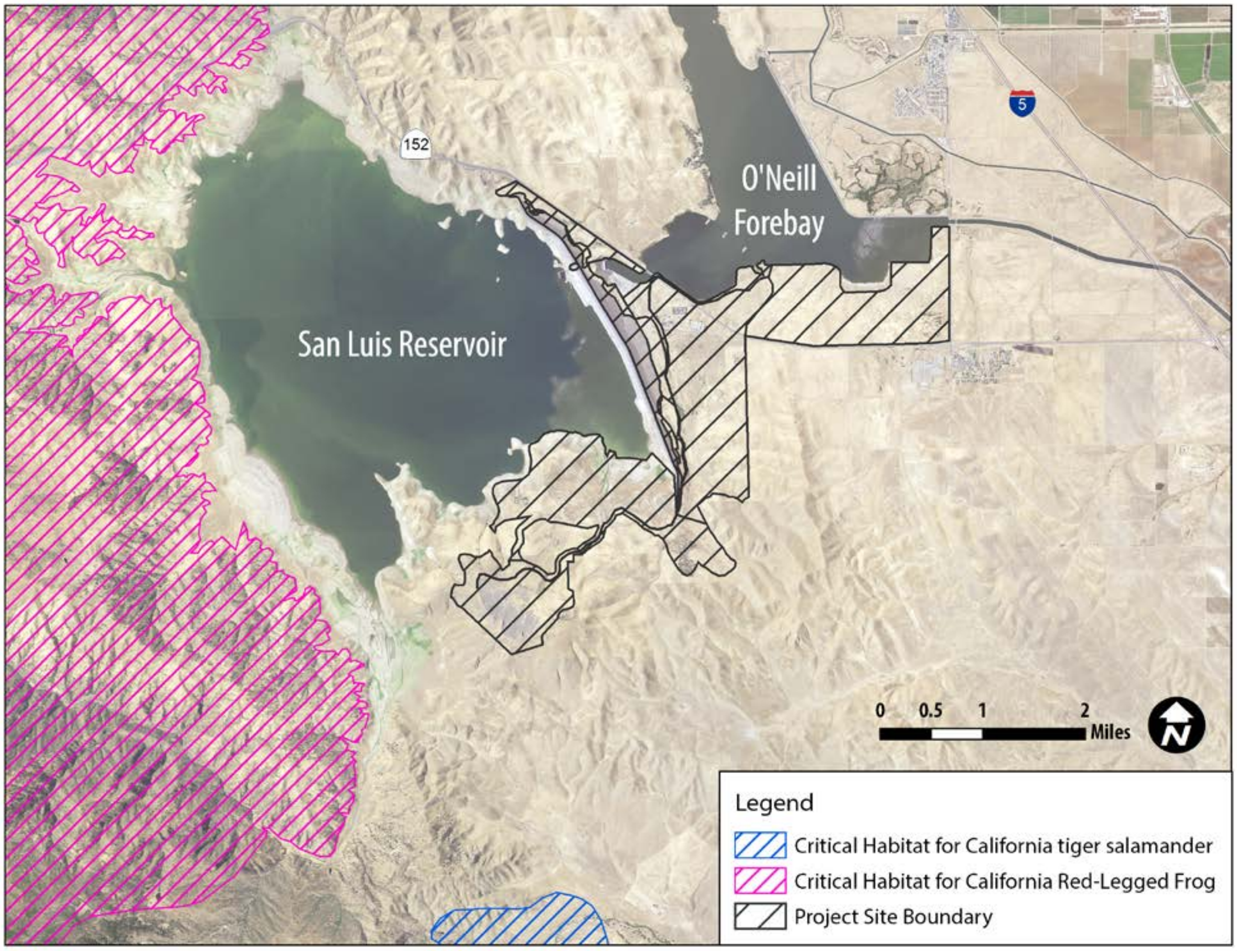
During drought years when ponds do not form, adults may spend the entire year in upland environments, while juveniles may spend 4 to 5 years in their upland burrows before reaching sexual maturity and breeding for the first time (Petranka 1998; Trenham et al. 2000). Adult tiger salamanders swiftly disperse after breeding and have been documented to migrate up to 129 meters (423 feet) the first night after leaving a breeding pond (Loredo et al. 1996). Adult California tiger salamanders readily aestivate[3] in grasslands near ponds and at great distances from breeding ponds. Adults are known to travel distances greater than 1 kilometer (0.62 mile) from breeding ponds and have been documented at distances of 2 kilometers (1.2 miles) or more (Orloff 2007). Typical aestivation sites include the burrows of California ground squirrels and valley pocket gophers (*Thomomys bottae*).

There are three CNDDB records over 2.5 and 4 miles from San Luis Reservoir. Critical habitat is designated for California tiger salamander approximately one mile southeast of San Luis Reservoir and approximately 2.5 miles from the construction gravel pit area (Figure 15-6) (USFWS 2017). San Luis Reservoir Region may provide suitable breeding habitat within the freshwater emergent and seasonal wetlands. Grassland provides upland habitat for California tiger salamander.

During the 2018 surveys, one potential low-to-moderate quality California tiger salamander breeding pond was identified within the project area near the Basalt Quarry. Two additional potential breeding ponds were identified within 1 mile southeast of the quarry that could support breeding and serve as a source for species movement into the project area. Hence, California tiger salamander may be encountered in select areas south of the reservoir. Aquatic habitat that may support breeding does not occur in other portions of the project area (Appendix I).

California Red-Legged Frog. California red-legged frog is a Federally-listed threatened species and California species of special concern. California red-legged frog was listed as Federally threatened in 1996 (61 FR 25813). Critical habitat was designated in 2006 (71 FR 19244) and finalized in 2010 (75 FR 12816). They occur at ponds and slow-moving streams with permanent or semi-permanent water. This species opportunistically migrates into upland habitats, during normal dispersal behavior, up to 1.3 miles. The California red-legged frog may aestivate in upland environments when aquatic sites are unavailable or environmental conditions are inhospitable. If water is unavailable, they shelter from dehydration in a variety of refuges, including boulders, downed wood, moist leaf litter, and small mammal burrows. California red-legged frogs disperse up to one mile from their breeding habitat through upland habitat (USFWS 2002).

[3] Aestivation is a state of dormancy similar to hibernation that occurs during summer and fall.



Source: USFWS 2017

Figure 15-6. Critical Habitat in the Project Area.

There are several CNDDB occurrences documented for California red-legged frogs within the western portion of the San Luis Reservoir Region. California red-legged frogs inhabit stock ponds within Pacheco State Park to the west of the reservoir and within the Upper Cottonwood Wildlife Area to the north of the reservoir.

Critical habitat is designated along the western boundary of the San Luis Reservoir, outside the project area.

The reservoir does not provide breeding habitat for California red-legged frogs due to fluctuations in water levels, lack of suitable egg-laying emergent vegetation, and abundant populations of nonnative fish that prey on this species.

During the 2018 surveys, a robust California red-legged frog breeding population was identified at a vegetated pond fed by Willow Spring, approximately 0.3-mile south of the reservoir, off the quarry access road. This location is located on the fringe of the designated borrow area. Habitat for this species was also identified outside of the project area in a spring-fed stock pond located approximately 0.6-mile northwest of the Basalt Hill summit. Adjacent uplands to 1.3 miles provide dispersal and aestivation habitat. Additional freshwater emergent and seasonal wetlands in the San Luis Reservoir Region may provide suitable breeding habitat and the grassland provides upland refugia and overland movement habitat for California red-legged frog. California red-legged frog are not expected to be encountered near Basalt Campground, below the dam, nor at the Medeiros Use Area.

15.1.4.2.2 Federal or State Candidate Species

Foothill Yellow-Legged Frog. Foothill yellow-legged frog is a Federal and State candidate for listing. Foothill yellow-legged frog inhabit shallow, small to medium sized permanent streams with cobble substrates, beneath which they deposit their eggs, from sea level to 6,000 feet (Jennings and Hayes 1994).

Foothill yellow-legged frog has been recorded along the western end of Los Banos Creek over five miles southeast of San Luis Reservoir (CDFW 2017). Given that the tributaries to San Luis Reservoir dry seasonally, habitat is not present for the foothill yellow-legged frog. Although CNDDB occurrences are documented in the vicinity, no permanent streams occur in the vicinity of San Luis Reservoir that could support this species.

15.1.4.3 Reptiles

15.1.4.3.1 Federal or State Threatened and Endangered Species

Alameda Whipsnake. Alameda whipsnake is Federally and State-listed as threatened. Alameda whipsnake was Federally listed in 1997 (62 FR 64306). This species is found in chaparral, scrubland, open woodlands, rocky hillsides, foothills, and in higher-elevation mixed woodlands. This species lives underground or under cover when inactive. This species is mostly active from March through November. This species is known from Alameda, Contra Costa, San Joaquin, Santa Clara, and Stanislaus counties. The San Luis Reservoir Region occurs outside of the known geographic range for this species.

Blunt-nosed Leopard Lizard. The blunt-nosed leopard lizard is a Federal and State-listed Endangered species. They were listed as Federally endangered in 1967 (32 FR 4001). Blunt-nosed leopards inhabit open, sparsely vegetated areas on the San Joaquin Valley floor and coastal foothills. On the valley floor, this species most commonly occurs in open grasslands and valley sink scrub communities dominated by alkali-tolerant shrubs such as iodine bush (*Allenrolfea occidentalis*) and seep weeds (*Suaeda* spp.). Open, sparsely vegetated areas in the coastal foothills provide less suitable habitat for this species. Leopard lizards do not occur in areas with steep slopes, dense vegetation, or areas subject to seasonal flooding. This species' range is restricted to areas south of San Luis Reservoir, with a 1993 observation south of Los Banos Creek Reservoir being the closest. A 1931 record of a population in the vicinity of the B.F. Sisk Dam is presumed extant though suitable habitat for this species in the Project footprint has been disturbed by dam construction, operations, and maintenance.

15.1.4.3.2 State Species of Special Concern

Western Pond Turtle. Western pond turtle is a California species of special concern. They are commonly found in ponds, lakes, marshes, rivers, streams, and irrigation ditches with rocky or muddy substrates surrounded by aquatic vegetation. These watercourses usually are within woodlands, grasslands, and open forests, between sea level and 6,000 feet. Western pond turtles bask on logs or other objects when water temperatures are lower than air temperatures. Nests are located at upland sites, up to 0.25-mile from an aquatic site (Jennings and Hayes 1994; Stebbins 2003; Zeiner et al. 1988–1990).

Western pond turtle has not been documented within San Luis or O’Neil Forebay reservoirs, but there are numerous occurrences from stock ponds and drainages within Pacheco State Park, San Luis Wildlife Area, and further to the west in the hills (CDFW 2017). The reservoirs and spring-fed ponds provide marginal aquatic habitat for this species. Based on the absence of suitable perennial aquatic habitat in the project area, this species is unlikely to occur on the project site.

San Joaquin Whipsnake. San Joaquin whipsnake (coachwhip) is a California species of special concern. They use open, dry areas with little or no tree cover. In the western San Joaquin Valley, they occur in valley grassland and saltbush scrub. They use small mammal burrows for refuge and egg-laying (Jennings and Hayes 1994). San Joaquin whipsnakes range from the eastern edge of the San Joaquin Valley from Colusa County southward to Kern County and into the inner South Coast Ranges, with an isolated population in the Sutter Buttes.

Occurrences of the San Joaquin whipsnake have been recorded from the mid- to late 1980s around Los Banos Creek Reservoir, over five miles to the southeast of San Luis Reservoir (CDFW 2017). This species was not observed during the 2018 surveys. However, the grassland and scrub provide habitat for this species within the San Luis Reservoir area of analysis.

Coast Horned Lizard. Coast horned lizard is a California species of special concern. This species occurs in several habitat types, ranging from areas with an exposed gravelly-sandy substrate containing scattered shrubs, clearings in riparian woodlands, chaparral, annual grassland with scattered perennial seepweed or saltbush, and sandy washes.

There are no CNDDB occurrences for Coast horned lizard within 10 miles of the San Luis Reservoir. However, the grassland and chaparral within the San Luis Reservoir area of analysis provide suitable habitat for this species.

15.4.1.4 Birds

15.4.1.4.1 Federal or State Threatened and Endangered Species

Swainson's Hawk. Swainson's hawks are a State-listed threatened species. They are large migratory hawks that nest in North America and winter in Central and South America. Swainson's hawks begin arriving in California in late February and depart for their wintering grounds in early September (Woodbridge 1998). Nests are typically constructed in sturdy trees within or near agricultural lands, riparian corridors, and roadside trees. Nests are composed of a platform of sticks, bark, and fresh leaves. Swainson's hawks reside in the Central Valley from March through October, with eggs typically laid in April and early May (peaking in late April). This species is known from Alameda, Butte, Colusa, Contra Costa, Fresno, Glenn, Inyo, Kern, Kings, Lassen, Los Angeles, Madera, Merced, Modoc, Mono, Napa, Placer, Plumas, Sacramento, San Bernardino, San Joaquin, San Luis Obispo, Siskiyou, Solano, Stanislaus, Sutter, Tehama, Tulare, Yolo, and Yuba counties.

There are several Swainson's hawk records within the San Luis Reservoir Region (CFDW 2017). A Swainson's hawk was observed circling over the grasslands between San Luis Reservoir and O'Neil Forebay during a 2016 field survey (ESA 2016). Since 2011, several active nests have been documented at the CDFW O'Neill Forebay Wildlife Area, approximately 0.5-mile north of identified staging areas, with nesting also reported in 2006 at sites in the San Luis Reservoir Region near B.F. Sisk Dam. The grasslands in the region provide foraging habitat and the trees in the riparian and oak woodland provide suitable nesting habitat.

California Condor. California condors are a Federal and State-listed species. California condor was Federally listed as endangered in 1967 (32 FR 4001). They nest on the floors of cliff cavities or caves and in crevices among boulders on steep slopes at elevations from 1,968 to 3,281 feet. California condors forage within grasslands, oak savannas, mountain plateaus, ridges, and canyons, usually within 70 kilometers of the nest.

While there are no CNDDB records for this species within the San Luis Reservoir Region, the annual grassland provides foraging habitat for California condor.

Bald Eagle. Bald eagles are State-listed as endangered and fully protected, and are protected by the Federal BGEPA. They occupy a wide range of habitats, including woodlands, forests, grasslands, and wetlands. They winter throughout California near lakes, reservoirs, rivers, and some rangelands and coastal wetlands. Nesting is usually restricted to mountainous habitats near reservoirs, lakes, and rivers in northern California. Bald eagles usually nest in large coniferous trees within 1 mile of permanent water. They forage on large water bodies or rivers with easily approached snags and other perches (Zeiner et al. 1988–1990).

Bald eagles have not been documented to nest around San Luis Reservoir Region. One adult bald eagle was observed flying over B.F. Sisk Dam during the 2018 field surveys, and one was observed along Pacheco Creek approximately five miles west of the reservoir in 2016 (Appendix I). The San Luis Reservoir Region provides wintering and potential nesting habitat for this species; however, nesting has not been recorded for the San Luis watershed (CDFW 2017).

Tricolored Blackbird. Tricolored blackbird has no Federal status and is a candidate for listing as threatened or endangered under CESA. Tricolored blackbirds are a colonial species that nest in dense vegetation in and around freshwater wetlands. When nesting, tricolored blackbirds generally require freshwater wetland areas large enough to support colonies of 50 pairs or more. They prefer freshwater emergent wetlands with tall, dense cattails or tules for nesting, but will also breed in thickets of willow, blackberry, wild rose, or tall herbs. During the nonbreeding season, flocks are highly mobile and forage in grasslands, croplands, and wetlands (Zeiner et al. 1988–1990).

There are CNDDB records documented for tricolored blackbird within the San Luis Reservoir Region. The grassland provides foraging habitat and the cattail marsh riparian vegetation provide suitable nesting habitat.

15.4.1.4.2 State Fully Protected

Golden Eagle. Golden eagles are fully protected in California and protected by the Federal BGEPA. Golden eagle foraging habitat consists of relatively open habitat types such as; open-country grassland, prairie, savanna, shrub-steppe, desert, and tundra. This species is known to occur where there are dense populations of ground squirrels and black-tailed jackrabbits. Nesting habitat for this species includes cliffs, other elevated rocky substrates, and large and mature oak trees or eucalyptus. Within their nesting territory golden eagles may have up to twelve alternate nest structures that are maintained every year even though they may favor one nest several years in a row. The population of golden eagles in California are mostly sedentary and do not migrate in the winter (USFWS 2013).

CNDDB occurrences of nesting golden eagles are documented within five miles of the northern portion of San Luis Reservoir. The trees within the oak woodland along the steep slopes provide nesting habitat and the grassland provides foraging habitat within the San Luis Reservoir Region.

White-Tailed Kite. White-tailed kites are fully protected in California. They forage in open grasslands, meadows, farmlands, and emergent wetlands. They typically nest in oak woodlands or trees, especially along marsh or river margins, although they will use any suitable tree or shrub that is of moderate height. They are rarely found far from agricultural areas (Zeiner *et al*. 1988–1990).

There are no white-tailed kite nesting records within 10 miles of the San Luis Reservoir Region (CDFW 2017). The trees surrounding the San Luis Reservoir Region provide suitable nesting habitat.

15.4.1.4.3 State Species of Special Concern

Western Burrowing Owl. Western burrowing owls are a California species of special concern. They are residents of open dry grassland and desert. They occupy burrows for both breeding and roosting. They use burrows excavated by ground squirrels and other small mammals and will use human-made burrows and cavities. Where the number and availability of natural burrows is limited, owls may occupy human-made burrows such as drainage culverts, cavities under piles of rubble, discarded pipe, and other tunnel-like structures (Zeiner *et al*. 1988–1990).

There are CNDDB records documented for western burrowing owl within the San Luis Reservoir Region. Several burrowing owls were observed just east of San Luis Recreation Area during 2016 vegetation surveys (Appendix I). The burrows within the grassland, the scrub/chaparral, and ruderal provide nesting and roosting habitat for this species.

Northern Harrier. Northern harriers are a California species of special concern. They are found in a wide variety of habitats from annual grasslands up to lodgepole pines and alpine meadow habitats. They are known to frequent meadows, grasslands, open rangelands, desert sinks, and freshwater and saltwater emergent wetlands. Harriers are seldom found in wooded areas. Nests are constructed amid shrubby vegetation usually in emergent wetlands or near a river or lake. They may also nest in grasslands, grain fields, or sagebrush flats several miles from water (Zeiner *et al*., 1988–1990). Northern harriers are commonly observed foraging over croplands, marshlands, or grasslands within the project region.

There are CNDDB records for northern harrier within the northern portion of the San Luis Reservoir Region. The freshwater emergent marsh and grassland provide nesting habitat for this species.

15.4.1.4.4 Migratory Bird Treaty Act (MBTA) and §3503.5 Department of Fish and Game Code

Nests of migratory birds and other birds of prey are protected from take under 50 CFR 10 of the MBTA and/or Section 3503 of the California Fish and Game Code. The generally accepted nesting season is from February 1 to August 31.

The San Luis Reservoir Region provides habitat for a variety of nesting birds in all habitat types.

15.4.1.5 Mammals

15.4.1.5.1 Federal or State Threatened and Endangered Species

San Joaquin Kit Fox. San Joaquin kit fox are Federally-listed as endangered and State-listed as threatened. San Joaquin kit fox was Federally listed as endangered in 1967 (32 FR 4001). They are a permanent resident of arid grasslands and open scrubland, where friable soils are present. Dens are required year-round for reproduction, shelter, temperature regulation, and protection from predators (USFWS 1998). Historically their habitat included native alkali marsh and saltbush scrub of the valley floor, but the availability of such habitats has diminished markedly due to agricultural conversion. Grasslands with friable soils are considered the principal habitat for denning, foraging, and dispersal, while open oak woodlands provide lower quality foraging and dispersal habitat. Prior to 1930, San Joaquin kit foxes inhabited most of the San Joaquin Valley from southern Kern County to northern San Joaquin County. The current range is thought to cover less than half of the original area, with the largest portion of the range remaining in the southern and western parts of the San Joaquin Valley (USFWS 1998).

North of Kern County, San Joaquin kit foxes primarily occur in a narrow north-south band bordered by Interstate 5 (I-5) to the east and the Coast Range to the west. A low-density kit fox population is found on lands just south of Santa Nella, which may be augmented from dispersers from the Panoche Valley kit fox population to the south. San Joaquin kit foxes were documented in the vicinity on numerous occasions during the 1970s through the 1990s (CDFW 2017). Three observations of kit foxes are reported in 2005 on Billy Wright Road, which is between San Luis Reservoir and Los Banos Creek Reservoir (CDFW 2017). No observations in the reservoir vicinity have been reported to the CNDDB since December 2005. However, a habitat evaluation for kit fox in 2010 found one known den (with kit fox tracks) and 194 potential kit fox dens within the B.F. Sisk project boundary, similar to the current area of analysis (Reclamation 2010c; see Appendix I, Biological Resources Appendix). Potential north-to-south wildlife movement at San Luis Reservoir is substantially hampered by the shortage and poor quality of existing movement opportunities. Among the few active north-to-south wildlife movement options, a short single-track game trail on the dam face, west of the spillway, supports limited wildlife movement. Surveys in 2018 documented use by raccoon and tule elk (see Figure 15-7; Appendix I). If kit foxes are present at the dam, there is a remote likelihood that San Joaquin kit fox may also use this trail to circumnavigate the reservoir and O’Neill Forebay. Other possible, though less likely movement routes include crossing a roughly 500-foot SR 152 bridge span over the O’Neill Forebay inlet, which experiences high vehicle traffic, or traversing several miles of paved road at the top of B.F. Sisk Dam.

Source: Photograph taken by Brian Pittman, ESA

Figure 15-7. Detail of the Narrow Wildlife Movement Trail on the Dam Face and the Dam Spillway, which is Impassible to Terrestrial Wildlife.

The San Joaquin kit fox was not observed during 2018 field surveys (Appendix I). The site's grassland provides suitable denning, dispersal, and foraging habitat within the San Luis Reservoir Region.

15.4.1.5.2 State Fully Protected Species

Ringtail. The ringtail is a fully protected species. This species is found from northern Oregon down through California except the agricultural portion of the Central Valley. They are found in dense riparian growth, montane evergreen forests, oak woodlands, pinyon juniper, chaparral, and deserts. Their territory is usually no farther than 0.5-mile away from a permanent water source and they find reproductive and resting cover in hollow trees, logs, snags, rocks, and abandoned burrows (CDFW 1995).

There are no CNDDB occurrences for this species within the San Luis Reservoir Region. However, the oak woodland, chaparral, and riparian communities provide suitable habitat for this species.

15.4.1.5.3 State Species of Special Concern

Bats including Pallid Bat, Townsend's Big-eared Bat, Western Red Bat and Greater Western Mastiff Bat. Several bats are California species of special concern. Day roosts occur in rock crevices, unoccupied buildings, hollows in large trees, and under bridges.

Pallid bats are a California species of special concern. They inhabit low elevation (< 6,000 feet) rocky arid desert lands and canyonlands, shrub-steppe grasslands, and higher elevation coniferous forests (> 7,000 feet). Pallid bats roost in rock crevices, unoccupied buildings, hollows in large trees, and under bridges. They are most abundant in xeric (dry) ecosystems, including the Great Basin, Mojave, and Sonoran Deserts (Western Bat Working Group 2016).

Western red bat is a California species of special concern. This species is associated strongly with riparian areas, particularly mature stands of cottonwood and sycamore, and may also be found in orchards. Western red bats range through the Central Valley, southern Coast Range, Salinas Valley and San Francisco Bay area (Pierson *et al.*, 2006).

There are no CNDDB occurrences documented for any rare bat species within 10 miles of the San Luis Reservoir Region. However, trees within several habitat types provide suitable roosting habitat for this species within the San Luis Reservoir Region. Three species of bats [Yuma myotis (*Myotis yumanensis*), Mexican free-tailed bat (*Tadarida brasiliensis*), and the western red bat (*Lasiurus blossevillii*), a species of special concern], were recorded in the project area during the 2018 field surveys, and roosting habitat was present in a concrete structure for Yuma myotis and Mexican free-tailed bat (see Appendix I).

American Badger. American badger is a California species of special concern. In California, American badgers occupy a diversity of habitats. Grasslands, savannas, and mountain meadows near the timberline are preferred, though they can be found in deserts as well. The principal requirements seem to be sufficient food, friable soils, and relatively open, uncultivated ground.

CNDDB occurrences are documented for American badger within the San Luis Reservoir Region. This species was observed during the 2018 field surveys near the junction of Basalt Road and Gonzaga Road and a badger skull was found in the cattail marsh below the dam (Appendix I). Scrub/chaparral and grasslands provide suitable habitat for this species within the San Luis Reservoir Region.

15.4.1.5.4 Managed Big Game Species

Tule Elk. Though not a Federal or State special-status species, tule elk are a notable game animal within the San Luis Reservoir Region. This species inhabits native grass, and forb, and perennial bunch grass areas in valley floor and surrounding foothills and oak woodland.

Approximately half a million tule elk were distributed throughout the Sacramento and San Joaquin valleys and the oak-woodlands and oak-grasslands of the Coast Range at the time the early European explorers arrived. By the 1860s, the population was nearly extirpated due to market hunting, competition from introduced livestock, conversion of perennial grasslands to annual grasslands, and the change of large amounts of their habitat to agricultural land use (Reclamation and CDPR 2013).

In the early 1990s, as part of a continuing effort to expand the tule elk population throughout its historic range, CDFW reintroduced tule elk to a private ranch (Wild Rose Ranch) on the southwest side of San Luis Reservoir. The population has slowly increased to the upper 200s, with over half of the elk spending most of their time in Pacheco State Park. This group generally stays west of a line between Dinosaur Point to south of Portuguese Cove. When the water level in San Luis Reservoir is low and there is green vegetation along the shoreline, these individuals will move down to the reservoir from Pacheco State Park (Reclamation and CDPR 2013).

There are no CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. However, tule elk were observed during the 2016 field survey along the northern and eastern portions of San Luis Reservoir and are commonly found here throughout the year. The grassland and oak woodland provide habitat for this species within the San Luis Reservoir Region.

15.4.1.6 Plants

15.4.1.6.1 Federal or State Threatened and Endangered Species

There are no CNDDB records documented for any threatened or endangered plant species within 10 miles of the San Luis Reservoir Region. However, no targeted protocol-level surveys are known to have been conducted.

15.4.1.6.2 California Rare Plant Rank Species

Arcuate Bush-Mallow. Arcuate bush-mallow has a California Rare Plant Rank of 1B. This species is found in chaparral and cismontane woodland. The blooming period for this species is from April through September. There is one CNDDB record documented for this species within 10 miles of the San Luis Reservoir Region. Chaparral areas provide suitable habitat for this species within the San Luis Reservoir Region.

Big-Scale Balsamroot. Big-scale balsamroot has a California Rare Plant Rank of 1B. This species is a perennial herb sometimes found on serpentinite soils in chaparral, cismontane woodland, and valley and foothill grassland. The blooming period for this species is from March through June. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. The grassland and oak woodland provide suitable habitat within the San Luis Reservoir Region.

California Alkali Grass. California alkali grass has a California Rare Plant Rank of 1B. This species is found on alkaline, vernally mesic, sinks, flats, and lake margins within chenopod scrub, meadows and seeps, valley and foothill grassland, and vernal pools. The blooming period for this species is from March through May. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. The grassland and scrub/chaparral provide suitable habitat within the San Luis Reservoir Region.

Chaparral Harebell. Chaparral harebell has a California Rare Plant Rank of 1B. This species is found in chaparral, which is occasionally rocky, and usually serpentinite. The blooming period for this species is from May through June. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. Chaparral areas provide suitable habitat for this species within the San Luis Reservoir Region.

Congdon's Tarplant. Congdon's tarplant has a California Rare Plant Rank of 1B. It is found in valley and foothill grassland, which is occasionally alkaline. The blooming period for this species is from May through June. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. The grassland areas provide suitable habitat within the San Luis Reservoir Region.

Hall's Bush-Mallow. Hall's bush-mallow has a California Rare Plant Rank of 1B. This species is found in chaparral and coastal scrub. The blooming period for this species is from May through September and occasionally into October. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. Chaparral habitat within the San Luis Reservoir Region is suitable for this species.

Hispid Bird's Beak. Hispid bird's beak has a California Rare Plant Rank of 1B. This species is usually found in alkaline substrate in meadows and seeps, playas, and valley and foothill grassland. The blooming period for this species is from June through September and occasionally into October. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. Grasslands within the San Luis Reservoir Region provide suitable habitat for this species.

Hospital Canyon Larkspur. Hospital canyon larkspur has a California Rare Plant Rank of 1B. This species is found occasionally in openings of chaparral, in mesic areas of cismontane woodland, and in coastal scrub. The blooming period for this species is from April through June. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. The chaparral and oak woodland provide suitable habitat for this species within the San Luis Reservoir Region.

Lemmon's Jewel-Flower. Lemmon's jewel-flower has a California Rare Plant Rank of 1B. This species is found in pinyon-juniper woodland and valley and foothill grassland. The blooming period for this species is from February through May. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. Grassland within the San Luis Reservoir Region provide suitable habitat for this species.

Lime Ridge Navarretia. Lime Ridge Navarretia has a California Rare Plant Rank of 1B. This species is found in chaparral. The blooming period for this species is from May through June. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. Chaparral habitat within the San Luis Reservoir Region could provide suitable habitat for this species.

Round-Leaved Filaree. Round-leaved filaree has a California Rare Plant Rank of 1B. It is a found in valley and foothill grassland and cismontane woodland, on clay soils. The blooming period for this species is from March through May. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. Grassland and woodlands within the San Luis Reservoir Region provide suitable habitat for this species.

Shining Navarretia. Shining navarretia has a California Rare Plant Rank of 1B. This species is found in cismontane woodland, valley and foothill grassland, and vernal pools. The blooming period for this species is from March through June. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. Oak woodland and grassland areas provide suitable habitat for this species.

Spiny Sepaled Button-Celery. Spiny-sepaled button-celery has a California Rare Plant Rank of 1B. This species is found in vernal pools and valley and foothill grassland. The blooming period is from April through May. There are CNDDB records documented for this species within 10 miles of the San Luis Reservoir Region. Grasslands within the San Luis Reservoir Region provide suitable habitat for this species.

15.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts associated with each alternative.

15.2.1 Assessment Methods

This section describes the assessment methods used to analyze potential biological resource effects of the alternatives, including the No Action/No Project Alternative.

15.2.2 Significance Criteria

The significance criteria described below were developed consistent with the CEQA Guidelines, and consider the context and intensity of the environmental effects as required under NEPA. Impacts of an alternative on terrestrial resources would be significant if project implementation would do any of the following:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as an endangered, threatened, candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW, NMFS, or USFWS.

- Have a substantial adverse effect on any riparian habitat or other sensitive (or special-status) natural community identified in local or regional plans, policies, regulations, or by the CDFW, NMFS, or USFWS.
- Have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the CWA (including, but not limited to, marsh, vernal pool, coast, etc.) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Communities Conservation Plan (NCCP), or other approved local, regional, or State conservation plan.

15.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative includes the most likely future conditions in the absence of the project. Under the No Action/No Project Alternative, there would be no construction at San Luis Reservoir. **There would be no change to the profile of B.F. Sisk Dam, or the capacity or operations of San Luis Reservoir and no impact on terrestrial resources.**

Because the No Action/No Project Alternative does not entail construction, there would be no related impacts on special-status terrestrial wildlife, plants, or their habitat. Implementation of this alternative would neither temporarily nor permanently affect wetlands or other waters of the United States (U.S.), or sensitive plant communities. There would be no impacts on migratory birds from destruction or disturbance during the nesting season. Wildlife movement corridors and nursery sites for wildlife would remain unchanged. **The No Action/No Project Alternative would not conflict with any policies protecting biological resources or approved HCPs or NCCPs, nor degrade the quality of the environment.**

15.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

The Reservoir Restriction Alternative would restrict the amount of water stored in the San Luis Reservoir to reduce the likelihood of overtopping if the dam failed during a seismic event.

15.2.4.1 Construction Impacts

Construction activities could destroy or adversely affect sensitive habitats, kill, harm or disturb terrestrial wildlife, migratory birds, special-status plant species at San Luis Reservoir, or result in conflicts with local policies or plans. Under the Reservoir Restriction Alternative, an approximately 21-mile-long access road would be constructed above the fill level of the reservoir (489 feet following restriction), to access the newly exposed area. The exposed lands will be revegetated over a construction period of 1.5 years. The habitat impacted by road construction is presently lacustrine habitat beneath the present reservoir surface (elevation 544 ft.). Traffic on the 21-mile maintenance road would have the potential to injure or kill common or special status wildlife, such as kit fox. Trash or pets on construction sites would potentially attract predators and could increase predation or roadkill. **Impacts from traffic-related mortality or injury are potentially significant.** Implementation of Mitigation Measure TERR-15 would provide worker awareness training and litter removal. These measures would avoid and minimize impacts to common and special status wildlife species. **Implementation of Mitigation Measure TERR-15 would reduce this impact to a less than significant level.**

There would be no construction impacts to wetlands, riparian vegetation communities, sensitive wildlife resources, including special-status species, special-status plants, or applicable HCPs. The Reservoir Restriction Alternative would not conflict with any policies protecting biological resources or approved HCPs or NCCPs, nor degrade the quality of the environment.

15.2.4.2 Operation Impacts

Operation of the Reservoir Restriction Alternative could result in long term impacts to terrestrial resources. Operation of the Reservoir Restriction Alternative would utilize existing infrastructure at San Luis Reservoir. In addition, the 21-mile access road used for construction would be removed. Non-native grassland habitat would be present on the newly exposed soil above the lower reservoir. This area could provide habitat for ground-nesting birds or small mammals. Special status species such as kit fox would not be expected to colonize this area because the ground is not suitable for burrows, but may forage or transit through it. **Operation of the Reservoir Restriction Alternative would have a less than significant impact on terrestrial resources.**

15.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

The Crest Raise Alternative would reduce safety concerns for the downstream public, by reducing the likelihood of overtopping of the dam, if slumping were to occur during a seismic event, by increasing the height of the dam. Following construction, the dam footprint following Crest Raise would cover an additional 81 acres of existing annual grassland and 3.4 acres of freshwater emergent wetland.

15.2.5.1 Construction

Construction activities could destroy or adversely affect sensitive habitats at San Luis Reservoir including wetland and riparian vegetation communities. Table 15-2 shows the anticipated habitat impacts associated with the Crest Raise Alternative are associated with construction. The Crest Raise Alternative would permanently impact approximately 3.4 acres of freshwater emergent wetland, and 1.5 acres of seasonal wetland from the expansion of the dam footprint. Additional habitat would be temporarily impacted in the borrow and staging areas (see Table 15-2). It is assumed that no oaks or other trees would be removed or damaged in the staging area. Permanently or seasonally flooded lacustrine habitat (shoreline of the reservoir as water level rises and falls) that would remain inundated is not included in the impact total.

Table 15-2. Habitat Impacts Associated with the Crest Raise Alternative Construction

Habitat Type	Temporary Impact (Acres)	Permanent Impact (Acres)
Annual Grassland	2,473	86
Valley Foothill Riparian	34	0
Scrub/Chaparral	182	7.3
Urban	354	256
Lacustrine (Reservoir)	520	3.0
Fresh Emergent Wetland	21	3.4
Seasonal Wetland	15	1.5
Ephemeral drainage	4.6	>0.1
Purple needlegrass grassland	1.0	0.5
Total (excluding lacustrine)	3,084	358

Construction of the larger dam could result in permanent impacts to special-status natural communities, including purple needlegrass grassland, wetlands. These impacts are potentially significant. Impacts would be associated with clearing, soil borrowing, grading, staging of equipment, and other ground-disturbing activities that are proposed within streams and jurisdictional aquatic features. A formal wetland delineation was performed for the proposed project in 2018 (Reclamation, 2018).

In addition, changes to local topography could alter the surface or subsurface hydrology of these sensitive habitats. Hazardous materials associated with construction equipment (e.g., fuel, oil, etc.) could be released to the environment and adversely affect water quality in wetland and riparian areas.

Mitigation Measure TERR-16a below supports the avoidance of wetlands and other sensitive areas. Mitigation Measure TERR-16b defines compensatory mitigation requirements to offset impacts. **Following the implementation of Mitigation Measure TERR-16, impacts to wetland habitat or riparian vegetation at San Luis Reservoir associated with construction of the Crest Raise Alternative would be offset through compensatory mitigation and would be reduced to a less than significant level.**

Construction activities could kill, harm or disturb terrestrial wildlife, including special-status species, or their habitats. Construction activities would permanently remove 358 acres of upland and aquatic habitat and temporarily disturb 3,084 acres within the construction footprint (excludes the reservoir areas) (Table 15-2). The dam raise would require the use of materials excavated from borrow areas, and construction will require areas for equipment and materials staging, equipment access, excavation, deconstruction of the dam cap, and reconstruction of the dam. Each of these activities could directly affect special-status species that are either known to occur or have potential to occur in the project area. Worker environmental awareness training and site protection measures (Mitigation Measure TERR-15) would benefit all species. Potential impacts to each group of species are discussed below.

15.2.5.1.1 Vernal Pool Invertebrates

Seasonal wetlands occur within the grassland to the south and east of the San Luis Reservoir, within the staging areas, construction footprint, and haul roads. During the 2018 surveys, four features were identified which could provide habitat for listed vernal pool invertebrates, including vernal pool fairy shrimp and vernal pool tadpole shrimp. In the absence of protocol-level surveys for vernal pool invertebrates in the project vicinity, these species are assumed to be present in these features onsite (see Figure 15-5). No other potential vernal pool crustacean habitat was identified in the project area.

Approximately 1.5 acres of seasonal wetland habitat would be permanently impacted under the Crest Raise Alternative. Construction activities in these areas could result in direct mortality or injury to these species. Indirect effects could also occur to these species if their seasonal wetland habitat is modified through changes in hydroperiod, as a result of construction. **Direct and indirect impacts to vernal pool invertebrates are potentially significant.** If avoidance of identified habitat features is not possible, Mitigation Measure TERR-13 would provide for compensation for both occupied and potential habitat for these species. **Implementation of Mitigation Measure TERR-14 would reduce impacts to sensitive vernal pool invertebrates to a less than significant level.**

15.2.5.1.2 Valley Elderberry Longhorn Beetle

The VELB generally occurs in savanna areas and riparian corridors that contain elderberry (*Sambucus* spp.) shrubs. To provide VELB habitat, elderberry stems must be greater than 1-inch in diameter at ground level. VELB larvae burrow into the elderberry trunk, through which the adult beetle later exits the plant. Adults are active between March and June (USFWS 2006). Impacts on VELB or their host plant habitat elderberries would occur if elderberry shrubs are removed or damaged during construction activities.

VELB has been recorded near the San Luis Reservoir, along Los Banos Creek in 1987 (CNDDB 2017), and a large mixed stand containing more than 25 elderberry shrubs was identified during the 2018 field surveys in the project area northwest of Basalt Quarry. Additional small stands with approximately 10 shrubs total were also present in the vicinity. No evidence of VELB was found but not all shrubs could be examined due to vegetation density (Appendix I). The range for VELB includes western Merced County (USFWS 2014). Thus, VELB is assumed present in the elderberry shrubs within the area of analysis. **Damage or removal of elderberry shrubs as a result of construction activities would be a significant impact.** Mitigation Measures TERR-1 and TERR-2 would require pre-construction plant surveys and specific compensation actions for elderberry shrubs supporting VELB. These measures would avoid, minimize or compensate impacts to VELB and its habitat. **The implementation of the species-specific protection covered in Mitigation Measures TERR-1 and TERR-2 would reduce impacts to VELB to less than significant.**

15.2.5.1.3 Amphibians and Reptiles

Construction activities could affect special-status amphibians and reptiles including California tiger salamander, California red-legged frog, San Joaquin whipsnake, and Coast horned lizard. Project construction has the potential to directly affect the California red-legged frog breeding population in Willow Spring Pond, and could also affect potential habitat for red-legged frog and California tiger salamander in other aquatic habitat areas and in upland aestivation sites in seasonal wetlands (1.5 acres permanently impacted), drainages (0.02 acres permanently impacted) or annual grasslands (2,473 acres temporarily impacted, 81 acres permanently; see Table 15-2) east and south of the reservoir.

The identified breeding population of California red-legged frog in Willow Spring Pond is located approximately 0.3-mile south of the reservoir off the quarry access road, in a perennially wet vegetated area fed by the spring (see Figure 15-8). This area will be avoided during staging and borrow activities and will not experience direct impacts. In addition, a suitable buffer will be established to minimize indirect effects that could cause disturbance to the population, such as equipment use or blasting (see Mitigation Measure TERR-3).

Source: Photograph taken by Brian Pittman, ESA

Figure 15-8. California Red-legged Frog Breeding Site at Willow Spring Pond, north of Basalt Quarry.

Western pond turtles have not been reported within the San Luis Reservoir, but the reservoir or spring-fed pools in the project area may provide marginal aquatic habitat. Thus, pond turtles could potentially be encountered in streams, drainages or adjacent uplands surrounding the reservoir. If present, pond turtles could be subject to direct mortality from interactions with construction equipment and temporary habitat loss. The majority of habitat impacts resulting from construction would not be permanent, and disturbed habitat in the borrow area would be replanted with native vegetation to the extent possible. The expanded dam footprint would impact disturbed annual grassland habitat at the base of the present dam that does not provide habitat for western pond turtles or special status amphibians.

Coast horned lizards have not been reported in the San Luis Reservoir Region, but suitable habitat is present in grassland and chaparral habitats south of the reservoir. If present, coast horned lizards could be subject to direct mortality from interactions with construction equipment. The majority of habitat impacts resulting from construction would not be permanent, and disturbed habitat in the borrow area would be replanted with native vegetation to the extent possible. The expanded dam footprint with optional shear key would impact disturbed annual grassland habitat at the base of the current dam that is unlikely to provide habitat for coast horned lizard or other special status reptiles.

Based on habitat availability, San Joaquin whipsnakes are expected to occur sporadically in open, dry grasslands in the project area east or south of the reservoir. Documented occurrences in the project area of both are limited, with an occurrence documented near Los Banos Creek Reservoir, approximately five miles east of the project area. No other occurrences are reported near any other project facilities. This species is relatively uncommon and difficult to detect, even when present. Impacts to this species include the potential for mortality by equipment, or entrenchment in open trenches or other project facilities.

Ground clearing and earth-moving activities would directly harm or kill special-status amphibians and reptiles that are present in the project area either by collapsing burrows or crushing by equipment. The removal of terrestrial or aquatic habitat could expose amphibians and reptiles to increased predation and environmental stress. **Any potential construction impacts to special-status amphibians and reptiles would be significant.** Mitigation Measures TERR-1 and TERR 3 through TERR-5 would require pre-construction surveys and species-specific compensation actions such as exclusion fencing for special-status amphibians and reptiles identified in and adjacent to the construction areas. **Implementation of Mitigation Measures TERR-1 and TERR-3 through TERR-5 would reduce impacts to special-status amphibians and reptiles to less than significant.**

15.2.5.1.4 Bats

Breeding and nonbreeding bats could roost in many of the large trees that would be inundated by the crest raise or in crevices in B.F. Sisk Dam that would be subject to disturbance during construction. Western red bat and non-special-status Yuma myotis and Mexican free-tailed bat were detected during the 2018 field surveys, and roosting habitat was identified for Yuma myotis and Mexican free-tailed bat. The identified roosting habitat would not be impacted by the project.

The loss of individual bats in a nonbreeding roost is not considered significant. **However, the loss of an active maternity roost, even of a relatively common species, would be significant.** Based on their known range and available habitat in the watershed and along pipeline alignments, other bat species that could be affected by the project include the pallid bat, Townsend’s big-eared bat, greater western mastiff bat, hoary bat, and long-eared myotis bat.

Bats are mobile and can move away from roosting sites (e.g., trees, crevices in cliffs and buildings, etc.) during construction, except during maternity and hibernation periods. However, given the potential for loss of a maternity roost, project effects to special-status bats would be significant. Mitigation Measure TERR-10 would require the completion of pre-construction surveys and the establishment of no-disturbance buffers around any active bat roosts during the breeding season and limits on tree removal. **Therefore, with implementation of Mitigation Measure TERR-11 impacts to special-status bats would be less than significant.**

15.2.5.1.5 San Joaquin kit fox

Annual grassland habitat in the San Luis Reservoir region of Merced County is considered to represent the northernmost extent of stable San Joaquin kit fox populations near the inner coast range. The loss, fragmentation, and degradation of habitat are considered primary threats to the northern population of San Joaquin kit fox (Orloff *et al*. 1986). Fragmentation of populations by aqueducts, busy highways, and other obstructions increases isolation, limits dispersal, and reduces gene flow between populations. Other general threats to San Joaquin kit fox include the application of rodenticides in some areas, either as a direct threat through poisoning or as an indirect threat through reducing the abundance of their prey. Use of fragmented habitats by coyotes, red foxes (*Vulpes vulpes*), and feral dogs can also increase kit fox mortality (Ralls and White 1995).

As shown in Table 15-2, annual grassland habitat is the primary vegetation community that would be affected by construction of the Crest Raise Alternative and expansion of the dam footprint. Grasslands are the principal habitat used by San Joaquin kit foxes for denning, foraging, and dispersal, while oak woodland and coastal scrub provide lower quality foraging habitat, but may provide dispersal and provide cover from predators such as coyotes.

Direct Impacts The Crest Raise Alternative would impact approximately 2,473 acres of annual grassland habitat temporarily in the borrow and staging areas, and 81 acres permanently. In addition, this alternative would permanently impact 7.3 acres of scrub/chaparral, 1.5 acres of seasonal wetland, and 3.4 acres of freshwater emergent wetland habitat. These are all habitats that could be used by San Joaquin kit fox. Though focused surveys have not been performed to ascertain the distribution of San Joaquin kit fox around San Luis Reservoir, the species was observed near the reservoir in 2005 (CNDDB, 2017), and the project area scrub and grasslands could provide kit fox denning, foraging, or dispersal habitat. Kit fox was not observed during 2018 field surveys. A habitat assessment for this species conducted in 2010 found one known den and 194 potential dens in the area of analysis, and in earlier literature, San Joaquin kit fox were sighted and tracked through this area, with movements across the project area in the area of the known and potential dens (Reclamation 2010c; see Appendix I, Biological Resources Appendix). The permanent removal of potential habitat that could support San Joaquin kit fox is considered a significant impact.

It is estimated that construction areas such as the borrow sites on Basalt Hill south of the reservoir would be active for a period of at least 2 years during the expansion of B.F. Sisk Dam and construction of other facilities. During this period, these areas would be unavailable for San Joaquin kit fox habitation or movement. However, following completion of construction, the corridor would be revegetated and after re-occupation by prey animals, would again provide suitable kit fox habitat. It is unknown whether kit fox would be likely to reoccupy this habitat after a prolonged absence.

Given the impassible spillway on the face of B.F. Sisk Dam, the only potential wildlife movement corridor between the reservoir and O'Neill Forebay is a narrow trail on the dam face where San Joaquin kit fox activity has not been observed (see Figure 15-7), the SR 152 bridge span over the O'Neill Forebay inlet, or traversing several miles of paved road at the top of B.F. Sisk Dam. Among the three, the dam face provides the shortest and most natural corridor, and SR 152 provides the most hazardous movement option. All the potential movement corridors in this area traverse habitat of low suitability (Reclamation 2010c), and kit fox sightings are sparse, potentially indicating a declining population. While the project would permanently modify the existing dam and temporarily modify the borrow areas, such actions would not permanently modify or degrade any existing or established movement corridors. Project construction on the dam face and in the Medeiros Use Area would reduce grassland habitat quality for kit fox near each of the three potential movement corridors during the construction period, resulting in a long-term (approximately 2-year) temporary loss of habitat use and movement opportunities. Any use of the three described north-to-south movement corridors by kit fox, including the dam face, would be so infrequent as to be considered improbable. Following the completion of construction, the quality and availability of wildlife movement corridors would be comparable to existing, poor conditions. Thus, construction impacts on kit fox movement corridors would be less than significant.

Indirect Impacts The Crest Raise Alternative is not expected to indirectly increase the potential for San Joaquin kit fox predation by coyotes. Coyotes are cited as a source of kit fox mortality where populations of these species overlap (Cypher and Spenser 1998, Disney and Spiegel 1992, Ralls and White 1995) and possibly rank among the greatest threats to kit fox recovery. It is suggested that coyotes kill kit foxes to reduce competition for food and other resources, as the two species rely on somewhat similar food items—principally rabbits for coyotes and small rodents for kit fox (White et al. 1994, Cypher and Scrivner 1992). Because coyote populations are expected to remain essentially unchanged with or without the crest raise, the project is not expected to alter or negatively affect coyote/kit fox interactions.

Nighttime lighting would be used during the 24-hour construction period. Some reservoir facilities would also require nighttime lighting for safety and security, after construction. Existing nighttime lighting occurs within the construction footprint along SR 33 and within one mile of the construction footprint within Santa Nella. Nighttime lighting may disturb kit fox, or expose them to injury. Lighting will be minimized and shielded to reduce disturbance to kit fox (see Mitigation Measure TERR-15 below).

Construction impacts to San Joaquin kit fox through the direct loss of habitat, injury, or mortality through vehicular impact or the collapse of occupied dens would be significant. Mitigation Measure TERR-12 would require the completion of pre-construction surveys for San Joaquin kit fox in the work area, the implementation of the protective measures during project construction for any kit fox identified during the surveys, and the acquisition and dedication of lands into conservation easements or the purchase of mitigation credits. Mitigation Measure TERR-15 would limit the use of nighttime lighting and would require trash removal and limit construction traffic speeds which would avoid and minimize disturbance of San Joaquin kit fox. **With implementation of Mitigation Measures TERR-12 and 15, impacts would be reduced to a less than significant level.**

15.2.5.1.6 American badger

American badgers are a California species of special concern that are found throughout the regional project vicinity and are known to occur in low densities in annual grasslands that immediately surround San Luis Reservoir (CDFW 2017, Figure 15-5). During the 2018 field surveys, American badger was observed at the junction of Gonzaga Road and Basalt Road, and badger remains were found in the cattail marsh south of the dam. American badgers could be directly affected by vehicle and construction-related injury, mortality, and disturbance at active construction sites. Because this species typically remains in burrows during construction hours (6 am to 6 pm), it is not anticipated that badgers would be affected by indirect impacts such as project noise, dust, lighting, or other construction disturbances. The principal impacts to individual badgers would be injury and mortality by vehicle and equipment collision or burial in dens. Given their potential presence in the project area and the alternative's operation of heavy construction equipment throughout the construction schedule, and the potential for this equipment to impact the American badger, this impact would be significant. Mitigation Measure TERR-14 would require pre-construction surveys, construction worker training and the passive or active relocation of potentially impacted badgers as necessary. **With the implementation of Mitigation Measure TERR-13, this impact would be less than significant.**

15.2.5.1.7 Special-status Birds

Construction activities could disturb nesting migratory birds, including raptors and special-status species with potential to occur. Construction activities associated with the crest raise (including grading and removal of trees, shrubs, and other potential nesting habitat during the breeding season) could result in direct mortality of nesting birds that are considered special-status (i.e., loggerhead shrike, California horned lark, and tricolored blackbird) or are protected under the Federal MBTA. Indirect impacts from construction noise, vibrations, and increased human presence could disturb adult birds causing nest abandonment, death of young, or loss of reproductive potential at active nests near active work areas. Project construction would result in the permanent removal of grassland, scrub, woodland, and riparian habitats that support breeding birds. However, this impact area represents a small portion of the available nesting, foraging, and wintering habitat for special-status birds in the region.

A tricolored blackbird colony is reported on the south portion of B.F. Sisk Dam in the San Luis Reservoir SRA outside the project area, most recently observed in 2012 (Reclamation and CDPR 2013). Colonies have been documented near the south shore of O'Neil Forebay (2006 to 2007) and near the borrow area on Basalt Hill south of the reservoir (see Figure 15-5) (CDFW 2017). Impacts on tricolored blackbird colonies at the San Luis Reservoir would occur if freshwater marsh habitat (typically dominated by cattails (*Typha* spp.) and bulrushes (*Scirpus* or *Schoenoplectus* spp.) or adjacent grain fields utilized by the species is disturbed or altered during construction. A temporary drop in water level during construction would not be expected to harm freshwater marsh habitat. Following construction, the water level would return to its normal operation range.

Special-status raptors including Swainson's hawk, golden eagle, and bald eagle could be impacted by the Crest Raise Alternative. Construction of the crest raise could result in disturbance to nesting sites for these raptors and permanently reduce foraging habitat for Swainson's hawk (see below).

Golden eagles are known to nest within the San Luis Reservoir region and could be directly and indirectly affected by the project. Golden eagle nest locations have not been mapped in the San Luis Reservoir watershed and no currently active nests are known from the surrounding vicinity. Much of the construction activities are proposed within non-wooded annual grasslands to the south of San Luis Reservoir that support few trees; hence, the likelihood of encountering active nests in these areas during construction is considered low.

Potential direct impacts on golden eagles include disturbance of nesting birds, if present near construction areas, and the temporary and permanent loss of foraging habitat at the dam footprint, borrow areas, and staging areas. The raising of B.F. Sisk Dam and other facilities would generate construction noise and related disturbances that would temporarily reduce available nesting and foraging habitat suitability for golden eagles near the dam; if any nest sites occur near construction areas, they could be impacted by work activities.

Swainson's hawk has been observed foraging between San Luis Reservoir and O'Neil Forebay and several active nests have been documented approximately 0.5-mile north of identified staging areas. Preferred foraging habitat is in grasslands, pasturelands and agricultural lands. During construction of this alternative, 2,473 acres of grassland would be temporarily lost as foraging habitat and the expanded dam footprint would permanently cover 81 acres of annual grassland habitat. Tens of thousands of acres of suitable foraging habitat are present in the vicinity of San Luis Reservoir.

Project effects to migratory and special-status birds would be significant. Mitigation Measures TERR-6 through 10 would require pre-construction surveys for nesting birds in the construction area, compensatory mitigation for Swainson's hawk foraging habitat loss, and other species-specific compensation actions for migratory and special-status birds identified in and adjacent to the construction areas. **With implementation of Mitigation Measures TERR-6 through 10, impacts on migratory and special-status birds would be less than significant.**

Construction activities could destroy or adversely affect special-status plant species. There is a low to moderate likelihood that construction of the Proposed Project could directly impact special-status plants. Rare plant populations are not documented in the Crest Raise Alternative project area; however, focused botanical surveys have not yet been performed for the project. Because presence/absence surveys have not been performed in this area, if special-status plants are present they could be impacted by the proposed project.

Construction-related activities such as site preparation, vegetation removal, and the use of construction related equipment could cause temporary and permanent direct impacts by loss of special-status plants or their habitat, root or seed damage or indirectly through changes in soil profile. **This impact to special-status plants is considered significant.** Indirect impacts to rare plant populations are not anticipated. Mitigation Measure TERR-1 requires pre-construction surveys for special-status plant species, and compensatory mitigation when impacts cannot be avoided. **With implementation of Mitigation Measure TERR-1, impacts on special-status plants would be reduced to a less than significant level.**

Construction activities could adversely affect wildlife corridors. No permanent fences or barriers to wildlife movement would be constructed under the Crest Raise Alternative. Temporary construction fencing and protective fencing around wetlands, riparian areas, or other sensitive natural communities, special-status plants, or wildlife habitat, would limit wildlife movement for the duration of construction, but would be removed following construction and restoration of disturbed areas. During the extended period that this exclusion fencing would be in place, it would create small localized barriers to wildlife transit. These barriers, in addition to the permanent barriers of the reservoir and forebay, will limit wildlife movement in the vicinity of the dam for an extended period during construction. Project construction would reduce overall habitat quality for common wildlife in the project area during the construction period, resulting in a long-term (approximately 2-year) temporary loss of habitat use and wildlife displacement. Heavy construction will compel the local movement of common terrestrial wildlife species from work areas, and has the potential to increase injury or mortality from vehicles or equipment. Given the largely undeveloped nature of the project area and the expansive habitat directly adjacent, many displaced wildlife species would not be prevented from traversing the larger area, while many smaller species (e.g., mice, ground squirrels, etc.) would not be able to effectively relocate and avoid mortality. Existing site fencing should direct larger wildlife (e.g., deer and tule elk) to move into non-project lands and reduce the likelihood of wildlife encounters with vehicles on SR 152 and other roads. Limited loss of common wildlife species and temporary movement impediments would occur during construction; however, these species would recolonize the site following construction. and no new obstacles to wildlife movement would be present following project completion. **Therefore, the impact on wildlife corridors would be less than significant.**

Construction of the Crest Raise Alternative could result in conflicts with local policies or ordinances protecting biological resources. As described in Chapter 28, Consultation, Coordination, and Compliance, the Merced County General Plan includes objectives and policies to preserve and protect biologic resources in the County. These include provisions to preserve existing and increase the overall acreage of protected lands in the County, and the designation of buffers around and protection of wetlands. **Development of the Crest Raise Alternative could generate significant impacts on terrestrial wildlife and vegetation, representing a significant impact**. Mitigation Measures TERR-1 through 14 would reduce these potential impacts to terrestrial wildlife and vegetation including wetlands during construction near the San Luis Reservoir shoreline to a less than significant level. **Therefore, with implementation of Mitigation Measures TERR-1 through 14 impacts on consistency with local policies or ordinances protecting biological resources would be less than significant.**

Construction of the Crest Raise Alternative could result in conflicts with HCPs or Other Local Plans or Policies. There are no HCPs or local plans and policies that cover the San Luis Reservoir Region. However, construction of the Crest Raise Alternative would comply with the policies established in the *San Luis Reservoir SRA Resource Management Plan/ General Plan EIS/EIR* (Reclamation and CDPR 2013). **Therefore, there would be no impact.**

15.2.5.2 Operation Impacts

Operation of the Crest Raise Alternative could result in long term impacts to terrestrial resources. Operations of the dam under the Crest Raise Alternative would maintain the existing water level and would not inundate any additional acreage. Thus, operational impacts under this alternative would be the same as the No Action Alternative. Thus, there would be no operational impacts to wetlands or vegetation communities; sensitive wildlife resources, including special-status species, special-status plants, wildlife corridors, or nursery sites; or applicable HCPs. All operational impacts would be the same as under the No Action Alternative. **Operational impacts under the Crest Raise Alternative would not conflict with any policies protecting biological resources or approved HCPs or NCCPs, nor degrade the quality of the environment.**

15.3 Comparative Analysis of Alternatives

Table 15-3 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 15-3 are NEPA impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 15-3. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities could destroy or adversely affect special-status natural communities including wetland and riparian vegetation communities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	TERR-16: Jurisdictional wetlands or waters, and streambeds and streambank mitigation	LTS
Construction activities could kill, harm, or disturb terrestrial wildlife, including special-status species, or their habitats.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	TERR-15	LTS
	Alternative 3 - Crest Raise	S	TERR-1 through TERR-5 and TERR-11 through TERR-15: Species-specific mitigation measures	LTS
Construction activities could disturb nesting migratory birds, including raptors.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	S	TERR-15	LTS
	Alternative 3 - Crest Raise	S	TERR-6 through TERR-10: Species-specific mitigation measures	LTS
Construction activities could destroy or adversely affect special-status plant species.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	TERR-1: Species-specific mitigation measures	LTS
Construction activities could adversely affect wildlife corridors.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities could result in conflicts with local policies or ordinances protecting biological resources.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	TERR-1 through TERR-15: Species-specific mitigation measures TERR-16: Jurisdictional wetlands or waters, and streambeds and streambank mitigation	LTS
Construction activities could reduce foraging habitat for golden eagles and California condors at the San Luis Reservoir.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	TERR-8: Species-specific mitigation measures	LTS
Operations could result in long term impacts to terrestrial resources.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key:
LTS = less than significant
NI = no impact
None = no mitigation required
S = significant
-- = not required per CEQA Guidelines

15.4 Mitigation Measures

The following mitigation measures include avoidance and compensation measures for potential impacts to wetlands. They also include species-specific components that would be implemented for special-status species which have unique habitat requirements or require special protections based on their life history.

Although some of the special-status species have low potential to occur within the proposed construction areas, pre- construction surveys outlined in these mitigation measures would be implemented in areas of potential habitat. In the event that these species are found and could be affected, the avoidance and restoration actions described in the following mitigation measures will be implemented.

Mitigation measures would be implemented for wetlands, sensitive natural communities, and special-status plant and wildlife species that have potential to occur in the area of analysis and require specific protections or detailed surveys. If these special-status species are found and could be affected by the alternatives, the avoidance and minimization measures described in the mitigation measures shall be implemented.

TERR-1: Special-status Plant Species and Special-Status Natural Communities

Surveys of the project area for special-status plant species will be conducted during the identifiable blooming period prior to commencement of work. Special-status plants include: Arcuate bush-mallow (blooms April through September), big-scale balsamroot (blooms March through June), California alkali grass (blooms March through May), chaparral harebell (blooms May through June), Congdon’s tarplant (blooms May through October), Hall’s bush-mallow (blooms May through September), Hispid bird’s beak (blooms June through September), Hospital Canyon larkspur (blooms March through June), Lemmon’s jewelflower (blooms February through May), Lime Ridge navarretia (blooms May through June), round-leaved filaree (blooms March through May), shining navarretia (blooms April through July), and spiny-sepaled button-celery (bloom April through June).

A qualified DWR biologist (qualified biologist) will be present prior to and during construction to ensure avoidance of impacts on special-status plant species and special-status natural communities by implementing one, or more, of the following, as appropriate, per the biologist’s recommendation:

a. Flag the population or natural community areas to be protected;

b. Allow adequate buffers; and/or,

c. Time construction or other activities during dormant and/or non-critical life cycle periods.

For unavoidable impacts to special-status plant species, compensatory mitigation may be required based on recommendations of the qualified biologist. If any impacts occur to listed plant species, consultation with USFWS and/or CDFW will be initiated. If deemed necessary based on the type and extent of special-status plant populations affected, compensatory mitigation will entail:

a. The protection, through land acquisition or a conservation easement, of a population of equal or greater size and health. Or,

b. If it is not feasible to acquire and preserve a known population of a special-status plant to be impacted, suitable unoccupied habitat capable of supporting the species will be acquired, and used to create a new population. For population creation, the following considerations will also be met:

- Prior to unavoidable and permanent disturbance to a population of a special-status plant species, propagules shall be collected from the population to be disturbed. This may include seed collection or cuttings, and these propagules will be used to establish a new population on suitable, unoccupied habitat as described above. Transplantation may be attempted but will not be used as the primary means of plant salvage and new population creation.

- Creation of new populations will require identifying suitable locations and researching and determining appropriate and viable propagation or planting techniques for the species. It will also require field and literature research to determine the appropriate seed sampling techniques and harvest numbers for acquisition of seed from existing populations.

- A minimum ten-year monitoring plan with adaptive management will be implemented to document the success of creating new plant populations. Adequate funding for compensatory mitigation will be provided on an agreed-to schedule, following a discussion with the appropriate regulatory agencies, to ensure long-term protection and management of lands acquired or placed under conservation easement.

TERR-2: Valley Elderberry Longhorn Beetle
Prior to construction, the known stand of more than 25 elderberry shrubs and surrounding areas with suitable elderberry habitat would be surveyed to determine the current number of elderberry shrubs present, their stem diameters, and, if feasible, the presence and number of exit holes formed by VELB as they exit the branch. Surveys are valid for two years.

A 100-foot buffer around construction areas would also be surveyed for elderberry shrubs that could be affected by dust from construction. Areas containing elderberry shrubs with stems greater than 1-inch in diameter would be assumed to provide VELB habitat, protected with fencing, and avoided to the extent possible. Consultation with the USFWS through the Section 7 process may be required if shrubs cannot be avoided during construction. If shrubs cannot be avoided, removal measures would be implemented, including transplanting shrubs to a USFWS-approved conservation area, compensating for habitat loss at a ratio ranging from 1:1 to 8:1 depending on the diameter of the impacted elderberry stems and habitat type that they were removed from (riparian or non-riparian), under an Elderberry Mitigation Plan approved by USFWS, or purchasing credits at a USFWS-approved mitigation bank for valley elderberry longhorn beetle.

TERR-3: Special-Status Amphibians
Before and during construction:

- The Proponent shall submit the name and credentials of a DWR biologist qualified to act as construction monitor to USFWS and CDFW for approval at least 15 days before construction work begins. General minimum qualifications are a 4-year degree in biological sciences and experience in surveying, identifying, and handling California tiger salamanders and California red-legged frogs. The qualified biologist shall be present at all times during construction. Consultation with the USFWS through the Section 7 process may be required to determine avoidance, conservation, and mitigation measures.

- The USFWS and CDFW-approved biologist, under the appropriate Federal and State authorities (e.g. permitting and consultation), shall survey the work sites 2 weeks before the onset of construction. If California tiger salamanders or California red-legged frogs (or their tadpoles or eggs) are found, the approved biologist shall contact USFWS and CDFW to determine whether moving any of these life-stages is appropriate. If USFWS and CDFW approve moving the animals, the biologist shall be allowed sufficient time to move frogs and/or salamanders from the work sites before work begins. If these species are not identified, construction can proceed at these sites. The biologist shall use professional judgment to determine whether (and if so, when) the California tiger salamanders and/or frogs are to be moved. The biologist shall immediately inform the construction manager that work shall be halted, if necessary, to avert avoidable take of listed species.

- The known location of California red-legged frogs and Willow Spring, the water source for the perennial frog pond, near the borrow area will be avoided during construction with a buffer of 250 feet to avoid modifying aquatic habitat that supports the frog population; or as otherwise approved by the resource agencies.

- Areas impacted by construction will be monitored during construction to identify, capture, and relocate special-status amphibians, if present.

- Areas beneath construction equipment and vehicles shall be inspected daily, prior to operation, for presence of special-status amphibians under tracks/tires and within machinery. If special-status amphibians are found a qualified biologist will capture and relocate animals from work sites.

- Appropriate State and Federal permits for handling of special-status species will be acquired

- If necessary, a detailed amphibian relocation plan will be prepared at least 3 weeks before the start of groundbreaking and submitted to CDFW and USFWS for review. The purpose of the plan is to standardize amphibian relocation methods and relocation sites.

- A USFWS and CDFW-approved biologist shall be present at the active work sites until special-status amphibians have been removed, and habitat disturbance has been completed. Thereafter, the contractor shall designate a person to monitor onsite compliance with all minimization measures. A CDFW and USFWS-approved biologist shall ensure that this individual receives training consistent with USFWS requirements.

- The project proponent and its contractors shall install frog-exclusion fencing (i.e., silt fences) around all construction areas that are within 100 feet of any identified ponds that provide potential special-status amphibian aquatic breeding habitat. During and after rain events, an approved biologist will monitor work areas for the presence of special-status amphibians.

- Reclamation shall provide compensation for permanent and temporary impacts on California tiger salamander and California red-legged frog aquatic habitat. Compensatory mitigation shall be provided for the loss of aquatic breeding sites that will be filled or otherwise directly affected by the project, as well as mitigate for any impacts on associated California red-legged frog upland habitat through compensatory mitigation. If possible, compensatory mitigation areas shall be located within a California red-legged Frog Recovery Area, as identified in the 2002 *California Red-legged Frog Recovery Plan* (USFWS 2002).

- The total area, size and number of California red-legged frog or California tiger salamander mitigation ponds to be created will be based on a comparable loss of breeding sites (e.g., a minimum 1:1 replacement ratio) as a result of the project. These ponds shall concurrently satisfy wetland mitigation requirements identified in Mitigation Measure TERR-2. To the degree possible, new mitigation ponds that are created for California red-legged frog and California tiger salamander shall be hydrologically self-sustaining and shall not require a supplemental water supply.

TERR-4: Western Pond Turtle

Before construction activities begin, a qualified biologist shall conduct western pond turtle surveys within creeks and in other ponded areas affected by the project. Adjacent upland areas shall also be examined for evidence of nests as well as individual turtles. The project biologist shall be responsible for the survey and for the relocation of pond turtles, if found. Construction shall not proceed until a reasonable effort has been made to capture and relocate as many western pond turtles as possible to minimize take. However, some individuals may be undetected or enter sites after surveys and would be subject to injury or mortality. If a nest is observed, a biologist with the appropriate permits and prior approval from CDFW shall move eggs to a suitable location or facility for incubation, and release hatchlings into the creek system the following autumn.

TERR-5: San Joaquin Whipsnake
Before construction activities begin a qualified biologist shall conduct San Joaquin whipsnake surveys 2 weeks prior to construction activities within work sites and within 100 feet of disturbance areas. A qualified biologist shall relocate any San Joaquin whipsnakes to suitable habitat outside of areas of disturbance. There is possibility of snakes to move into the work sites after pre-construction surveys have checked the area and some individuals could be subject to mortality. If San Joaquin whipsnakes are detected in work sites during construction, activities and equipment travel shall cease in the immediate area of detection until the snake has left work site or has been relocated out of the area by a qualified biologist.

TERR-6: Nesting Bird Surveys
A qualified biologist would conduct nesting bird surveys prior to construction and supervise avoidance of nests during construction. The generally accepted nesting season extends from February 1 through September 15. If an active nest of a special-status bird is found, construction within 300 feet of the nest (500 feet for raptor nests, excluding Swainson’s hawk) would be postponed until the nest is no longer active.

TERR-7: Swainson’s Hawk
Prior to construction, surveys for active Swainson’s hawk nests will be conducted in and around all potential nest trees within 0.5 mile of construction areas. If known or active nests are identified through preconstruction surveys or other means, a 0.5 mile no-disturbance buffer shall be established around all active nest sites if construction cannot be limited to occur outside the nesting season (February 15 through September 15). Buffer sizes may be reduced if approved by CDFW and active nest sites are monitored during construction by a qualified biologist.

Permanent foraging habitat losses (i.e. grasslands) within one mile of active Swainson’s hawk nests shall be compensated by preserving in perpetuity suitable foraging habitat at a ratio of 1:1. This includes permanently disturbed construction sites. The CDFW shall approve the location and types of habitats preserved.

TERR-8: Bald and Golden Eagles, and California Condor
The following measures address potential impacts on nesting eagles in the San Luis Reservoir vicinity. Prior to the initiation of construction, an Eagle Conservation Plan will need to be developed that details eagle protection guidelines specific to the San Luis Reservoir construction area. These

protections will include, the initiation of pre-construction surveys by a USFWS-approved biologist for golden eagles and bald eagles initiating approximately two years prior to construction continuing through the construction period. These surveys will be completed across an area at a 5-mile radius from where impacts from the project occur, including construction areas. Any nesting sites identified during these surveys would be mapped and monitored for up to ten years, depending on the monitoring specifications identified within the plan. Whenever feasible, construction near recently active nest sites shall start outside the active nesting season. The nesting period for golden eagles is between January 15 and August 15 and bald eagles nest between January 1 and August 15. If groundbreaking activities begin during the nesting period, a qualified biologist shall perform a preconstruction survey 14 to 30 days before the start of each new construction phase to search for eagle nest sites within two miles of proposed activities. If active nests are not identified, no further action is required and construction may proceed. If active nests are identified, the avoidance guidelines identified below shall be implemented.

- For golden and bald eagles, construction contractors shall observe CDFW and USFWS avoidance guidelines, which stipulate a minimum 660 foot to 0.5-mile buffer zone depending upon the visibility and severity of the activity (e.g., earth-moving versus blasting) (USFWS 2007). Buffer zones shall remain until young have fledged. A qualified biologist will monitor the nest daily for one week to determine whether construction activities are disturbing nest behavior. If nest behavior appears normal, then weekly monitoring will continue until the nest is no longer active. If the nest appears disturbed, the biological monitor will increase the no-work buffer at their discretion to ensure normal nesting behavior. For activities conducted with agency approval within this buffer zone, a qualified biologist shall monitor construction activities and the eagle nest(s) to monitor eagle reactions to activities. If activities are deemed to have a negative effect on nesting eagles, the biologist shall immediately inform the construction manager that work should be halted, and CDFW and USFWS will be consulted.

- CDFW and USFWS often allow construction activities that are initiated outside the nesting season to continue without cessation even if raptors such as eagles choose to nest within 500 feet of work activities. Thus, work at the dam construction site may continue if approved by CDFW and USFWS and a qualified biologist monitors the nest site during construction.

- To compensate for the loss of grassland, which provides suitable foraging habitat for golden eagles and California condors, grasslands shall be enhanced or restored at a minimum ratio of 1:1. Restoration or enhancement of grassland habitat shall be conducted under a USFWS and CDFW-approved restoration/enhancement plan, and may be conducted on lands also used for mitigation for Swainson’s hawk and/or San Joaquin kit fox.

TERR-9: Burrowing Owl

Prior to construction, surveys for burrowing owls would be conducted in areas supporting potentially suitable habitat. Any occupied burrows shall not be disturbed during the breeding season (February 1 through August 31). A minimum 160-foot-wide buffer shall be placed around occupied burrows during the nonbreeding season (September 1 through January 31), and a 250-foot-wide buffer shall be placed around occupied burrows during the breeding season. Ground- disturbing activities shall not occur within the designated buffers.

The project proponent shall implement the measures listed below for grassland habitats to avoid incidental take of burrowing owls. In advance of construction, a qualified biologist shall follow the current CDFW burrowing owl survey guidance to evaluate burrowing owl use. Measures shall apply to all construction activities near active nests or within potential burrowing owl nesting habitat, to avoid, minimize, or mitigate impacts on burrowing owls.

Breeding season surveys shall be performed to determine the presence of burrowing owls for the purposes of inventory, monitoring, avoidance of take, and determining appropriate mitigation. In California the breeding season begins as early as February 1 and continues through August 31. Under the Burrowing Owl Consortium’s multi-phase survey methodology, for areas within 500 feet of construction boundaries, a biologist shall: 1) perform a habitat assessment to identify essential components of burrowing owl habitat, including artificial nest features; 2) perform intensive burrow surveys in areas that are identified to provide suitable burrowing owl habitat, and; 3) perform at least four appropriately-timed breeding season surveys (four survey visits spread evenly [roughly every 3 weeks] during the peak of the breeding season, from April 15 to July 15) to document habitat use.

Pre-construction surveys shall be used to assess the owl presence before site modification is scheduled to begin. Generally, initial pre-construction surveys should be conducted within 7 days, but no more than 30 days prior to ground-disturbing activities. Additional surveys may be required when the initial disturbance is followed by periods of inactivity or the development is phased spatially and/or temporally over the project area. Up to four or more survey visits performed on separate days may be required to assure with a high degree of certainty that site modification and grading will not take owls. The full extent of the pre-construction survey effort shall be described and mapped in detail (e.g., dates, time periods, area[s] covered, and methods employed) in a biological report that will provided for review to CDFW.

In addition to the above survey requirements, the following measures shall be implemented to reduce project impacts to burrowing owls:

- Construction exclusion areas (e.g., orange exclusion fence or signage) shall be established around occupied burrows, where no disturbance shall be allowed. During the nonbreeding season (September 1 through January 31), the exclusion zone shall extend at least 160 feet around occupied burrows. During the breeding season (February 1 through August 31), exclusion areas shall extend 250 feet around occupied burrows (or farther if warranted to avoid nest abandonment).

- If work or exclusion areas conflict with owl burrows, passive relocation of onsite owls could be implemented as an alternative, but only during the nonbreeding season and only with CDFW approval. The approach to owl relocation and burrow closure will vary depending on the number of occupied burrows. Passive relocation shall be accomplished by installing one-way doors on the entrances of burrows within 160 feet of the project area. The one-way doors shall be left in place for 48 hours to ensure the owls have left the burrow. The burrows shall then be excavated with a qualified biologist present. Construction shall not proceed until the project area is deemed free of owls.

- Unoccupied burrows within the immediate construction area shall be excavated using hand tools, and then filled to prevent reoccupation. The qualified biologist will be present during construction to continue examination of burrows. If any burrowing owls are discovered during the excavation, the excavation shall cease and the owl shall be allowed to escape. Excavation would be completed when the biological monitor confirms the burrow is empty.

- Artificial nesting burrows will be provided as a temporary measure when natural burrows are lacking. To compensate for lost nest burrows, artificial burrows shall be provided outside the 160-foot buffer zone. The alternate burrows shall be monitored daily for 7 days to confirm that the owls have moved in and acclimated to the new burrow.

TERR-10: Tricolored Blackbird

Prior to construction, appropriately timed surveys for tricolored blackbirds would be conducted in areas supporting potentially suitable habitat within 0.25 mile of construction areas. Habitat within 0.25 mile of tricolored blackbird colonies will be avoided during nesting season, which can begin as early as mid-March and extend through August. If colonies cannot be avoided, CDFW shall be consulted to potentially reduce buffer distances with active monitoring during construction by a qualified biologist.

TERR-11: Special-Status Bats
Impacts to special-status bats shall be minimized by performing preconstruction surveys and creating no-disturbance buffers around active bat roosting sites.

Before construction activities (i.e., ground clearing and grading, including trees or shrub removal) within 200 feet of trees that could support special-status bats, a qualified bat biologist shall survey for special-status bats. If no evidence of bats (i.e., direct observation, guano, staining, or strong odors) is observed, no further mitigation shall be required.

If evidence of bats is observed, the following measures shall be implemented to avoid potential impacts on breeding populations:

- A no-disturbance buffer of 200 feet shall be created around active bat roosts during the breeding season (April 15 through August 15). Bat roosts initiated during construction are presumed to be unaffected by the indirect effects of noise and construction disturbances. However, the direct take of individuals will be prohibited.

- Removal of trees showing evidence of active bat activity shall occur during the period least likely to affect bats, as determined and monitored by a qualified bat biologist (generally between February 15 and October 15 for winter hibernacula, and between August 15 and April 15 for maternity roosts). If the exclusion of bats from potential roost sites is necessary to prevent indirect impacts due to construction noise and human activity adjacent, bat exclusion activities (e.g., installation of netting to block roost entrances) shall also be conducted during these periods. If special-status bats are identified in the dam or special allowances must be made to relocate bats, Reclamation will coordinate the effort in advance with CDFW.

TERR-12: San Joaquin Kit Fox
San Joaquin kit fox would be affected by construction activities if animals are harmed or killed by equipment, their movement is blocked or their dens or other habitat is altered or destroyed. Consultation with the USFWS through the Section 7 process may be required to determine avoidance, conservation, and mitigation measures. Prior to construction, a qualified biologist will conduct surveys to identify potential dens more than 4 inches in diameter. A habitat assessment in 2010 found 195 potential kit fox dens in the San Luis Reservoir work area (Reclamation 2010c; see Appendix I, Biological Resources Appendix). If dens are located within the proposed work area, and cannot be avoided during construction activities, a USFWS- and CDFW-approved biologist will determine if the dens are occupied. If occupied dens are present within the proposed work, their disturbance and destruction shall be avoided. Exclusion zones will be implemented following the latest USFWS procedures (USFWS 2011).

The Proponent shall implement San Joaquin kit fox protection measures. The following measures, which are intended to reduce direct and indirect project impacts on San Joaquin kit foxes, are derived from the *San Joaquin Kit Fox Survey Protocol for the Northern Range* (USFWS 1999a) and the *Standardized Recommendations for Protection of the San Joaquin Kit Fox* (USFWS 1999b). The following measures shall be implemented for construction areas at San Luis Reservoir:

- Preconstruction surveys shall be conducted within 200 feet of work areas to identify potential San Joaquin kit fox dens or other refugia in and surrounding workstations. A qualified biologist shall conduct the survey for potential kit fox dens 14 to 30 days before construction begins. All identified potential dens shall be monitored for evidence of kit fox use by placing an inert tracking medium at den entrances and monitoring for at least 3 consecutive nights. If no activity is detected at these den sites, they shall be closed following guidance established in the USFWS *Standardized Recommendations* report (USFWS 1999b).

- If kit fox occupancy is determined at a given site during the pre-construction surveys or during the construction period, the construction manager should be immediately informed that work should be halted within 200 feet of the den and the USFWS contacted. Depending on the den type, reasonable and prudent measures to avoid effects to kit foxes could include seasonal limitations on project construction at the site (i.e., restricting the construction period to avoid spring-summer pupping season), and/or establishing a construction exclusion zone around the identified site, or resurveying the den a week later to determine species presence or absence.

- Off-road vehicle and equipment movement will be limited to the project footprint.

- To compensate for permanent impacts to grassland, which provides habitat for San Joaquin kit fox, lands shall be acquired and covered by conservation easements or mitigation credits shall be purchased at a 2:1 mitigation ration, or other compensation ratios approved by the USFWS and the CDFW.

TERR-13: American Badger

Impacts on badgers within annual grasslands and oak woodland at San Luis Reservoir will be minimized through a combination of worker training, preconstruction surveys, and passively or actively relocating animals. Concurrent with other required surveys, during winter/spring months before new project activities, and concurrent with other preconstruction surveys (e.g., kit fox and burrowing owl), a qualified biologist shall perform a survey to identify the presence of active or inactive American badger dens. If this species is not found, no further mitigation shall be required. If badger dens are identified within the construction footprint during the surveys or afterwards, they shall be inspected and closed using the following methodology:

When unoccupied dens are encountered outside of work areas but within 100 feet of proposed activities, vacated dens shall be inspected to ensure they are empty and temporarily covered using plywood sheets or similar materials. If badger occupancy is determined at a given site within the work area, work activities at that site should be halted. Depending on the den type, reasonable and prudent measures to avoid harming badgers will be implemented and may include seasonal limitations on project construction near the site (i.e., restricting the construction period to avoid spring-summer pupping season), and/or establishing a construction exclusion zone around the identified site, or resurveying the den at a later time to determine species presence or absence. Badgers may be passively relocated using burrow exclusion (e.g., installing one-way doors on burrows) or similar CDFW-approved exclusion methods. In unique situations it might be necessary to actively relocate badgers (e.g., using live traps) to protect individuals from potentially harmful situations. Such relocation would be performed with advance CDFW coordination and concurrence.

TERR-14: Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp
While project design is planned to avoid fill of seasonal wetlands and pools identified as suitable habitat for vernal pool crustaceans, if any vernal pool fairy shrimp or vernal pool tadpole shrimp habitat will be impacted, the project proponent may assume presence of the species. Consultation with the USFWS through the Section 7 process may be required to determine avoidance, conservation, and mitigation measures. Measures may include, but are not limited to, compensating for impacts at a 2:1 ratio for preservation and at a 1:1 ratio for creation.

TERR-15: Contractor Environmental Awareness Training and Site Protection Measures.
All construction personnel working in biologically sensitive areas shall attend an environmental education program delivered by a qualified biologist prior to starting work. The training shall include an explanation as how to best avoid the accidental take of special-status plants and wildlife. The field meeting shall include species identification, life history, descriptions, and habitat requirements. The program shall include an explanation of Federal and State laws protecting endangered species, and avoidance and minimization methods being implemented to protect these species. A qualified biologist will be present on the site at all times during construction.

The contractor shall provide closed garbage containers for the disposal of all trash items (e.g., wrappers, cans, bottles, food scraps). Work sites shall be cleaned of litter before closure each day, and placed in wildlife-proof garbage receptacles. Construction personnel shall not feed or otherwise attract any wildlife. No pets, excluding service animals, shall be allowed onsite or in construction areas.

Nighttime vehicle traffic shall be kept to a minimum on non-maintained roads with a maximum speed of 15 mph.

To minimize disturbance to wildlife, temporary and permanent exterior lighting shall be installed such that:

(a) lamps and reflectors are not visible from beyond the project site,

(b) reflective glare will be minimized to the extent feasible;

(c) illumination of the project and its immediate vicinity is minimized;

(d) lighting shall incorporate fixture hoods/shielding, with light directed downward or toward the area to be illuminated;

(e) all lighting shall be of minimum necessary brightness consistent with operational safety and security;

(f) lights in areas not occupied on a continuous basis (such as maintenance areas) shall have (in addition to hoods) switches, timer switches, or motion detectors so that the lights operate only when the area is occupied, and

(g) the plan complies with local policies and ordinances.

TERR-16: Mitigation measures for special-status communities, including jurisdictional wetlands or waters, and streambeds and banks regulated by the CDFW, RWQCB, and USACE, and native grassland.

Mitigation Measure TERR -16a. Final project design shall avoid and minimize the fill of wetlands and other waters to the greatest practicable extent. The following actions shall be performed to protect jurisdictional wetlands:

1. The distribution of Federal and State jurisdictional wetlands and waters; streambeds and banks regulated by CDFW; and sensitive habitat regulated by CDFW, shall be defined and avoided to the greatest possible extent.

2. Prior to construction, a qualified biologist shall delineate the extent of jurisdictional areas to be avoided in the field. Reclamation will designate areas to be avoided as “Restricted Areas” and protect them using highly visible fencing, rope, or flagging, as appropriate based on site conditions. No construction activities or disturbance will occur within restricted areas that are designated to protect wetlands.

3. Minimize the removal of riparian and wetland vegetation. Avoid disturbance of riparian and aquatic habitat north of the access road to the dam.

4. Minimize the removal or damage to purple needlegrass grassland. Avoid impacts to native grasslands in the staging area.

Mitigation Measure TERR-16b. Where jurisdictional wetlands and other waters cannot be avoided, to offset temporary and permanent impacts that would occur as a result of the project, restoration and compensatory mitigation shall be provided as described below.

A wetland mitigation and monitoring plan shall be developed in coordination with CDFW, USACE, and/or the Regional Water Quality Control Board (RWQCB) that details mitigation and monitoring obligations for temporary and permanent impacts to wetlands and other waters as a result of construction activities; and other CDFW jurisdictional areas. The plan shall quantify the total acreage affected; provide for mitigation as described below to wetland or riparian habitat; annual success criteria; mitigation sites; monitoring and reporting requirements; and site-specific plans to compensate for wetland losses resulting from the project.

Prior to construction, the aquatic structure of wetland and riparian areas to be disturbed will be photo-documented, and measurements of width, length, and depth will be recorded. Reclamation will recontour and revegetate disturbed portions of jurisdictional areas in areas temporarily affected by construction prior to demobilization by the contractor at the end of project construction. Creek banks will be recontoured to a more stable condition if necessary.

Revegetation will include a palette of species native to the watershed area according to a revegetation plan to be developed by Reclamation and submitted to the USACE, CDFW, and RWQCB for approval. Following removal, woody trees habitat acreage would be replanted at a minimum 1:1 ratio, or as determined and agreed upon by the permitting agencies. Interim vegetation or other measures will be implemented as necessary to control erosion in disturbed areas prior to final revegetation.

Wetland and other waters impacts in the construction area shall be compensated at a ratio of 2:1 or at a ratio agreed upon by the wetland permitting agencies. Compensatory mitigation shall be conducted by creating or restoring wetland and aquatic habitat at an agency-approved location on nearby lands or through purchasing mitigation credits at a USACE and/or CDFW-approved mitigation bank (depending on the resource). If mitigation is conducted on- or off-site, a five-year wetland mitigation and monitoring program for onsite and offsite mitigation shall be developed. Appropriate performance standards may include, but are not limited to: a 75 percent survival rate of restoration plantings; absence of invasive plant species; and a viable, self-sustaining creek or wetland system at the end of five years.

A weed control plan for the project to limit the spread of noxious or invasive weeds shall also be developed. This plan would be consistent with current

Integrated Pest Management Plans that are already in practice on lands surrounding the reservoir. Noxious or invasive weeds include those rated as “high” in invasiveness by the California Invasive Plant Council. The plan will include a baseline survey to identify the location and extent of invasive weeds in the project area prior to ground-disturbing activity, a plan to destroy existing invasive weeds in the construction area prior to initiation of ground-disturbing activity, weed-containment measures while the project is in progress, and monitoring and control of weeds following completion of construction.

15.5 Significant Unavoidable Impacts

There would be no significant and unavoidable impacts on terrestrial resources from construction or operation of any of the action alternatives.

Chapter 16
Regional Economics

This chapter presents regional economics within the area of analysis and discusses potential regional economic effects from implementation of proposed alternatives.

16.1 Affected Environment/Environmental Setting

This section presents the area of analysis (Section 16.1.1), describes the regulatory setting pertaining to regional economics in the area of analysis (Section 16.1.2), and describes the existing economic conditions in the area of analysis (Sections 16.1.3).

16.1.1 Area of Analysis

The area of analysis for socioeconomics includes counties where Central Valley Project (CVP) and State Water Project (SWP) water service contractors could be affected by the project alternatives. The CVP water service contractors have service areas in the San Joaquin Valley ranging from the Delta south to Kern County, and in the Bay Area region. The SWP water service contractors have services areas in the Bay Area region, San Joaquin Valley region in Kern and Tulare counties, and in southern California. The socioeconomic area of analysis is divided into the following regions, which are made up of counties grouped together based on whether the major water use is agricultural or Municipal and Industrial (M&I).

- San Joaquin Valley Region – most water use is agricultural
- Bay Area Region – most water use is M&I
- Southern California Region – most water use is M&I

Figure 16-1 shows the regional economics area of analysis.

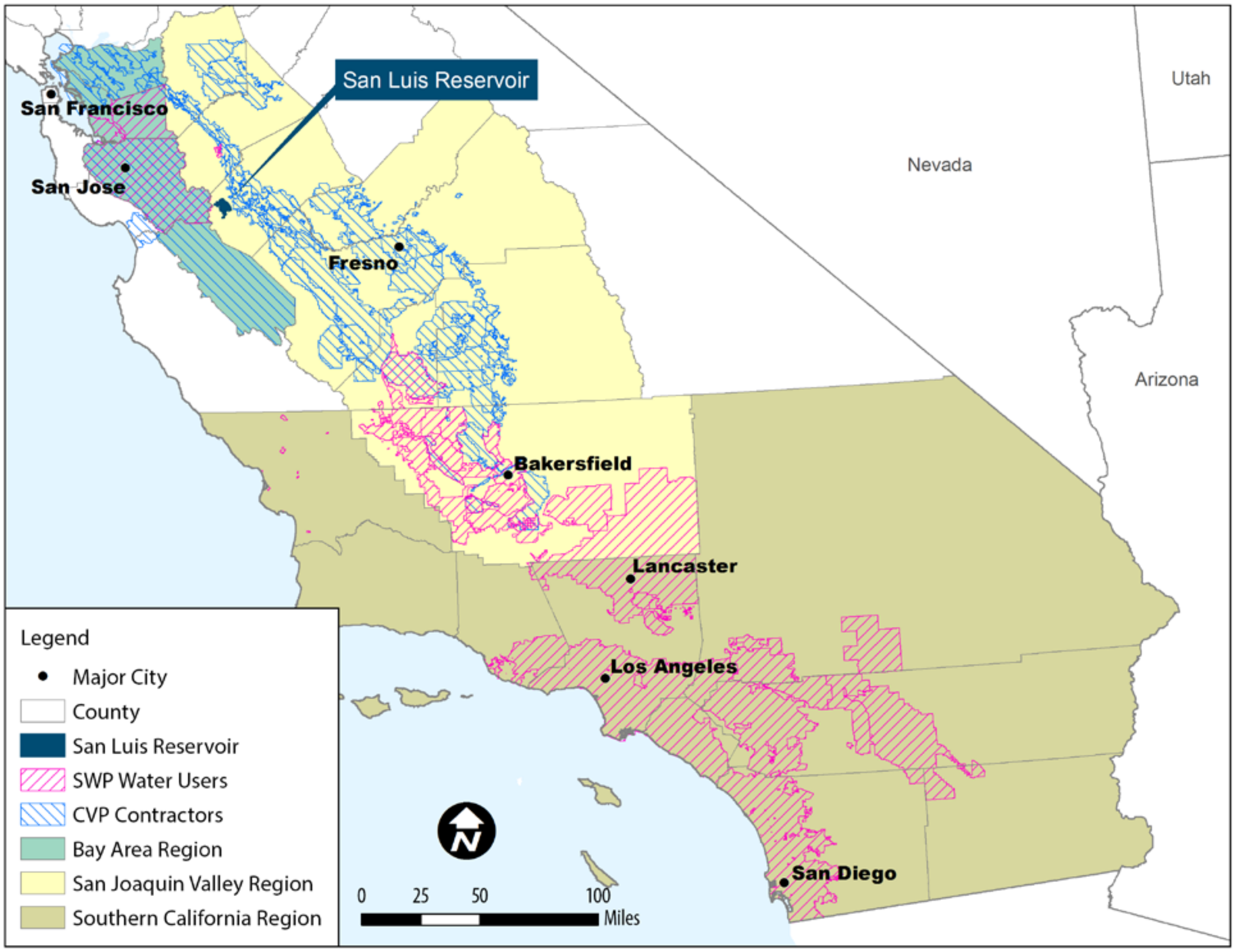


Figure 16-1. Regional Economics Area of Analysis

16.1.2 Regulatory Setting

16.1.2.1 Federal

Under the National Environmental Policy Act (NEPA), economic or social effects must be discussed if they are inter-related to the natural or physical environmental effects of a project. NEPA states the following with regard to analysis of economic effects (Title 40, Code of Federal Regulations [CFR], Section 1508.14):

> "…economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment."

Since economic effects of the project are related to physical environmental effects, a NEPA economic analysis is required.

16.1.2.2 State

The California Environmental Quality Act (CEQA) does not consider economic or social changes resulting from a project as adverse effects on the environment. If a physical change in the environment is caused by economic or social effects, the physical change may be regarded as an adverse effect. Specifically, under CEQA Guidelines (Section 15358[b]), an Environmental Impact Report (EIR) must analyze impacts "related to a physical change" in the environment. State CEQA Guidelines Section 15131(a) states that "economic or social effects of a project shall not be treated as significant effects on the environment" unless the economic effects result in physical effects.

The Guidelines (Section 15131[a]) also state, "An EIR may trace a chain of cause and effect from a proposed decision on a project through anticipated economic or social changes resulting from the project to physical changes caused in turn by the economic or social changes. The intermediate economic or social changes need not be analyzed in any detail greater than necessary to trace the chain of cause and effect. The focus of the analysis shall be on the physical changes."

To summarize Guidelines 15358[b] and 15131[a], the economic or social effect of a project may be used to determine the significance of physical changes caused by the project. However, analyses of other environmental resources in this document rely on resource-specific tools or qualitative discussions to determine environmental effects. Therefore, economic effects are not needed to judge the significance of changes to other environmental resources.

Physical effects of the project alternatives are evaluated separately and do not require economic analysis; therefore, this section does not provide a CEQA analysis.

16.1.2.3 Regional

Local governments have adopted policies and ordinances to protect local economies. County and city general plans in the area of analysis also have policies to sustain and promote economic development.

16.1.3 Existing Conditions

The following section describes the existing economic conditions within the area of analysis. Regional economic data is presented at a county level, with data from the U.S. Census Bureau and IMPLAN (Impact Planning and Analysis) 2014 data (see Section 16.2.1 for a description of IMPLAN). IMPLAN data files are compiled from a variety of sources including, but not limited to, the U.S. Bureau of Economic Analysis, the U.S. Bureau of Labor, and the U.S. Census Bureau. Output represents the dollar value of industry production. Labor income is the dollar value of total payroll (including benefits) for each industry plus income received by self-employed individuals.

16.1.3.1 San Joaquin Valley Region

The CVP and SWP water service contractors within the San Joaquin Valley have service areas within Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties. Table 16-1 presents household income, per capita income, and poverty status for the counties in the San Joaquin Valley region relative to California.

Table 16-1. San Joaquin Valley Region 2014 Households and Income

Households and Income	Fresno County	Kern County	Kings County	Madera County	Merced County	San Joaquin County	Stanislaus County	Tulare County	California
Number of Households	292,550	257,737	41,108	42,723	76,516	217,343	168,090	132,706	1,2617,280
Average Household Size	3.18	3.20	3.24	3.37	3.35	3.15	3.07	3.36	2.77
Median Household Income ($)	45,201	48,574	47,341	45,490	43,066	53,253	49,573	42,863	61,489
Mean Household Income ($)	63,045	65,412	63,381	60,120	59,868	70,572	65,348	58,798	86,704
Per Capita Income ($)	20,231	20,467	18,518	17,797	18,454	22,642	21,729	17,888	29,906

Source: U.S. Census Bureau 2014.

Table 16-2 presents the regional economy for this entire region, followed by a discussion of the regional economy in each individual county. In 2014, the total population in the 8-county region was 4.1 million (IMPLAN Group, LLC 2016). The region is largely rural with some large population centers in the cities of Stockton, Merced, Fresno, and Bakersfield. Much of the region's land is in agricultural production.

CVP contractors in this region deliver both irrigation and M&I water supplies with the majority of the CVP water used in the region for agriculture.

In 2014, services provided the most jobs (754,630 jobs) in the region, followed by government (268,377 jobs), agriculture (244,649 jobs) and trade (233,472 jobs). Services also had the highest output ($87.2 billion) of all industries in the region, followed by manufacturing ($69.2 billion), and agriculture ($36.6 billion).

Table 16-2. San Joaquin Valley 2014 Regional Economy Summary (Fresno, Kern, Kings, Merced, San Joaquin, Stanislaus, and Tulare Counties)

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	244,649	$36,579.8	$14,700.4
Mining	20,672	$12,847.9	$2,503.8
Construction	83,509	$14,268.1	$4,278.3
Manufacturing	127,519	$69,213.6	$7,516.5
TIPU	92,081	$25,931.4	$6,232.2
Trade	233,472	$28,185.6	$9,810.3
Service	754,630	$87,209.7	$29,790.3
Government	268,377	$28,581.5	$21,528.1
Total	1,824,909	$302,817.6	$96,359.9

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016
Notes:
TIPU= traffic, information, and public utilities

Fresno County In 2014, the total population in Fresno County was 965,974 (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (213,341 jobs) in Fresno County, followed by government (67,308 jobs), trade (58,385 jobs), and agriculture (58,143 jobs). Services had the highest output ($24.3 billion) in the county, followed by manufacturing ($11.7 billion), and agriculture ($8.0 billion). In 2014, top industries in terms of output included electric power generation fossil fuels ($4.8 billion), wholesale trade ($3.6 billion), owner occupied dwellings ($3.0 billion), and real estate ($2.9 billion) (IMPLAN Group, LLC 2016). Table 16-3 summarizes the regional economy in Fresno County, in terms of employment, output, and labor income.

Table 16-3. Fresno County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	58,143	$7,985.6	$3,259.9
Mining	739	$225.2	$54.9
Construction	19,758	$3,346.9	$1,005.2
Manufacturing	29,392	$11,752.0	$1,431.6
TIPU	23,228	$9,330.2	$1,783.0
Trade	58,385	$7,182.1	$2,519.1
Service	213,341	$24,350.6	$8,594.7
Government	67,308	$6,821.5	$5,248.7
Total	470,293	$70,994.0	$23,897.3

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Kern County In 2014, the total population in Kern County was 874,589 (IMPLAN Group, LLC 2016). In 2011, services provided the most jobs (160,981 jobs) in Kern County, followed by agriculture (66,800 jobs), and government (61,056 jobs). Services had the highest output ($19.2 billion) in the county, followed by manufacturing ($16.6 billion), and mining ($12.1 billion).

Top industries in terms of output included petroleum refineries ($9.4 billion), extraction of natural gas and crude petroleum ($8.3 billion), owner occupied dwellings ($2.8 billion), and wholesale trade ($2.7 billion) (IMPLAN Group, LLC 2016). Table 16-4 summarizes the regional economy in Kern County, in terms of employment, output, and labor income.

Table 16-4. Kern County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	66,800	$6,581.7	$3,405.1
Mining	18,513	$12,127.9	$2,419.5
Construction	24,986	$4,372.7	$1,352.4
Manufacturing	17,871	$16,616.9	$1,158.8
TIPU	18,022	$4,919.3	$1,413.9
Trade	47,051	$5,833.0	$2,201.9
Service	160,981	$19,233.2	$6,697.6
Government	61,056	$6,979.8	$5,250.6
Total	415,280	$76,664.5	$23,899.8

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Kings County In 2014, the total population in Kings County was 150,269 (IMPLAN Group, LLC 2016). In 2014, government provided the most jobs (18,437 jobs) in Kings County, followed by services (18,035 jobs), and agriculture (7,771 jobs). Manufacturing had the highest output ($4.6 billion) in the county, followed by government ($2.8 billion), and agriculture ($2.4 billion). Top industries in terms of output included cheese manufacturing ($1.6 billion), soybean and other oilseed production ($1.2 billion), and dairy cattle and milk production ($838.5 million) (IMPLAN Group, LLC 2016). Table 16-5 summarizes the regional economy in Kings County, in terms of employment, output, and labor income.

Table 16-5. Kings County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	7,771	$2,364.4	$765.0
Mining	158	$29.6	$0.0
Construction	1,261	$220.8	$67.6
Manufacturing	5,396	$4,653.0	$331.0
TIPU	1,577	$372.4	$98.2
Trade	5,634	$574.7	$209.1
Service	18,035	$2,225.7	$673.3
Government	18,437	$2,780.2	$1,482.9
Total	58,269	$13,220.8	$3,627.1

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Madera County In 2014, the total population in Madera County was 154,548 (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (23,001 jobs) in Madera County, followed by agriculture (15,404 jobs), and trade (5,783 jobs). Services had the highest output ($2.7 billion) in the county, followed by agriculture ($2.6 billion), and manufacturing ($2.2 billion). Top industries in terms of output included tree nut farming ($1.0 billion), hospitals ($567.2 million), and fruit farming ($551.4 million) (IMPLAN Group, LLC 2016). Table 16-6 summarizes the regional economy in Madera County, in terms of employment, output, and labor income.

Table 16-6. Madera County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	15,404	$2,592.6	$923.4
Mining	306	$58.9	$1.0
Construction	2,299	$381.8	$105.9
Manufacturing	4,538	$2,182.7	$287.2
TIPU	2,073	$538.0	$125.8
Trade	5,783	$646.1	$230.6
Service	23,001	$2,724.2	$896.5
Government	9,897	$1,047.0	$744.4
Total	63,301	$10,171.3	$3,314.8

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Merced County In 2014, the total population in Merced County was 259,898 (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (34,741 jobs) in Merced County, followed by government (17,850 jobs), and agriculture (17,273 jobs). Agriculture had the highest output ($4.1 billion) in the county, followed by manufacturing ($5.0 billion), and services ($3.8 million). Top industries in terms of output included dairy cattle and milk production ($1.5 billion), cheese manufacturing ($958.8 million), and canned fruits and vegetables ($767.5 million) (IMPLAN Group, LLC 2016). Table 16-7 summarizes the regional economy in Merced County, in terms of employment, output, and labor income.

Table 16-7. Merced County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	17,273	$4,070.2	$1,405.4
Mining	238	$53.3	$3.7
Construction	3,494	$597.5	$177.1
Manufacturing	12,080	$5,054.1	$624.6
TIPU	4,402	$1,000.2	$222.7
Trade	11,640	$1,238.3	$427.5
Service	34,741	$3,844.5	$1,182.6
Government	17,850	$1,718.1	$1,362.0
Total	101,718	$17,576.2	$5,405.5

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

The San Luis Reservoir State Recreation Area (SRA) is a popular recreation facility in Merced County that generates economic activity. In Fiscal Year 2015/16, annual visitation was 242,694 which generated total revenues of $927,866. User fees accounted for $898,662 and $24,945 was from miscellaneous sources. Of total visitation, paid day use attendance was 187,123, free day use attendance was 21,653, and camping attendance was 33,918 (California Department of Parks and Recreation (CDPR) 2017a). Day use fees at San Luis Reservoir are $10.00 per vehicle for developed parking and camping fees are $30.00 for a developed site (CDPR 2017b and 2017c).

San Joaquin County In 2014, the total population in San Joaquin County was 715,597 (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (133,970 jobs) in San Joaquin County, followed by trade (46,667 jobs), and government (36,808 jobs). Services had the highest output ($15.6 billion) in the county, followed by manufacturing ($9.1 billion), and trade ($6.0 billion). Top industries in terms of output included wholesale trade ($3.5 billion), owner-occupied dwellings ($2.6 billion), and real estate ($1.9 billion) (IMPLAN Group, LLC 2016). Table 16-8 summarizes the regional economy in San Joaquin County, in terms of employment, output, and labor income.

Table 16-8. San Joaquin County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	19,400	$3,074.8	$1,267.0
Mining	295	$251.4	$15.2
Construction	13,494	$2,354.2	$734.3
Manufacturing	18,957	$9,106.6	$1,245.0
TIPU	22,518	$5,494.0	$1,433.8
Trade	46,667	$5,998.0	$1,897.5
Service	133,970	$15,617.4	$5,204.0
Government	36,808	$3,757.1	$3,070.9
Total	292,109	$45,653.4	$14,867.6

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Stanislaus County In 2014, the total population in Stanislaus County was 531,997 (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (103,626 jobs) in Stanislaus County, followed by trade (33,667 jobs), and government (26,923 jobs). Manufacturing had the highest output ($12.4 billion) in the county, followed by services ($12.0 billion), and trade ($4.0 billion). Top industries in terms of output included wholesale trade ($1.9 billion), owner-occupied dwellings ($1.7 billion), and canned fruits and vegetables manufacturing ($1.5 billion) (IMPLAN Group, LLC 2016). Table 16-9 summarizes the regional economy in Stanislaus County, in terms of employment, output, and labor income.

Table 16-9. Stanislaus County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	18,797	$3,384.5	$1,332.6
Mining	227	$45.3	$2.3
Construction	11,005	$1,808.0	$501.3
Manufacturing	25,223	$12,459.5	$1,640.3
TIPU	10,854	$1,852.5	$607.5
Trade	33,667	$3,997.4	$1,347.0
Service	103,626	$12,008.6	$4,305.0
Government	26,923	$2,780.6	$2,111.3
Total	230,322	$38,336.4	$11,847.3

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Tulare County In 2014, the total population in Tulare County was 458,198 (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (66,935 jobs) in Tulare County, followed by agriculture (41,061 jobs), and government (30,009 jobs). Manufacturing had the highest output ($7.4 billion) in the county, followed by services ($7.2 billion), and agriculture ($6.5 billion). Top industries in terms of output included dairy cattle and milk production ($2.4 billion), owner-occupied dwellings ($1.3 billion), and fruit farming ($1.3 billion) (IMPLAN Group, LLC 2016). Table 16-10 summarizes the regional economy in Tulare County, in terms of employment, output, and labor income.

Table 16-10. Tulare County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	41,061	$6,526.0	$2,342.1
Mining	196	$56.3	$7.1
Construction	7,212	$1,186.3	$334.7
Manufacturing	14,062	$7,388.8	$798.0
TIPU	9,407	$2,424.8	$547.3
Trade	24,644	$2,716.0	$977.6
Service	66,935	$7,205.6	$2,236.7
Government	30,099	$2,697.2	$2,257.1
Total	193,616	$30,201.0	$9,500.6

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

16.1.3.2 Bay Area Region

The Bay Area region includes Alameda, Contra Costa, San Benito, and Santa Clara counties. CVP contractors in this region receive both irrigation and M&I water supplies. Contractors in Alameda, Contra Costa, and Santa Clara counties receive and deliver CVP M&I deliveries and the San Benito County Water District in San Benito County receives and delivers CVP agricultural water to irrigation customers. SWP contractors in this region are in Santa Clara County and receive M&I water for delivery to urban customers within the county.

Table 16-11 presents household income and per capita income for the counties in the Bay Area region relative to California.

Table 16-11. Bay Area Region 2014 Households and Income

Households and Income	Alameda County	Contra Costa County	San Benito County	Santa Clara County	California
Number of Households	551,734	380,163	17,121	614,714	12,617,280
Average Household Size	2.77	2.82	3.30	2.94	2.77
Median Household Income ($)	73,775	79,799	67,874	93,854	61,489
Mean Household Income ($)	99,356	107,920	83,170	124,513	86,704
Per Capita Income ($)	36,439	38,770	26,317	42,666	29,906

Source: U.S. Census Bureau 2014.

Table 16-12 presents the regional economy for this entire region, followed by a discussion of the regional economy in each individual county. In 2014, the total population in the 4-county region was approximately 4.7 million (IMPLAN Group, LLC 2016). Alameda, Contra Costa, and Santa Clara counties have the largest urban areas in the region, supporting the most employment and industry. These counties include residential suburbs of San Francisco, but are also home to important business services and retail businesses. California’s Silicon Valley, the center of the region high-tech businesses, is in Santa Clara County.

In 2014, services provided the most jobs (1.6 million jobs) in the region, followed by trade (335,661 jobs), manufacturing (261,628 jobs) and government (245,056 jobs). Services also had the highest output ($259.4 billion) of all industries in the region, followed by manufacturing ($261.6 billion).

Table 16-12. Bay Area Region 2014 Regional Economy Summary (Alameda, Contra Costa, San Benito, and Santa Clara Counties)

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	8,885	$952.8	$486.3
Mining	4,494	$2,014.4	$422.7
Construction	138,083	$26,911.0	$9,336.8
Manufacturing	261,628	$220,109.1	$39,828.9
TIPU	181,681	$90,934.7	$30,514.9
Trade	335,661	$57,105.6	$22,937.2
Service	1,655,112	$259,394.8	$114,615.5
Government	245,056	$29,853.2	$24,554.6
Total	2,830,602	$687,275.5	$242,697.0

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Alameda County In 2014, Alameda County had a population of 1.6 million (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (557,504 jobs) in Alameda County, followed by trade (121,573 jobs), and government (108,155 jobs). Services had the highest output ($80.8 billion) in the county, followed by manufacturing ($39.7 billion). Top industries in terms of output included wholesale trade ($11.3 billion), real estate ($8.8 billion), owner occupied dwellings ($7.9 billion)[1], and management of companies and enterprises ($6.9 billion) (IMPLAN Group, LLC 2016). Table 16-13 summarizes the regional economy in Alameda County, in terms of employment, output, and labor income.

Table 16-13. Alameda County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	1,189	$109.8	$58.4
Mining	1,148	$510.8	$60.2
Construction	50,975	$10,031.7	$3,524.9
Manufacturing	70,692	$39,675.2	$7,010.5
TIPU	54,395	$16,060.1	$4,771.7
Trade	121,573	$19,096.2	$7,450.5
Service	557,504	$80,865.9	$33,730.0
Government	108,155	$13,354.6	$11,032.3
Total	965,630	$179,704.2	$67,638.4

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

[1] The IMPLAN model treats the value of owner-occupied housing as though it were a rental unit.

Contra Costa County In 2014, Contra Costa County had a population of 1.1 million (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (325,575 jobs) in Contra Costa County, followed by trade (64,118 jobs), and government (46,720 jobs). Manufacturing had the highest output ($52.0 billion) in the county, followed by services ($47.2 billion), and trade ($7.9 billion). Top industries in terms of output included petroleum refineries ($45.0 billion), real estate ($7.2 billion), owner occupied dwellings ($5.6 billion), and natural gas distribution ($5.0 billion) (IMPLAN Group, LLC 2016). Table 16-14 summarizes the regional economy in Contra Costa County, in terms of employment, output, and labor income.

Table 16-14. Contra Costa County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	1,490	$133.8	$62.2
Mining	1,344	$798.2	$310.8
Construction	32,317	$6,240.9	$2,141.1
Manufacturing	22,192	$52,564.6	$2,616.2
TIPU	30,498	$15,763.7	$3,556.8
Trade	64,118	$7,919.8	$3,066.8
Service	325,575	$47,245.8	$18,297.9
Government	46,720	$5,305.7	$4,290.4
Total	524,255	$135,972.4	$34,342.1

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

San Benito County In 2014, San Benito County had a population of 58,267 (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (8,548 jobs) in San Benito County, followed by manufacturing (4,203 jobs), and trade (3,618 jobs). Manufacturing had the highest output ($1.4 billion) in the county, followed by services ($975.6 million), and government ($322.6 million). Top industries in terms of output included canned fruits and vegetables manufacturing ($3.13 million); owner occupied dwellings ($219.7 million); motorcycle, bicycle, and part manufacturing ($173.9 million); and retail food and beverage stores ($167.6 million) (IMPLAN Group, LLC 2016). Table 16-15 summarizes the regional economy in San Benito County, in terms of employment, output, and labor income.

Table 16-15. San Benito County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	2,416	$316.2	$142.3
Mining	33	$7.7	$1.1
Construction	1,476	$234.8	$60.1
Manufacturing	4,203	$1,461.0	$217.5
TIPU	717	$121.3	$41.3
Trade	3,618	$422.2	$166.4
Service	8,548	$975.6	$262.0
Government	2,661	$322.6	$233.6
Total	23,672	$3,861.4	$1,124.3

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Santa Clara County In 2014, Santa Clara County had a population of 1.9 million (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (763,485 jobs) in Santa Clara County, followed by manufacturing (164,541 jobs), and trade (146,352 jobs). Service had the highest output ($130.3 billion) in the county, followed by manufacturing ($126.4 billion); and traffic, information and public utilities (TIPU) ($59.0 billion). Top industries in terms of output included electronic computer manufacturing ($50.7 billion), semiconductor and related device manufacturing ($32.4 billion), internet publishing and broadcasting and web search portals ($29.8 billion), and wholesale trade ($16.8 billion) (IMPLAN Group, LLC 2016). Table 16-16 summarizes the regional economy in Santa Clara County, in terms of employment, output, and labor income.

Table 16-16. Santa Clara County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	3,790	$393.1	$223.5
Mining	1,968	$697.7	$50.6
Construction	53,316	$10,403.6	$3,610.8
Manufacturing	164,541	$126,408.3	$29,984.8
TIPU	96,071	$58,989.6	$22,145.0
Trade	146,352	$29,667.4	$12,253.5
Service	763,485	$130,307.5	$62,325.7
Government	87,520	$10,870.2	$8,998.3
Total	1,317,045	$367,737.4	$139,592.2

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

16.1.3.3 Southern California Region

The SWP water service contractors within the southern California Region are in Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties. Table 16-17 presents household income and per capita income for the counties in the southern California region relative to California.

Table 16-17. Southern California Region 2014 Households and Income

Households and Income	Los Angeles County	Orange County	Riverside County	San Bernardino County	San Diego County	San Luis Obispo County	Santa Barbara County	Ventura County	California
Number of Households	3,242,391	1,002,285	690,388	607,604	1,083,811	102,350	142,026	267,829	12,617,280
Average Household Size	3.02	3.04	3.24	3.34	2.85	2.52	2.91	3.07	2.77
Median Household Income ($)	55,870	75,998	56,592	54,100	63,996	59,454	63,409	77,335	61,489
Mean Household Income ($)	82,109	102,520	74,062	69,373	86,416	78,731	89,545	100,397	86,704
Per Capita Income ($)	27,987	34,416	23,660	21,384	31,043	30,392	30,526	33,308	29,906

Source: U.S. Census Bureau 2014.

Table 16-18 presents the regional economy for this entire region, followed by a discussion of the regional economy in each individual county. In 2014, the total population in the 8-county region was 22.5 million (IMPLAN Group, LLC 2016). The region is largely urban and water use is for M&I uses.

In 2014, services provided the most jobs (7.5 million jobs) in the region, followed by trade (1.7 million jobs), government (1.4 million jobs), and manufacturing (793,280 jobs). Services also had the highest output ($970.2 billion) of all industries in the region, followed by manufacturing ($346.6 billion), TIPU ($274.8 billion), and trade ($230.9 billion).

Table 16-18. Southern California 2014 Regional Economy Summary (Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura Counties)

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	92,908	$9,530.8	$4,945.0
Mining	32,989	$18,160.7	$3,816.0
Construction	584,098	$103,138.5	$31,535.3
Manufacturing	793,280	$346,622.9	$64,480.4
TIPU	777,108	$274,817.4	$69,024.8
Trade	1,663,383	$230,900.9	$84,372.3
Service	7,472,189	$970,213.1	$370,390.2
Government	1,407,464	$184,560.7	$128,538.0
Total	12,823,418	$2,137,945.1	$757,102.1

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Los Angeles County In 2014, Los Angeles County had a population of 10.1 million (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (3.7 million jobs) in Los Angeles County, followed by trade (771,855 jobs), and government (551,201 jobs). Services had the highest output ($471.9 billion) in the county, followed by manufacturing ($177.9 billion), and TIPU ($177.1

billion). Top industries in terms of output included real estate ($68.5 billion), wholesale trade ($64.7 billion), motion picture and video industries ($63.5 billion), and owner occupied dwellings ($5.6 billion) (IMPLAN Group, LLC 2016). Table 16-19 summarizes the regional economy in Los Angeles County, in terms of employment, output, and labor income.

Table 16-19. Los Angeles County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	6,261	$483.5	$289.8
Mining	14,495	$10,084.7	$2,282.9
Construction	214,180	$37,349.5	$10,855.6
Manufacturing	381,831	$177,906.6	$30,013.8
TIPU	473,681	$177,129.6	$47,224.6
Trade	771,855	$110,544.4	$40,042.1
Service	3,669,340	$471,973.7	$185,770.0
Government	551,201	$67,279.2	$53,056.4
Total	6,082,843	$1,052,751.3	$369,535.0

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Orange County In 2014, Orange County had a population of 3.1 million (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (1.3 million jobs) in Orange County, followed by trade (280,090 jobs), and manufacturing (158,649 jobs). Services had the highest output ($187.1 billion) in the county, followed by manufacturing ($66.1 billion), and trade ($43.8 billion). Top industries in terms of output included real estate ($39.1 billion), wholesale trade ($27.3 billion), owner occupied dwellings ($14.3 billion), and wireless telecommunication carriers ($9.5 billion) (IMPLAN Group, LLC 2016). Table 16-20 summarizes the regional economy in Orange County, in terms of employment, output, and labor income.

Table 16-20. Orange County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	2,877	$324.1	$174.5
Mining	6,171	$2,437.3	$380.5
Construction	111,224	$21,160.1	$7,430.7
Manufacturing	158,649	$66,132.0	$14,268.8
TIPU	69,036	$28,809.5	$6,082.1
Trade	280,090	$43,885.0	$16,818.1
Service	1,274,376	$187,143.2	$70,921.4
Government	150,248	$16,687.8	$13,754.7
Total	2,052,670	$366,579.0	$129,830.8

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Riverside County In 2014, Riverside County had a population of 2.3 million (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (481,528 jobs) in Riverside County, followed by trade (133,246 jobs), and government (130,911 jobs). Services had the highest output ($50.3 billion) in the county, followed by government ($16.7 billion), and manufacturing ($15.9 billion). Top industries in terms of output included owner occupied dwellings ($8.3 billion), real estate ($7.7 billion), wholesale trade ($6.5 billion), and other local government enterprises ($6.1 billion) (IMPLAN Group, LLC 2016). Table 16-21 summarizes the regional economy in Riverside County, in terms of employment, output, and labor income.

Table 16-21. Riverside County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	14,400	$1,619.8	$706.9
Mining	1,780	$464.7	$127.9
Construction	71,143	$11,837.6	$3,332.3
Manufacturing	45,132	$15,941.3	$2,882.6
TIPU	48,214	$10,987.9	$2,518.2
Trade	133,246	$15,235.9	$5,285.5
Service	481,528	$50,339.6	$15,746.7
Government	130,911	$16,694.6	$10,961.4
Total	926,353	$123,121.5	$41,561.6

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

San Bernardino County In 2014, San Bernardino County had a population of 2.1 million (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (451,886 jobs) in San Bernardino County, followed by trade (136,936 jobs), and government (133,774 jobs). Services had the highest output ($48.5 billion) in the county, followed by manufacturing ($22.3 billion), and trade ($17.4 billion). Top industries in terms of output included wholesale trade ($9.2 billion), owner occupied dwellings ($7.0 billion), real estate ($5.1 billion), and truck transportation ($4.1 billion) (IMPLAN Group, LLC 2016). Table 16-22 summarizes the regional economy in San Bernardino County, in terms of employment, output, and labor income.

Table 16-22. San Bernardino County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	3,451	$803.7	$230.8
Mining	1,338	$437.8	$67.1
Construction	48,073	$8,147.6	$2,293.5
Manufacturing	53,476	$22,356.7	$3,443.7
TIPU	79,062	$15,799.6	$4,540.4
Trade	136,936	$17,442.6	$5,881.8
Service	451,866	$48,509.7	$16,598.9
Government	133,774	$16,660.7	$11,229.8
Total	907,976	$130,158.5	$44,286.0

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

San Diego County In 2014, San Diego County had a population of 3.3 million (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (1.1 million jobs) in San Diego County, followed by government (336,656 jobs), and trade (228,996 jobs). Services had the highest output ($156.1 billion) in the county, followed by government ($54.5 billion), and TIPU ($30.7 billion). Top industries in terms of output included real estate ($25.0 billion), scientific research and development services ($17.0 billion), wholesale trade ($14.7 billion), and owner occupied dwellings ($14.5 billion) (IMPLAN Group, LLC 2016). Table 16-23 summarizes the regional economy in San Diego County, in terms of employment, output, and labor income.

Table 16-23. San Diego County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	11,991	$1,003.4	$550.2
Mining	4,149	$1,212.0	$109.1
Construction	93,913	$16,838.9	$5,364.9
Manufacturing	102,968	$41,869.5	$9,616.4
TIPU	73,194	$30,724.1	$6,225.7
Trade	228,996	$29,814.0	$11,137.3
Service	1,129,199	$156,144.8	$61,438.9
Government	336,656	$54,464.1	$30,359.0
Total	1,981,064	$332,070.9	$124,801.4

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

San Luis Obispo County In 2014, San Luis Obispo County had a population of 279,083 (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (86,676 jobs) in San Luis Obispo County, followed by trade (21,049 jobs), and government (20,334 jobs). Services had the highest output ($9.3 billion) in the county, followed by TIPU ($3.2 billion), and manufacturing ($3.2 billion). Top industries in terms of output included electric power generation – nuclear ($2.0 billion), real estate ($1.3 billion), owner occupied dwellings ($1.3 billion), wholesale trade ($821.7 million), and other local government enterprises ($6.1 billion) (IMPLAN Group, LLC 2016). Table 16-24 summarizes the regional economy in San Luis Obispo County, in terms of employment, output, and labor income.

Table 16-24. San Luis Obispo County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	7,242	$1,000.3	$394.1
Mining	644	$142.5	$18.5
Construction	11,169	$1,946.4	$578.3
Manufacturing	8,197	$3,184.2	$464.2
TIPU	8,270	$3,207.7	$665.0
Trade	21,049	$2,260.0	$811.2
Service	86,676	$9,342.7	$3,067.6
Government	20,334	$1,884.8	$1,634.4
Total	163,580	$22,968.6	$7,633.4

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Santa Barbara County In 2014, Santa Barbara County had a population of 440,668 (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (144,069 jobs) in Riverside County, followed by government (37,423 jobs), and trade (28,997 jobs). Services had the highest output ($17.1 billion) in the county, followed by manufacturing ($5.1 billion), and government ($4.9 billion). Top industries in terms of output included real estate ($2.3 billion), owner occupied dwellings ($1.9 billion), wholesale trade ($1.5 billion), and other local government enterprises ($1.2 billion) (IMPLAN Group, LLC 2016). Table 16-25 summarizes the regional economy in Santa Barbara County, in terms of employment, output, and labor income.

Table 16-25. Santa Barbara County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	20,570	$2,070.1	$1,147.4
Mining	2,081	$1,546.5	$309.8
Construction	12,235	$2,116.6	$630.3
Manufacturing	13,636	$5,102.6	$1,071.2
TIPU	10,255	$3,150.8	$769.2
Trade	28,977	$3,530.0	$1,378.4
Service	144,069	$17,074.2	$6,527.0
Government	37,423	$4,900.4	$3,272.2
Total	269,245	$39,491.1	$15,105.6

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

Ventura County In 2014, Ventura County had a population of 846,178 (IMPLAN Group, LLC 2016). In 2014, services provided the most jobs (235,136 jobs) in Ventura County, followed by trade (62,235 jobs), and government (46,918 jobs). Services had the highest output ($29.7 billion) in the county, followed by manufacturing ($14.1 billion), and trade ($8.2 billion). Top industries in terms of output included real estate ($4.4 billion), wholesale trade ($4.3 billion), owner occupied dwellings ($3.8 billion), and monetary authorities and depository credit intermediation ($1.7 billion) (IMPLAN Group, LLC 2016). Table 16-26 summarizes the regional economy in Ventura County, in terms of employment, output, and labor income.

Table 16-26. Ventura County 2014 Regional Economy Summary

Industry	Employment (Jobs)	Output (Million $)	Labor Income (Million $)
Agriculture	26,117	$2,226.0	$1,451.4
Mining	2,330	$1,835.3	$520.2
Construction	22,161	$3,741.7	$1,049.7
Manufacturing	29,392	$14,130.1	$2,719.8
TIPU	15,396	$5,008.1	$999.5
Trade	62,235	$8,188.9	$3,017.9
Service	235,136	$29,685.2	$10,319.7
Government	46,918	$5,989.1	$4,270.2
Total	439,686	$70,804.3	$24,348.4

Source: 2014 IMPLAN data; IMPLAN Group, LLC 2016

16.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences associated with each of the project alternatives.

Impacts to regional economics are determined consistent with NEPA relative to the No Action/No Project Alternative.

16.2.1 Assessment Methods

The socioeconomic effects include changes to employment, income, or output that could result from implementation of the project alternatives. The analysis uses quantitative and qualitative methods to evaluate potential socioeconomic effects.

16.2.1.1 M&I and Agricultural Water Users Economic Effect

Water shortages could increase water costs if contractors must develop alternate supplies or implement additional water conservation measures. Implementation of project alternatives could also increase water costs for CVP and SWP contractors depending how costs of the project are allocated; however, this analysis does not include a cost allocation. Increased water costs could be passed on the M&I water users through increased water rates. Increased water rates could result in a reduction in discretionary income and reductions in spending. These effects are evaluated qualitatively. The economic effects are based on the water supplies provided by each alternative, as evaluated by CalSim. Chapter 5, Surface Water Supply, describes water supply effects of the project alternatives.

For agricultural water users, water shortages could lead to increased land fallowing or the users may need to acquire additional more expensive water supplies, such as increased groundwater pumping or water transfers. This could cause the operational value of crops increasing and potentially decreasing the annual value of production of crops. Decreased value of production could decrease employment, value added, labor income, and output in the crop sectors and the overall regional economy through indirect and induced impacts. Similar to impacts on M&I water users these effects are also evaluated qualitatively. The economic effects are based on the water supplies provided by each alternative, as evaluated by CalSim. Chapter 5, Surface Water Supply, describes water supply effects of the project alternatives.

16.2.1.2 Construction and Annual Expenditure Effects

Construction and annual operation and maintenance (O&M) expenditures would create jobs and generate additional economic activity within the region during the period of construction. The construction period for the Reservoir Restriction Alternative would be 1.5 to 2 years. For the Crest Raise Alternative construction is expected to last approximately 8 to 10 years and with the addition of the SVS shear key option, construction is expected to last approximately 10 to 12 years. However, as was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend this construction schedule to 20 years.

For both the Reservoir Restriction Alternative and Crest Raise Alternative, the economic region is Merced County for the analysis of construction costs. The regional economic analysis uses engineering estimates of total project costs, including materials and labor costs. If labor costs were not available, on-site construction worker estimates were used to determine direct construction effects for labor and employment. IMPLAN is then used to determine indirect and induced effects of construction work. Project contingency costs are evaluated as an industry change in IMPLAN in various sectors or as local government spending.

An important consideration in evaluating regional economic impacts is how much money is spent within the region for construction supplies and equipment, and how many workers originate from within the region. If supplies and workers would be imported into the region, there would be a minimal benefit to the region's economy.

16.2.1.3 Recreation Effects

This section also evaluates effects to visitor spending associated with the alternatives' impacts on recreation facilities. Chapter 19, Recreation, describes potential recreation effects of the project alternatives; this chapter evaluates the economic effects of those changes. Visitors spend money on park fees, fuel, food, equipment, and other expenses related to recreation that benefits the regional economy. If spending increases or decreases, there would be regional economic effects.

Visitors from outside a region are especially important for the regional economy because they bring money into the economy that would otherwise be spent in another county. If these visitors choose not to recreate in the region because of a project impact, then there would be adverse economic impacts. In-region visitors would likely spend their money in the region on another recreation option or in a different industry sector, and there would be no net change in economic activity. This effect is evaluated qualitatively.

16.2.2 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

Under the No Action/No Project Alternative, there would be no construction associated with the B.F. Sisk Dam Safety of Dams Modification Project and no regional economic effects as a result of construction and annual expenditures. There would be no changes to water supply to CVP and SWP water contractors in the San Joaquin Valley Region, Bay Area Region or Southern California Regions. Therefore, there would be no adverse or beneficial effects to the regional economy under the No Action/No Project Alternative.

16.2.3 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

The Reservoir Restriction Alternative would reduce the maximum elevation of the San Luis reservoir from 544 feet to 489 feet. This would permanently reduce the maximum capacity of the reservoir from 2,027,840 acre-feet (AF) to 1,383,000 AF. The alternative would reduce water supply to south-of-Delta CVP and SWP water contractors that would affect regional economics.

16.2.3.1 San Luis Reservoir Region (Merced County)

Construction and operation and maintenance expenditures could increase employment, income, and output in the regional economy. Construction associated with the Reservoir Restriction Alternative would include actions to revegetate the reservoir rim between the current maximum reservoir water surface elevation and the restricted reservoir maximum surface elevation. These construction activities would all occur at or near the San Luis Reservoir i.e. Merced County. Construction activities would create jobs and generate additional economic activity within the region during the period of construction.

The construction period for the Reservoir Restriction Alternative would be 1.5 to 2 years. Estimated construction costs would be $22.0 million. The majority of the cost would be for slope stabilization and to develop temporary access roads. Construction would occur 12 hours a day, 7 days week and 12 months per year. There would be approximately 20 construction workers on site. In addition to direct construction related activities, there would be additional administrative, design, environmental compliance, management, and oversight jobs, as well as, truck drivers and equipment haulers. The level of project expenditures ($22.0 million) would expectedly result in very high direct effects in output, employment and labor income. These direct effects would multiply through the regional economy and generate a high level of indirect and induced effects. Table 16-27 summarizes regional economic effects related to construction expenditures for the Reservoir Restriction Alternative. These would be temporary beneficial economic effects in Merced County.

Table 16-27. Direct, Indirect, Induced and Total Regional Economic Effects of Construction Expenditures for the Reservoir Restriction Alternative (2017 $)

Impact Type	Employment (# jobs)	Labor Income (Million $)	Output (Million $)
Direct Effect	384	$11.6	$20.6
Indirect Effect	26	$0.9	$2.7
Induced Effect	42	$1.6	$5.3
Total Effect	**452**	**$14.1**	**$28.6**

Changes in recreation opportunities could affect economic activity in Merced County related to San Luis Reservoir. The 55-foot reduction in maximum surface elevation of the reservoir would reduce the maximum capacity of the reservoir by approximately 25 percent. This large reduction of reservoir capacity would greatly reduce the availability of available boating areas by making some portions of the reservoir too shallow for boats. In addition, boat ramp access at Dinosaur Point and Basalt use areas would be difficult to access in periods of low reservoir levels. Lower reservoir levels could make access to the reservoir impossible. The decrease in reservoir levels and capacity would reduce available areas for swimming. The lower levels of water in the reservoir would also make fishing more difficult as there would be less accessible waters and reductions in available fish could occur.

Combined, approximately 4,500 boats per year are launched from the Basalt and Dinosaur Point main use areas and account for over 32 percent of boat launches at the San Luis Reservoir SRA. These visitors originate from both within Merced County and from surrounding counties, including the San Francisco Bay Area counties and northern San Joaquin Valley counties. Visitors that originate outside of Merced County (out-of-region visitors) generate new economic activity for the county because they bring money into the region that would otherwise be spent elsewhere. Local visitors would likely spend their money in the region, regardless of visiting San Luis Reservoir SRA; therefore, local visitors would not generate new economic activity. This analysis focuses on effects to recreation by out-of-region visitors. The estimate of in-region versus out-of-region visitors was not available; therefore, this analysis describes effects mostly qualitatively.

Because of the reduced boating, fishing, and swimming opportunities at San Luis Reservoir, some visitors may choose to recreate at alternate sites in the San Luis Reservoir SRA, such as San Luis Creek Use Area or Los Banos Creek Use Area. This would not result in any economic impacts in Merced County as visitors would continue to spend money within the county for recreation at San Luis Reservoir SRA.

However, due to periodically crowded conditions at the San Luis Creek main use area and limited recreation opportunities elsewhere at the reservoir, visitors may choose to recreate outside of the San Luis Reservoir SRA and outside of Merced County. As a result, the Merced County economy would lose any spending by out-of-region visitors that occurred under the No Action/No Project Alternative during these occasional periods of high use at the SRA. This includes money spent a local gas stations, grocery stores, convenience stores, restaurants, and equipment supply stores. Visitors would no longer spend this money in Merced County. This would be an adverse economic effect to businesses in the county.

In addition to the above spending, visitors would also not pay park entry fees. California State Parks would lose revenues from reductions in park fees paid as a result of lost visitors. A decline in park fees would reduce funds into the State treasury. As described above, some visitors would substitute for other San Luis Reservoir SRA areas or other California State park facilities; however, the loss in visitor fees would be substantial.

A permanent change to reservoir levels would not however be anticipated to result in job losses for park rangers or other staff at the recreation areas given the limited periodic nature of capacity limits at the reservoir. Some staff could be reassigned to other open areas at San Luis Reservoir SRA or another job assignment during these periods when use could shift to other facilities, if a position is available.

Reduced spending and employment would also result in indirect and induced impacts, as described under the construction expenditures impact analysis. There would also be indirect and induced losses in employment and labor income as a result of reduced visitor spending however the anticipated magnitude of these effects would be limited by the periodic nature of recreation capacity issues at San Luis Reservoir. These regional economic effects would be adverse effects for the Merced County economy.

In summary, the reduction of water-based recreation opportunities at San Luis Reservoir would result in limited periodic adverse regional economic effects to the Merced County economy and to California State Park entry fees collected when recreation facility capacity at San Luis Reservoir would be exceeded under the Reservoir Restriction Alternative.

16.2.3.2 South-of-Delta CVP Contractors (Bay Area Region and San Joaquin Valley Region)

Changes in water supply to CVP M&I water contractors in the Bay Area Region could affect the regional economy. This alternative would result in decreased CVP water supplies to M&I water service contractors. CVP M&I deliveries would reduce deliveries by one to five percent (between 1,100 to 4,200 AF/year deficit based on year type) in comparison to the No Action Alternative. Water contractors may need to implement additional water conservation measures or purchase expensive water through the water transfers market. Increased water costs could be passed on the M&I water users through increased water rates. A cost allocation will be performed by the water contractors prior to any changes in water rates where they will take into consideration potential water shortages; it is likely that water shortages would cause an increase in water rates. If water rates to customers are increased, the resulting economic effect is a decrease in customers' discretionary income available to spend in the region. This would be an adverse economic effect. The evaluation of potential CVP water supply impacts generated by the Reservoir Restriction Alternative presented in Chapter 5 determined that no feasible mitigation to reduce the severity of this impact could be identified.

Changes in water supply to CVP agricultural water users in the San Joaquin Valley could affect the regional economy. This alternative would result in decreased CVP water supplies to agricultural contractors. CVP agricultural deliveries would reduce by 11 to 15 percent (between 20,200 to 201,100 AF/year deficit based on year type). Agricultural users are likely to fallow lands or acquire additional more expensive water supplies, such as increased groundwater pumping or water transfers. Decreased water supplies for agricultural uses in the Bay Area and San Joaquin Valley Regions would decrease value of productions of crops. Decreased value of production could decrease employment, value added, labor income, and output in the crop sectors and the overall regional economy through indirect and induced impacts. This would be an adverse economic effect. As was noted above, the evaluation of potential CVP water supply impacts generated by the Reservoir Restriction Alternative presented in Chapter 5 determined that no feasible mitigation to reduce the severity of this impact could be identified.

16.2.3.3 South-of-Delta SWP Contractors (Bay Area Region and Southern California Region)

Changes in water supply to SWP M&I water contractors in the Bay Area Region and Southern California Region could affect the regional economy. Under this alternative, south-of-delta SWP deliveries could be lower than under the no action alternative. The Reservoir Restriction Alternative would result in three to nine percent reduction in SWP Table A deliveries to SWP contractors (between 46,100 to 279,300 AF/year deficit based on year type) in comparison to the No Action Alternative. Water contractors may need to implement additional water conservation measures or purchase expensive water through the water transfers market. Increased water costs could be passed on the M&I water users through increased water rates. A cost allocation will be performed by the water contractors prior to any changes in water rates where they will take into consideration potential water shortages; it is likely that water shortages would cause an increase in water rates. If water rates to customers are increased, the resulting economic effect is a decrease in customers' discretionary income available to spend in the region. This would be an adverse economic effect. Similar to the evaluation of potential CVP water supply impacts generated by the Reservoir Restriction Alternative, the evaluation of potential SWP water supply impacts presented in Chapter 5 determined that no feasible mitigation to reduce the severity of this impact could be identified.

16.2.4 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

16.2.4.1 San Luis Reservoir Region (Merced County)

Construction and operation and maintenance expenditures could increase employment, income, and output in the regional economy. The majority of construction under the Crest Raise Alternative would occur in or near the San Luis Reservoir Region i.e. Merced County. Construction activities would create jobs and generate additional economic activity within the region during the period of construction.

The construction period for the Crest Raise Alternative would be 8 to 10 years. Estimated construction costs would be $830.0 million. The majority of the cost would be for excavation and hauling activities to move dam fill material to the construction site. Construction would occur 12 hours a day, 7 days a week and 12 months per year. There would be approximately 76 construction workers on site. In addition to direct construction related activities, there would be additional administrative, design, environmental compliance, management, and oversight jobs, as well as, truck drivers and equipment haulers. The level of project expenditures ($830.0 million) would expectedly result in very high direct effects in output, employment and labor income. These direct effects would multiply through the regional economy and generate a high level of indirect and induced effects. Table 16-28 summarizes regional economic effects related to construction expenditures for the Crest Raise Alternative. These would be temporary beneficial economic effects in Merced County.

Table 16-28. Direct, Indirect, Induced and Total Regional Economic Effects of Construction Expenditures for the Crest Raise Alternative (2017 $)

Impact Type	Employment (# jobs)	Labor Income (Million $)	Output (Million $)
Direct Effect	2,958	$112.3	$790.4
Indirect Effect	1,406	$51.6	$153.4
Induced Effect	559	$21.1	$71.6
Total Effect	**4,923**	**$185.0**	**$1,015.4**

The construction period for the Crest Raise Alternative with shear key option would be 10 to 12 years. Estimated construction costs would be $1,133.9 million. The majority of the cost would be for excavation and hauling activities to move dam fill material to the construction site. Construction would occur 12 hours a day, 7 days week and 12 months per year. There would be approximately 76 construction workers on site. In addition to direct construction related activities, there would be additional administrative, design, environmental compliance, management, and oversight jobs, as well as, truck drivers and equipment haulers. The level of project expenditures ($1,133.9 million) would expectedly result in very high direct effects in output, employment and labor income. These direct effects would multiply through the regional economy and generate a high level of indirect and induced effects. Table 16-29 summarizes regional economic effects related to construction expenditures for the Crest Raise Alternative with the shear key option. These would be temporary beneficial economic effects in Merced County.

Table 16-29. Direct, Indirect, Induced and Total Regional Economic Effects of Construction Expenditures for the Crest Raise Alternative, Shear Key Option (2017 $)

Impact Type	Employment (# jobs)	Labor Income (Million $)	Output (Million $)
Direct Effect	3,193	$118.7	$1,094.2
Indirect Effect	1,868	$68.7	$206.5
Induced Effect	639	$24.1	$81.8
Total Effect	**5,700**	**$211.5**	**$1,382.5**

The facilities would also require periodic repair and replacement, which would also generate employment, income, and output during the repairs and replacement period. The project life of facilities included in Crest Raise

Alternative would over 50 years, therefore, regional economic effects of repair and replacement would not occur for many years after the initial construction period. Regional economic effects of construction, repair, and replacement expenditures would be temporary and beneficial to Merced County.

Changes in recreation opportunities could affect economic activity in Merced County related to San Luis Reservoir. Closure of recreation facilities at Basalt and Medeiros main use areas within the San Luis Reservoir SRA would reduce local spending and revenues in Merced County. During construction of the reservoir, both main use areas would be used for project staging and would be closed to the public during a period of 8 to 10 years, or 10 to 12 year with the shear key option, due to potential public safety hazards at the construction site. Combined, the Basalt and Medeiros main use areas annually serve approximately 120,000 day use and 8,000 overnight visitors. These visitors originate from both within Merced County and from surrounding counties, including the San Francisco Bay Area counties and northern San Joaquin Valley counties. Visitors that originate outside of Merced County (out-of-region visitors) generate new economic activity for the county because they bring money into the region that would otherwise be spent elsewhere. Local visitors would likely spend their money in the region, regardless of visiting San Luis Reservoir SRA; therefore, local visitors would not generate new economic activity. This analysis focuses on effects to recreation by out-of-region visitors. The estimate of in-region versus out-of-region visitors was not available; therefore, this analysis describes effects mostly qualitatively.

Because of facility closures, some visitors may choose to recreate at alternate sites in the San Luis Reservoir SRA. This would not result in any economic impacts in Merced County as visitors would continue to spend money within the county for recreation at San Luis Reservoir SRA.

However, due to already crowded conditions at the San Luis Creek main use area and limited recreation opportunities elsewhere at the reservoir, visitors may choose to recreate outside of the San Luis Reservoir SRA and outside of Merced County. As a result, the Merced County economy would lose any spending by out-of-region visitors that occurred under the No Action/No Project Alternative. This includes money spent a local gas stations, grocery stores, convenience stores, restaurants, and equipment supply stores. Higher visitor spending includes boating and camping activities relative to less expensive day use activities, such as swimming, picnicking, or hiking. Visitors would not spend this money in Merced County for the period of construction (maximum of 10 years or 12 years if the shear key option is selected). This would be a substantial economic effect to businesses in the county.

In addition to the above spending, visitors would also not pay park entry fees. California State Parks would lose revenues from reductions in park fees paid as a result of lost visitors. A decline in park fees would reduce funds into the State treasury. As described above, some visitors would substitute for other San Luis

Reservoir SRA areas or other California State park facilities; however, the loss in visitor fees would be substantial.

Closures for 10 to 12 years would also result in job losses for park rangers or other staff at the recreation areas. Some staff could be reassigned to other open areas at San Luis Reservoir SRA or another job assignment, if a position is available. If not, these workers would be temporarily unemployed. Loss of employment and loss of wages would be an adverse effect of this alternative.

Reduced spending and employment would also result in indirect and induced impacts, as described under the construction expenditures impact analysis. There would also be indirect and induced losses in employment and labor income as a result of reduced visitor spending. These regional economic effects would be adverse effects for the Merced County economy.

In summary, the closure of the Basalt and Medeiros use areas would result in substantial adverse regional economic effect to the Merced County economy and to California State Park entry fees collected.

16.2.4.2 South-of-Delta CVP Contractors (Bay Area Region and San Joaquin Valley Region)

Changes in water supply to CVP M&I water contractors in the Bay Area Region could affect the regional economy. This alternative would result in temporary decreases in CVP water supplies to M&I water service contractors for 2 seasons during the period of construction when the berm foundation would be excavated. During this period water contractors would most likely need to acquire expensive water supplies on the water transfer market or implement costly water conservation measures during years with water shortages. This could result in customer water rates increasing, the resulting economic effect is a decrease in customers’ discretionary income available to spend in the region. This would be temporary but adverse economic effect.

Changes in water supply to agricultural water users in the San Joaquin Valley could affect the regional economy. Similar to the M&I water service contractors, there would be a temporary decrease in CVP agricultural water supplies. During this period agricultural contractors would most likely fallow lands due to water supply shortages or may need to acquire additional water supplies, such as increased groundwater pumping or water transfers. Annual value of production would decrease and would result in decreases in employment, value added, labor income, and output in the crop sectors and the overall regional economy through indirect and induced impacts. This would be temporary but adverse economic effect.

16.2.4.3 South-of-Delta SWP Contractors (Bay Area Region and Southern California Region)

Changes in water supply to SWP M&I water contractors in the Bay Area Region and Southern California Region could affect the regional economy. This alternative would result in temporary decreases in SWP water supplies for 2 seasons during the period of construction when the berm foundation would be excavated. Contractors may need to acquire additional water supplies, such as increased groundwater pumping or water transfers. The costs to SWP contractors may slightly increase during these years, but this would be a minor economic effect, and would not likely affect water customers or residents. This would be temporary but adverse economic effect.

16.3 Comparative Analysis of Alternatives

Table 16-30 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative.

Table 16-30. Comparative Analysis of Alternatives

Potential Impact	Alternative	Effects Determination
Construction and operation and maintenance expenditures could increase employment, income, and output in the regional economy.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Under the Reservoir Restriction Alternative: Increase of 452 jobs, $14.1 million in labor income and $28.6 million in revenue
	Alternative 3 - Crest Raise	Under the Crest Raise Alternative: Increase of 4,923 jobs, $185.0 million in labor income and $1,015 million in revenue Under the Crest Raise Alternative with shear key option: Increase of 5,700 jobs, $211.6 million in labor income and $1,382.5 million in revenue
Changes in recreation opportunities could affect economic activity in Merced County related to San Luis Reservoir.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Adverse Impact
	Alternative 3 - Crest Raise	Adverse Impact (Temporary)
Changes in water supply to CVP M&I water contractors in the Bay Area Region could affect the regional economy.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Adverse Impact
	Alternative 3 - Crest Raise	Adverse Impact (Temporary)
Changes in water supply to CVP agricultural water users in the San Joaquin Valley could affect the regional economy.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Adverse Impact
	Alternative 3 - Crest Raise	Adverse Impact (Temporary)
Changes in water supply to SWP M&I water contractors in the Bay Area Region and Southern California Region could affect the regional economy.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Adverse Impact
	Alternative 3 - Crest Raise	Adverse Impact (Temporary)

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Chapter 17
Land Use

This chapter presents the existing land uses within the area of analysis, describes the regulatory environment related to actions and project alternatives that could affect land use, and discusses potential effects on land use from the proposed alternatives.

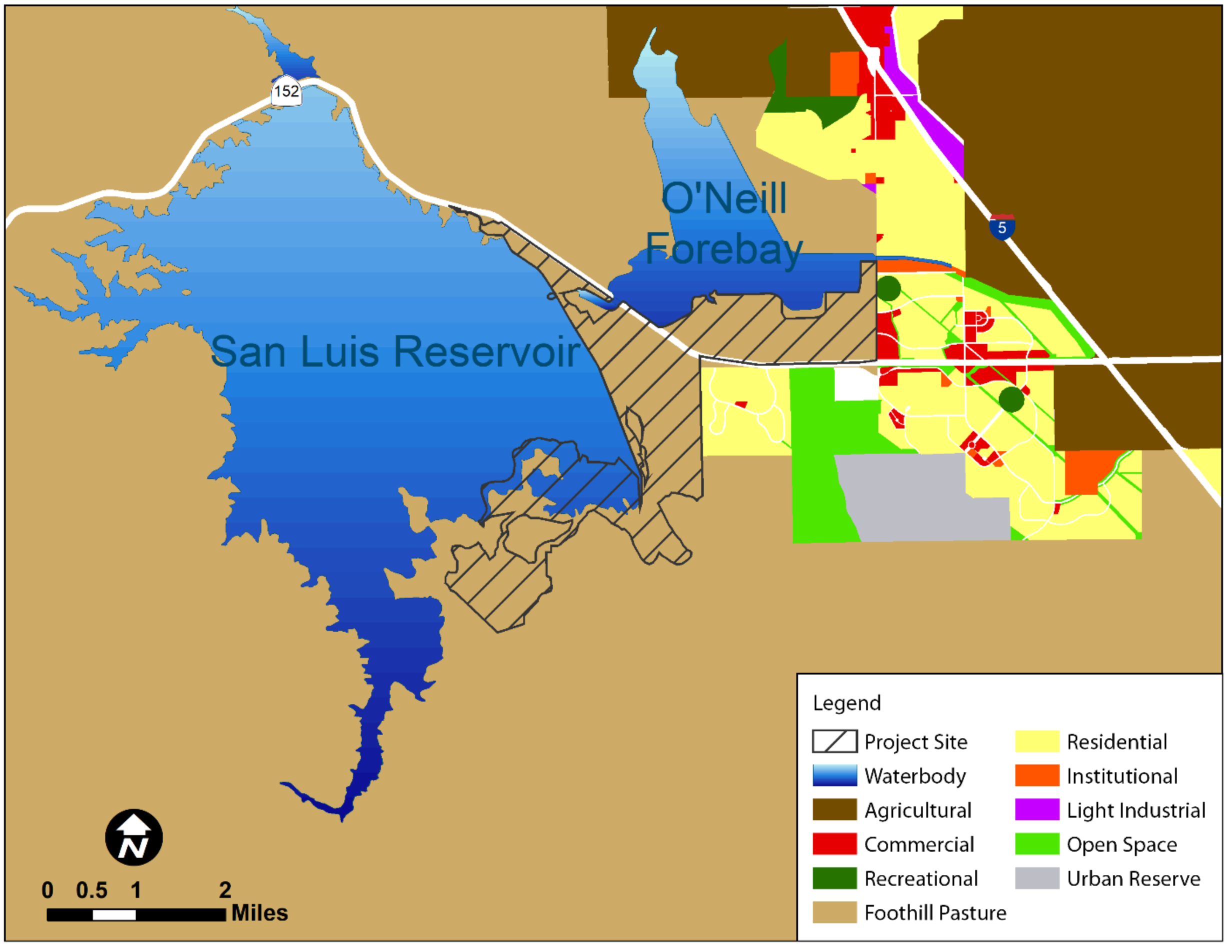
17.1 Affected Environment/Environmental Setting

This section provides an overview of the regulatory setting associated with land use and provides a description of lands with the potential to be affected by the action alternatives.

17.1.1 Area of Analysis

The area of analysis for land use includes areas where construction and operations of the action alternatives would take place and could result in effects on land use as a result of implementation of the No Action/No Project or action alternatives. These areas include land directly surrounding San Luis Reservoir, including the State Recreation Area (SRA) and the O'Neill Forebay, and South-of-Delta Central Valley Project (CVP) and State Water Project (SWP) Contractors' service areas. Figure 17-1 shows the land uses in the areas surrounding the reservoir.

The unincorporated area surrounding San Luis Reservoir SRA is mostly undeveloped and primarily owned by Reclamation. However, some of the surrounding land is owned or managed by other agencies including Pacheco State Park (California Department of Parks and Recreation [CDPR] managed and owned) and Upper and Lower Cottonwood Wildlife Areas (owned and managed by California Department of Fish and Wildlife [CDFW]). Some of the Reclamation-owned land is managed by either the CDFW, California Department of Water Resources (DWR), or CDPR (United States Department of the Interior, Bureau of Reclamation [Reclamation] and CDPR 2013).



Source: Merced County 2017

Figure 17-1. Land Use at San Luis Reservoir

17.1.2 Regulatory Setting

The following section describes the applicable laws, rules, regulations and policies associated with land use.

17.1.2.1 Federal

There are no applicable Federal laws, rules, regulations, or policies associated with land use; however, the following policies and plans could have an indirect effect on land use. These policies are described in Chapter 28, Consultation, Coordination, and Compliance.

- Central Valley Project (CVP) Municipal & Industrial Water Shortage Policy

17.1.2.2 State

There are no applicable State laws, rules, regulations, or policies associated with land use; however, the following policies and plans could have an indirect effect on land use. These policies are described in Chapter 28, Consultation, Coordination, and Compliance.

- San Luis Reservoir SRA Resource Management Plan /General Plan (RMP/GP)
- Natural Community Conservation Planning Program (NCCP)

17.1.2.3 Regional/Local

The following Regional/Local laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams (SOD) Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Merced County General Plan

17.1.3 Existing Conditions

The following section describes the existing land use designations within the study area.

17.1.3.1 Merced County

Land in Merced County is separated into specific land use designations that aid in guiding the type of development that takes place within the county. The vast majority of land within the county is designated as Agricultural and Foothill Pasture Land and lies outside of existing cities, Rural Centers, Urban Communities, and Highway Interchange Centers (Merced County 2013).

Table 17-1 summarizes the land use acreages in the county.

Table 17-1. Summary of Land Use Acreages in Merced County by Category [1]

Agricultural Land	Urban and Build-up Land	Other Land	Water Area
1,158,655	38,737	51,568	16,674

Source: California Department of Conservation (DOC) 2015
Notes:
[1] Based on 2012-2014 Land Use Conversion Data

17.1.3.2 San Luis Reservoir Region

As described in the RMP/GP, county land surrounding the reservoir and the SRA includes a variety of uses. As shown on Figure 17-2, land use in the area surrounding the reservoir is primarily grazing land. Lands to the southeast of the reservoir include privately owned ranchlands, agricultural lands, public utility uses, and other scattered nonresidential uses (Reclamation and CDPR 2013).

The RMP/GP defines distinct geographic divisions, or management zones, based on physical, social, and management characteristics (Reclamation and CDPR 2013). Land uses in each of the management zones include:

- **Administration and Operations Zone** - This zone accommodates staff administrative, operations, and maintenance activities, as well as limited staff-supported public uses.
- **Frontcountry Zone** - This zone accommodates the majority of visitor facilities and activities, as well as camping and concessions.
- **Backcountry Zone** - This zone accommodates resource management actions, less intensive recreation, and limited facilities for camping and mixed-use trails.

The Crest Raise Alternative would be developed in the Administration and Operations Zone at B.F. Sisk Dam. Other areas around the reservoir that could be affected by construction, including the Basalt Use Area, are located in the both the Frontcountry and Backcountry zones. Figure 17-2 shows the land management zones around the reservoir.

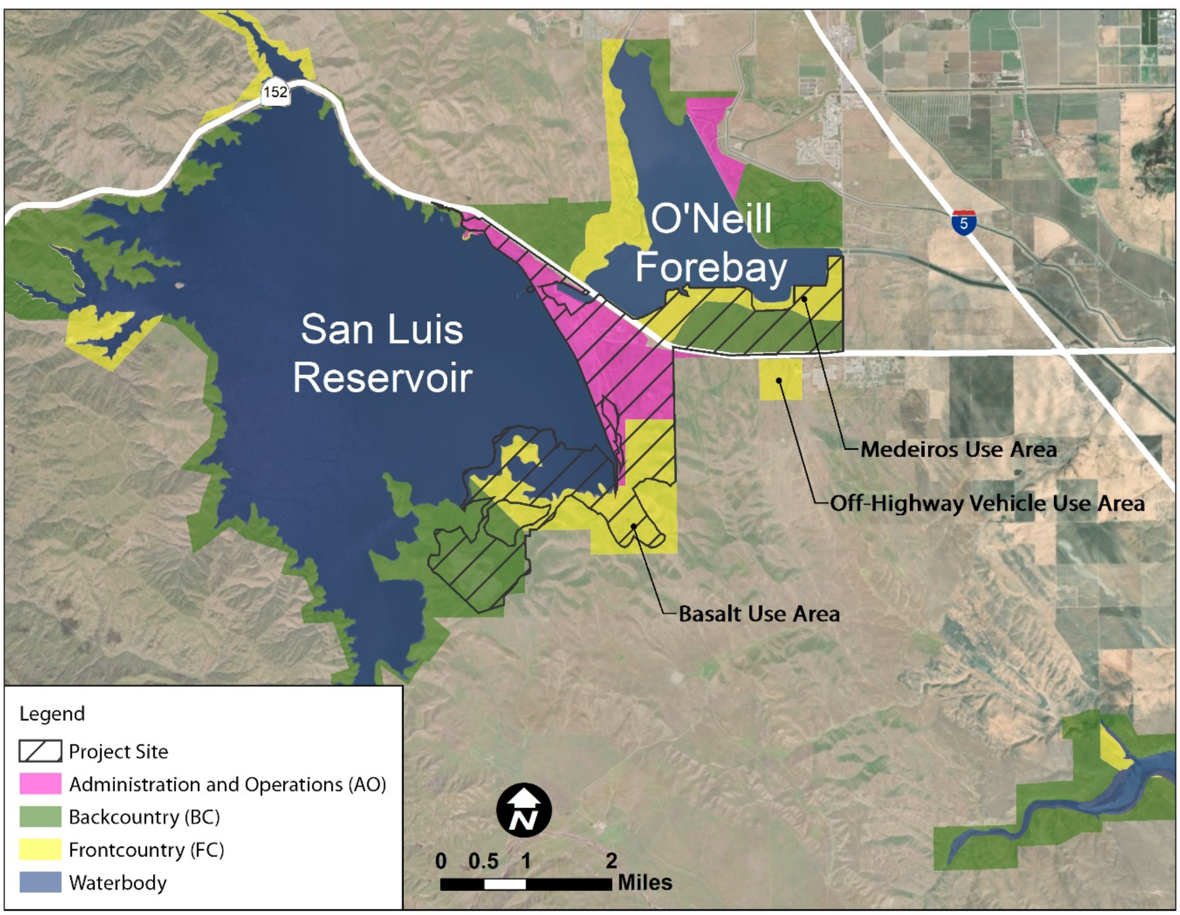


Figure 17-2. Land Management Zones around San Luis Reservoir

Table 17-2 summarizes the location and acreages of the land management zones at San Luis Reservoir near areas where construction and operation would occur.

Table 17-2. Land Management Zones around San Luis Reservoir around the Project Boundary

Management Zones/Reservoir Areas	Location	Acreage
Administration/Operations Zone		
San Luis Reservoir	Northeast side of San Luis Dam	1,231
Frontcountry Zone		
Basalt Use Area	Southeast corner of San Luis Reservoir	1,085
Medeiros Use Area	South side of O'Neill Forebay	507
Off-Highway Vehicle Use Area	South side of Gonzaga Road, east of Headquarters office	150
Backcountry Zone		
Medeiros Use Area	South of Medeiros Frontcountry Zone and north of State Road 152	568
Total		3,541

Source: Reclamation and CPDR 2013

17.2 Environmental Consequences/Environmental Impacts

This section provides information about the environmental consequences or environmental impacts to land use associated with each alternative. This section describes the assessment methods, significance criteria, and environmental consequences/environmental impacts associated with each alternative.

17.2.1 Assessment Methods

Construction and long-term operations of the alternatives could affect land use in the San Luis Reservoir region in Merced County. The potential for these effects to occur and their magnitude is evaluated qualitatively within the area of analysis, Merced County. The impact analysis below assesses any permanent changes in land use relative to the baseline condition. Changes in land use could result in incompatible uses and adverse effects.

17.2.2 Significance Criteria

The significance criteria described below were developed consistent with the California Environmental Quality Act (CEQA) Guidelines to determine the significance of potential impacts on land use that could result from implementation of the project. Impacts related to land use would be considered potentially significant if the project would:

- Physically divide a community;

- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environment effect; or

- Conflict with any applicable habitat conservation plan or natural community conservation plan.

The potential for impacts related to the potential conversion of forestland, conflicts with existing zoning or causing the rezoning of forestland is not evaluated in this Environmental Impact Statement/Environmental Impact Report (EIS/EIR). None of the alternatives under consideration would be located in forested areas or areas zoned as forestland. In addition, the alternatives would not impact either directly or indirectly forested areas inside or outside of the study area.

These thresholds of significance for impacts encompass the factors under the National Environmental Policy Act (NEPA) to determine the significance of an action in terms of its context and the intensity of its impacts.

17.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative includes the current and most likely future conditions in the project area in the absence of the project. Under the No Action/No Project Alternative, there would be no structural or operational changes to B.F. Sisk Dam. There would be no change from existing conditions. Therefore, the alternative would not physically divide a community; conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environment effect; or conflict with any applicable habitat conservation plan or natural community conservation plan. In the event of dam failure, there could be downstream effects and impacts on land use. **The No Action/No Project Alternative would result in no impact on land use.**

17.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

17.2.4.1 San Luis Reservoir Region

17.2.4.1.1 Construction

Construction activities associated with the Reservoir Restriction Alternative could affect land use around San Luis Reservoir by physically dividing a community. The Reservoir Restriction Alternative would include the construction of a temporary access road and placement of vegetation around the entire reservoir rim between the current maximum water surface elevation at 544 feet and the proposed restriction elevation of 489 feet. Construction of the

Reservoir Restriction Alternative would occur on lands directly around San Luis Reservoir, within the SRA. There are no communities present at in this area. The closest developed community, Santa Nella, is approximately 1.5 miles east of O'Neill Forebay. Construction activities would not affect the community of Santa Nella, or any other towns in the county. Therefore, the Reservoir Restriction Alternative would not physically divide a community. **Construction of the Reservoir Restriction Alternative would have a less than significant impact on land use near San Luis Reservoir.**

Construction of the Reservoir Restriction Alternative could affect land use by conflicting with an applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect. Construction associated with the Reservoir Restriction Alternative could impact lands on and directly around San Luis Reservoir, within the SRA. Lands at the reservoir are owned by a combination of Reclamation and CDFW and are managed by a combination of California State Parks (CSP), DWR, and CDFW. Construction activities would be temporary and would not conflict with land use policies of these agencies nor the policies set forth in the RMP/GP. Lands directly around the reservoir are not currently used for agricultural production or designated in the Merced County General Plan for agricultural use, and would therefore not conflict with the Merced County General Plan land use policies (Section 17.1.2). Therefore, construction activities would not impact land use by conflicting with an applicable land use plan, policy, or regulation. **Construction of the Reservoir Restriction Alternative would have a less than significant impact on land use near San Luis Reservoir.**

17.2.4.1.2 Operation

Operation of the Reservoir Restriction Alternative could result in changes to land use by conflicting with an applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect. Under the Reservoir Restriction Alternative, operation of the San Luis Reservoir would continue to occur on lands in the Administration and Operations Zone at the reservoir. This land management zone is used for staff administrative, operations, and maintenance activities. This zone includes "joint use" areas, defined as lands managed by the DWR for water operations and by CSP for recreation. At B.F. Sisk Dam, this zone also contains several built structures and is used primarily for water operations (Reclamation and CDPR 2013). Long-term operations of the Reservoir Restriction Alternative would not require a change to this land management designation and would not result in activities contrary to the allowable uses that currently take place in that zone. **Operation of the Reservoir Restriction Alternative would have a less than significant impact on land use near San Luis Reservoir.**

Operation of the Reservoir Restriction Alternative could result in changes to land use that would conflict with an applicable habitat conservation plan or community conservation plan. Operation of the Reservoir Restriction Alternative would reduce the water level in the San Luis Reservoir, resulting in a change to the surrounding habitat. However, there are no conservation plans associated with the lands located directly around the reservoir. In addition, it is expected that annual grassland, which currently surrounds the San Luis Reservoir, would establish itself in the newly exposed area resulting from the alternative. Therefore, the Reservoir Restriction would not conflict with habitat conservation plans or community conservation plans in the area. **There would be no impact.**

17.2.4.2 South-of-Delta CVP and SWP Service Area

17.2.4.2.1 Construction

Construction activities could affect land use in the south-of-Delta CVP and SWP service area. There would be no construction associated with the Reservoir Restriction Alternative. Therefore, there would be no construction activities that would affect land use by physically dividing a community or conflicting with an applicable land use plan, policy, or regulation or habitat conservation plan or community conservation plan. **There would be no impact.**

17.2.4.2.2 Operation

Operation of the Reservoir Restriction Alternative could result in changes to land use by conflicting with an applicable conservation plan, land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect. Operation of the Reservoir Restriction Alternative would occur at San Luis Reservoir in Merced County, not in the south-of-Delta CVP and SWP service area, and would therefore result in no changes to land use management designations. However, water supply operations at the reservoir would change in a way that would result in a reduction to CVP and SWP water supply deliveries, as discussed in Chapter 5, Water Supply. A reduction in water supply deliveries could affect agricultural practices in the south-of-Delta CVP and SWP service area, discussed further in Chapter 18, Agricultural Resources, which could cause landowners or local land use agencies responsible for these lands to switch to an alternate use, such as grazing or agricultural processing, planting alternate crops, dryland farming, or idling or fallowing lands. However, this would not permanently or drastically change land use designations, as specified in applicable general plans, or introduce activities contrary to the allowable uses that currently take place in that zone. Therefore, there would be no conflicts with applicable land use plans (including habitat conservation plans or community conservation plans), policies, or regulations. **Operation of the Reservoir Restriction Alternative would have a less than significant impact on land use in the south-of-Delta CVP and SWP service area.**

Operation of the Reservoir Restriction Alternative could result in changes to land use that would conflict with an applicable habitat conservation plan or community conservation plan. Operation of the Reservoir Restriction Alternative would result in a reduction of municipal and industrial (M&I) and agricultural south-of-Delta CVP and SWP water supply deliveries, as discussed in Chapter 5, Water Supply. However, there would be no change in water supply deliveries to wildlife refuges. Therefore, there would be no impact to habitat conservation plans or community conservation plans in the area. **There would be no impact.**

17.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

17.2.5.1 San Luis Reservoir Region

17.2.5.1.1 Construction

Construction activities associated with the Crest Raise Alternative could affect land use around San Luis Reservoir by physically dividing a community. Construction of the Crest Raise Alternative would occur on lands directly around San Luis Reservoir. There are no communities present at in this area, in the SRA. The closest developed community, Santa Nella, is approximately 1.5 miles east of O'Neill Forebay. Construction activities would not affect the community of Santa Nella, or any other towns in the county. Therefore, the Crest Raise Alternative would not physically divide a community. **Construction of the Crest Raise Alternative would have a less than significant impact on land use near San Luis Reservoir.**

Construction of the Crest Raise Alternative could affect land use by conflicting with an applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect. The Crest Raise Alternative would increase the crest elevation 12 feet and increase the distance between the water surface and the dam crest (freeboard). Construction activities would be temporary and could impact lands on and directly around San Luis Reservoir. Lands at the reservoir are owned by a combination of Reclamation and CDFW and are managed by a combination of CSP, DWR, and CDFW. Buildings and offices within the Administration and Operations Zone would remain intact and operational during and after the construction period. Construction activities would be temporary and would not conflict with land use policies of these agencies nor the policies set forth in the RMP/GP.

Lands directly around the reservoir, and outside of the SRA, and those identified as potential borrow areas and construction staging areas are not currently used for agricultural production or designated in the Merced County General Plan for agricultural use, and would therefore not conflict with the Merced County General Plan land use policies (Section 17.1.2). Similarly, areas identified as potential borrow areas and construction staging areas are not designated as Important Farmland. Therefore, construction activities would not impact land use by conflicting with an applicable land use plan, policy, or regulation. **Construction of the Crest Raise Alternative would have a less than significant impact on land use near San Luis Reservoir.**

17.2.5.1.2 Operation

Operation of the Crest Raise Alternative could result in changes to land use by conflicting with an applicable conservation plan, land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect. Operation of the Crest Raise Alternative would be consistent with the current operation of the water supply infrastructure at San Luis Reservoir as well as the water supply operations at the reservoir. There would be no change from the existing conditions or the No Action/No Project Alternative. Therefore, operation of the alternative would not result in conflicts with an applicable land use plan (including habitat conservation and community conservation plans), policy, or regulation. **Operation of the Crest Raise Alternative would have no impact on land use near San Luis Reservoir.**

17.2.5.2 South-of-Delta CVP and SWP Service Area

17.2.5.2.1 Construction

Construction activities could affect land use in the south-of-Delta CVP and SWP service area. There would be no construction associated with the Crest Raise Alternative in the south-of-Delta CVP and SWP service area. Therefore, there would be no construction activities that would affect land use by physically dividing a community or conflicting with an applicable land use plan, policy, or regulation in the south-of-Delta CVP and SWP service area. **There would be no impact.**

17.2.5.2.2 Operation

Operation of the Crest Raise Alternative could result in changes to land use by conflicting with an applicable conservation plan, land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect. Operation of the Crest Raise Alternative would occur at San Luis Reservoir in Merced County, not in the south-of-Delta CVP and SWP service area, and would therefore result in no changes to land use management designations. Furthermore, water supply operations at the reservoir would be consistent with current operations and would not result in a reduction to CVP and SWP water supply deliveries. The Crest Raise Alternative would not permanently change land use designations, as specified in applicable general plans, or introduce activities contrary to the allowable uses that currently take place in that zone. Therefore, land uses would not be expected to change compared to existing conditions and the No Action/No Project Alternative, and the alternative would not result in conflicts with applicable land use plans (including habitat conservation plans or community conservation plans), policies, or regulations. **Operation of the Crest Raise Alternative would have no impact on land use in the south-of-Delta CVP and SWP service area.**

17.3 Comparative Analysis of Alternatives

Table 17-3 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. Table 17-3 are NEPA impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 17-3. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities associated with the alternative could affect land use around San Luis Reservoir by physically dividing a community.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction of the alternative could affect land use by conflicting with an applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Operation of the alternative could result in changes to land use by conflicting with an applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environment effect.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	NI	None	NI
Operation of the alternative could result in changes to land use that would conflict with an applicable habitat conservation plan or community conservation plan.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI

Key:
NI = no impact
None = no mitigation required
-- = Not Applicable

17.4 Mitigation Measures

No significant land use impacts were identified for the action alternatives and no mitigation measures have been developed.

17.5 Significant Unavoidable Impacts

None of the action alternatives would result in significant unavoidable impacts on land use.

Chapter 18 Agricultural Resources

This chapter presents the existing agricultural resources within the area of analysis, describes the regulatory environment related to actions and project alternatives that could affect agricultural resources, and discusses potential effects to agricultural resources from the proposed alternatives.

18.1 Affected Environment/Environmental Setting

This section provides an overview of the regulatory setting associated with agricultural resources and provides a description of resources with the potential to be affected by the action alternatives.

18.1.1 Area of Analysis

The area of analysis for agricultural resources includes areas where construction and operations of the action alternatives would take place and could result in agricultural resource effects as a result of implementation of the No Action/No Project or action alternatives. These areas include land directly surrounding San Luis Reservoir, including the State Recreation Area (SRA) and the O'Neill Forebay, and South-of-Delta Central Valley Project (CVP) and State Water Project (SWP) Contractors' service areas.

18.1.2 Regulatory Setting

The following section describes laws, rules, regulations and policies associated with agricultural resources.

18.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Farmland Policy Act of 1981

18.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Williamson Act
- Farmland Mapping and Monitoring Program

- California Land Evaluation & Site Assessment Model (LESA) Model
- California Farmland Conservancy Program

18.1.2.3 Regional/Local

The following county/local laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Merced County General Plan

18.1.3 Existing Conditions

The following section describes the existing agricultural resources within the study area.

18.1.3.1 Merced County

Table 18-1 summarizes farm acreage enrolled in the Williamson Act and Farmland Security Zone (FSZ) program and the agricultural conservation easements in Merced County in 2014 and 2015. The table shows that from 2014 to 2015 approximately 6 percent of the county's Williamson Act lands were reclassified. It also shows that in both 2014 and 2015 there were no lands enrolled in the FSZ program.

Table 18-1. Williamson Act and Agricultural Conservation Easement Acreage in Merced County (2014 to 2015)

	2014 (Acres)	2015 (Acres)
Williamson Act Prime	259,108	256,120
Williamson Act Non-Prime	207,692	207,910
Total Williamson Act lands	466,800	464,030
Percent Change (Total Williamson Act lands 2014-2015)	--	-5.93%
FSZ Urban Prime	--	--
FSZ Urban Non-Prime	--	--
FSZ Non-Urban Prime	--	--
FSZ Non-Urban Non-Prime	--	--
Agricultural Conservation Easement (through the CFCP) Prime	--	--
Agricultural Conservation Easement (through the CFCP) Non-Prime	--	--
Total Conservation lands	466,799	464,031

Source: DOC 2016a.
Key:
FSZ = Farmland Security Zone
CFCP = California Farmland Conservancy Program

18.1.3.2 San Luis Reservoir Region

As discussed in Chapter 17, Land Use, county land surrounding the reservoir and the SRA includes a variety of uses, such as grazing land, privately owned ranchlands, agricultural lands, public utility uses, and other scattered nonresidential uses (United States Department of the Interior, Bureau of

Reclamation [Reclamation] and California Department of Parks and Recreation [CDPR] 2013). Figure 18-1 shows the agricultural land designations at San Luis Reservoir.

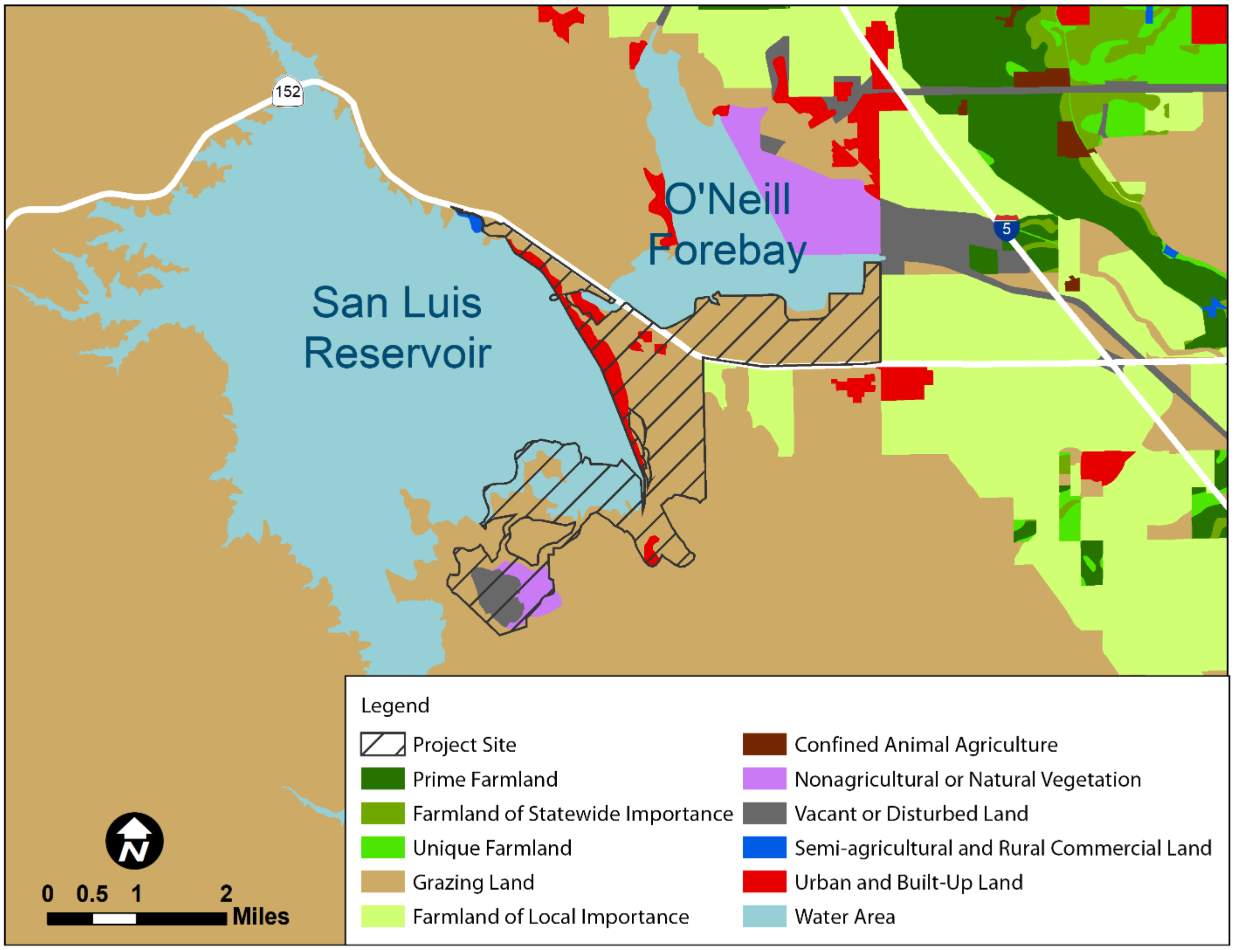


Figure 18-1. Agricultural Designations at San Luis Reservoir

18.2 Environmental Consequences/Environmental Impacts

This section provides information about the environmental consequences or environmental impacts on agricultural resources associated with each alternative. This section describes the assessment methods, significance criteria, and environmental consequences/environmental impacts associated with each alternative.

18.2.1 Significance Criteria

The significance criteria described below were developed consistent with the California Environmental Quality Act (CEQA) Guidelines to determine the significance of potential impacts on agricultural resources that could result from implementation of the project. Impacts on agricultural resources would be considered potentially significant if the project would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Important Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program (FMMP) of the California Resources Agency, to nonagricultural use;
- Conflict with existing zoning for agricultural use, or a Williamson Act contract; or
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Important Farmland, to nonagricultural use.

These thresholds of significance for impacts encompass the factors under National Environmental Policy Act (NEPA) to determine the significance of an action in terms of its context and the intensity of its impacts.

18.2.2 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative includes the current and most likely future conditions in the project area in the absence of the project. Under the No Action/No Project Alternative, there would be no structural or operational changes to B.F. Sisk Dam. There would be no change from existing conditions. Therefore, the alternative would not result in the conversion of Farmland to nonagricultural use; conflict with existing zoning for agricultural use, or a Williamson Act Contract; or include other changes in the existing environment that would result in the conversion of Farmland to nonagricultural uses. There would be no change to reduce the risk of dam failure. In the event of dam failure, water supply deliveries from San Luis Reservoir would be eliminated and agricultural production would be greatly reduced. **The No Action/No Project Alternative would result in no impact to agricultural resources.**

18.2.3 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

18.2.3.1 San Luis Reservoir Region

18.2.3.1.1 Construction

Construction activities could affect agricultural resources around San Luis Reservoir. The Reservoir Restriction Alternative would include the construction of a temporary access road and placement of vegetation around the entire reservoir rim between the current maximum water surface elevation at 544 feet and the proposed restriction elevation of 489 feet. Construction of the Reservoir Restriction Alternative would occur on lands directly around San Luis Reservoir, within the SRA, which are neither zoned for agricultural use nor designated as Important Farmland. Therefore, there would be no construction activities that would affect agricultural resources around San Luis Reservoir by converting Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural use or conflict with existing zoning for agricultural use, or Williamson Act contracts. **There would be no impact.**

18.2.3.1.2 Operation

Operation of the Reservoir Restriction Alternative could affect agricultural resources around San Luis Reservoir by converting Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural use. Operation of the Reservoir Restriction Alternative would change water supply operations at the reservoir, which would reduce agricultural water supply deliveries to CVP and SWP contractors, as discussed in Chapter 5, Surface Water Supply. However, lands located directly around the reservoir are not zoned for agricultural use. Additionally, water stored in the reservoir is not typically reserved to be used on lands surrounding the reservoir. As shown in Figure 18-2, directly around the San Luis Reservoir, and outside of the SRA, are not considered Important Farmland. **Operation of the Reservoir Restriction Alternative would have no impact on agricultural resources near San Luis Reservoir.**

18.2.3.2 South-of-Delta CVP and SWP Service Area

18.2.3.2.1 Construction

Construction activities could affect agricultural resources in the south-of-Delta CVP and SWP service area. There would be no construction associated with the Reservoir Restriction Alternative in the South-of-Delta CVP and SWP Service Area. Therefore, there would be no construction activities that would affect agricultural resources by converting Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural use or conflict with existing zoning for agricultural use, or Williamson Act contracts. **There would be no impact.**

18.2.3.2.2 Operation

Operation of the Reservoir Restriction Alternative could result in changes to agricultural resources as a result of any changes to south-of-Delta CVP and SWP water supply deliveries. Operation of the Reservoir Restriction Alternative would change the current water supply operations at the reservoir, and in the surrounding area, in a way that would reduce water supply deliveries to CVP and SWP contractors, as discussed in Chapter 5, Surface Water Supply. A reduction in water supply deliveries could result in reduced irrigation on agricultural lands, reduced agricultural production, increased amounts of idled or fallowed lands or purposefully dryland farmed lands, or changes to the type of crops planted. Under existing conditions, farmers have chosen to temporarily idle or fallow their lands, and sometimes plant different crops than they did the previous year. Because water supply deliveries would be reduced under this alternative, an estimated 33,000 acres of currently irrigated agricultural lands would not receive sufficient water supply (further details provided in Appendix H, Statewide Agricultural Production Model). Landowners or local land use agencies responsible for these lands may switch to an alternate use, such as grazing or agricultural processing, plant alternate crops, dryland farm, or idle or fallow lands.

Agricultural lands are categorized as Important Farmland on FMMP maps if they have been used for irrigated agricultural production at some point during the four years prior to the Important Farmland Map date (mapping is completed every two years) and the soil meets the physical and chemical criteria as determined by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) (Department of Conservation [DOC] 2016b). In order to convert or reclassify Important Farmland from Important Farmland categories or agricultural use, the lands would need to be idled or fallowed for four consecutive years.

CVP and SWP water supply deliveries are used to irrigate lands designated as Important Farmland as well as those without prime soils, such as grazing lands. It is unknown whether the lands that will be affected by reductions in water supply will be designated as Important Farmland. If so, the land uses on the affected Important Farmland could change or the lands could be taken out of production or reclassified for nonagricultural use.

Reductions in water supply could result in changes to agricultural land uses in the South-of-Delta CVP and SWP Service Area, potentially including Important Farmland. As stated above, there are a variety of changes that could be made to affected lands that would not result in a conversion from Important Farmland to nonagricultural uses. **Therefore, there would be less than significant impacts to agricultural resources**.

18.2.4 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

18.2.4.1 San Luis Reservoir Region

18.2.4.1.1 Construction

Construction activities could affect agricultural resources around San Luis Reservoir. Construction activities under the Crest Raise Alternative would be temporary and could impact lands on and directly around San Luis Reservoir. However, land within the project site is used for grazing and is not irrigated. Additionally, the land is neither zoned for agricultural use nor designated as Important Farmland. Similarly, areas identified as potential borrow areas and construction staging areas are not designated as Important Farmland. The irrigated agriculture located east of the reservoir is evaluated as a part of the South-of-Delta CVP and SWP Service Area under Section 18.2.4.2. **Therefore, construction of the Crest Raise Alternative would have a less than significant impact on agricultural resources near San Luis Reservoir.**

18.2.4.1.2 Operation

Operation of the Crest Raise Alternative could affect agricultural resources around San Luis Reservoir by converting Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural use. Operation of the Crest Raise Alternative would be consistent with the current water supply operations at San Luis Reservoir, and there would be no change in storage capacity in the reservoir. There would be no change from the existing conditions or the No Action/No Project Alternative. Therefore, the Crest Raise Alternative would not involve changes to the existing environment in a way that would result in the conversion of Important Farmland to nonagricultural use. **Operation of the Crest Raise Alternative would have no long-term impact to agricultural resources near San Luis Reservoir.**

18.2.4.2 South-of-Delta CVP and SWP Service Area

18.2.4.2.1 Construction

Construction activities could affect agricultural resources in the south-of-Delta CVP and SWP service area. There would be no construction associated with the Crest Raise Alternative in the south-of-Delta CVP and SWP Service Area and water supply deliveries to these contractors would continue throughout the construction of the Crest Raise Alternative without the optional shear key. There would be no change from the existing conditions or the No Action/No Project Alternative. However, construction of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, during the period that the berm foundation would be excavated. This reduction in surface elevation would reduce storage capacity in the reservoir and could limit CVP and SWP deliveries during this construction period, generating temporary agricultural impacts similar to the Reservoir Restriction Alternative. A temporary reduction in water supply deliveries could result in reduced irrigation on agricultural lands, reduced agricultural production, increased amounts of idled or fallowed lands or purposefully dryland farmed lands. However, a temporary reduction in water supply deliveries would not result in a conversion from Important Farmland to nonagricultural uses. **The Crest Raise Alternative without the shear key option would have no impact on agricultural resources in south-of-Delta CVP and SWP service area, however with the shear key option the alternative would have a short-term less than significant impact for these contractors.**

18.2.4.2.2 Operation

Operation of the Reservoir Restriction Alternative could result in changes to agricultural resources as a result of any changes to south-of-Delta CVP and SWP water supply deliveries. Operation of the Crest Raise Alternative would be consistent with the current water supply operations at San Luis Reservoir. Water supply operations in the reservoir, and in the surrounding area, would not change water supply deliveries to CVP and SWP contractors. Therefore, operation of the Crest Raise Alternative would not result changes to CVP and

SWP water supply deliveries in a way that would result in the conversion of Important Farmland to nonagricultural use. **Operation of the Crest Raise Alternative would have no long-term impact to agricultural resources in the south-of-Delta CVP and SWP service area.**

18.3 Comparative Analysis of Alternatives

Table 18-2 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 18-2 are NEPA impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 18-2. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities could affect agricultural resources around San Luis Reservoir.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could affect agricultural resources in the south-of-Delta CVP and SWP service area.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Operation of the alternative could affect agricultural resources around San Luis Reservoir by converting Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural use.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operation of the alternative could result in changes to agricultural resources as a result of any changes to south-of-Delta CVP and SWP water supply deliveries.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	NI	None	NI

Key:
NI = no impact
None = no mitigation required
LTS = less than significant

18.4 Mitigation Measures

No significant land use impacts were identified for the action alternatives and no mitigation measures have been developed.

18.5 Significant Unavoidable Impacts

None of the action alternatives would result in significant unavoidable impacts on agricultural resources.

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Chapter 19 Recreation

This section presents existing recreation resources in the area of analysis and potential impacts to recreation resources from the implementation of the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) Environmental Impact Statement/Environmental Impact Report (EIS/EIR) action alternatives.

19.1 Affected Environment/Environmental Setting

This Affected Environment/Environmental Setting section describes the area of analysis, the regulatory requirements, and the existing environmental setting for recreation resources and opportunities with the potential to be affected by the proposed alternatives.

19.1.1 Area of Analysis

The recreation area of analysis includes recreation resources with the potential to be affected by proposed restrictions or construction of the action alternatives. The recreation facilities included in this analysis are the San Luis Reservoir and the San Luis Reservoir State Recreation Area (SRA), Pacheco State Park (SP) in Merced County, Henry W. Coe State Park, Anderson Reservoir and Anderson Lake County Park (Anderson Park) in Santa Clara County. Henry W. Coe State Park, Anderson Reservoir and Anderson Lake County park are included in the area of analysis even though they are not in direct proximity of the Project area. Effects on boating and other recreational activities could increase use of recreation at nearby facilities.

Figure 19-1 shows the recreation area of analysis including San Luis Reservoir and the San Luis Reservoir SRA, Pacheco SP, Anderson Reservoir and Anderson Park.

19.1.1.1 San Luis Reservoir and San Luis Reservoir State Recreation Area

The San Luis Reservoir SRA lies along State Route (SR) 152, in Merced County, 13 miles northwest of the City of Los Banos, ten miles southeast of the City of Gustine, thirty-eight miles east of the City of Gilroy, and two miles west of the unincorporated Town of Santa Nella. It is accessible via Interstate 5 (I-5), or from State Route (SR) 33 to SR 152 (United States Department of the Interior, Bureau of Reclamation [Reclamation] and California Department of Parks and Recreation [CDPR] 2013). The San Luis Reservoir SRA spans approximately 27,000 acres and includes major facilities such as the San Luis Reservoir, O'Neill Forebay, and Los Banos Reservoir, as well as several other

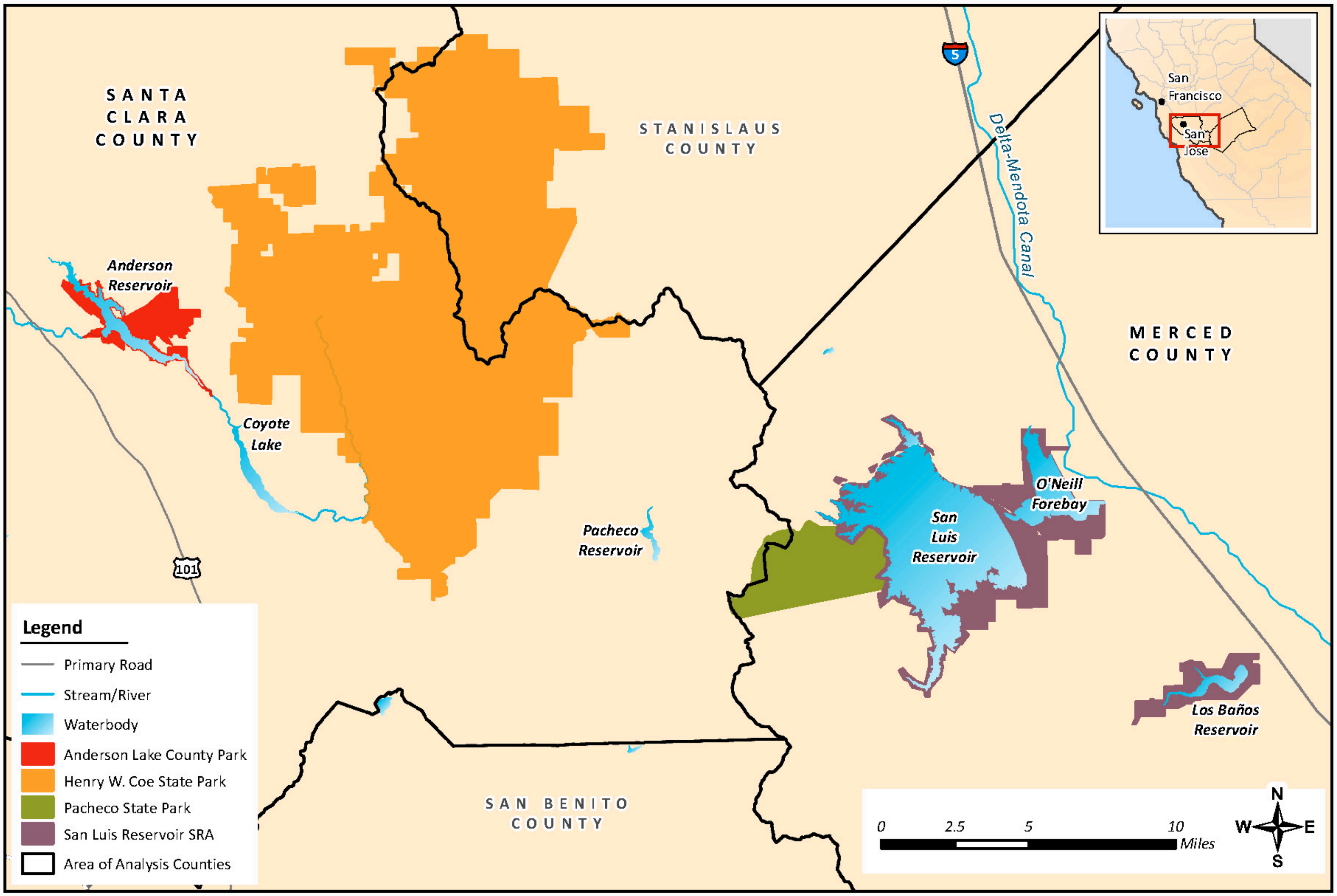


Figure 19-1. Recreation Area of Analysis (Anderson Lake County Park, Pacheco State Park and the San Luis Reservoir SRA)

Federal and State owned lands and facilities (Reclamation and CDPR 2013). Although, Los Banos Reservoir is not included in the area of analysis in other sections of this document, it is included in the recreation analysis as it is a part of the San Luis SRA.

19.1.1.2 Pacheco State Park

Pacheco SP lies on the southern side of SR 152, west of San Luis Reservoir SRA, twenty-four miles west of the City of Los Banos, and twenty miles east of the City of Gilroy. The Pacheco SP crosses two county lines, Merced and Santa Clara. The Pacheco SP spans approximately 6,900 acres; however, only the western 2,600 acres are open to the public (CDPR 2006, CDPR 2017a).

Although no construction is proposed at Pacheco SP by the action alternatives, it is included in the recreation analysis because of its close proximity to the San Luis SRA.

19.1.1.3 Henry Coe State Park

Henry Coe SP lies on the northern side of SR 152, northwest of San Luis Reservoir SRA. The Henry Coe SP crosses two county lines, Santa Clara and Stanislaus. The Henry Coe SP is the largest SP in northern California and spans approximately 87,000 acres.

Although no construction is proposed at Henry Coe SP by the action alternatives, it is included in the recreation analysis because of its close proximity to the San Luis SRA.

19.1.1.4 Anderson Reservoir and Anderson Lake County Park

Anderson Park lies in Santa Clara County, within the City of Morgan Hill, east of United States (U.S.) Highway (HWY) 101. Anderson Park is the largest park in the County, spanning 4,275 acres, which features Anderson Reservoir and Anderson Lake with a 953 acre surface area (Santa Clara County Parks 2017).

Although no construction is proposed at Anderson Reservoir and Anderson Lake by the action alternatives, it is included in the recreation analysis because of its close proximity to the San Luis SRA.

19.1.2 Regulatory Setting

The following section describes the applicable recreation laws, rules, regulations and policies.

19.1.2.1 Federal

Reclamation owns the San Luis Reservoir SRA, including the San Luis Reservoir, with the exception of some surrounding lands, Pacheco State Park (owned and managed by CDPR) and Upper and Lower Cottonwood Wildlife Areas (owned and managed by the California Department of Fish and Wildlife [CDFW]). Some of the Reclamation-owned land is managed by either the

CDFW, California Department of Water Resources (DWR), or CDPR (Reclamation and CDPR 2013).

Reclamation is subject to various Federal laws and regulations pertaining to recreation resources. Federal laws and regulations applicable to the proposed project are described below.

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation and Coordination:

- Federal Water Project Recreation Act
- Fish and Wildlife Coordination Act

19.1.2.2 State

The CDPR is a trustee agency, which owns and operates all State parks. The CDPR has the principle mission to provide and manage the operations of various recreation and outdoor facilities, provide for recreation opportunities, and manage and protect natural resources. Park designations dictate the level of resource management need and include natural preserves, State parks, State reserves, and State wilderness designations, among others.

Statewide recreation is implemented through the following plans and programs: The Strategic Vision of California State Parks, The California State Parks Trails Handbook, California State Parks Trails Policy, California Code of Regulations (CCR) and Public Resources Code (PRC).

The following State plans are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation and Coordination:

- San Luis Reservoir State Recreation Area Resource Management Plan/General Plan
- Pacheco State Park General Plan

19.1.2.3 Regional/Local

Cities and counties have stated goals, objectives, and policies in their respective general plans and other integrated management plan documents related to parks and recreation.

The following regional and local plans are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation and Coordination:

- Merced County General Plan
- Santa Clara County General Plan

19.1.3 Existing Conditions

This section discusses existing recreation resource conditions within the area of analysis.

19.1.3.1 San Luis Reservoir State Recreation Area

The San Luis Reservoir was constructed in 1967 as part of the California State Water Project and Central Valley Project (CVP) systems to store and deliver water. The San Luis Reservoir SRA was developed later, beginning with an agreement in 1969 and initiation of general plan development in 1971 (Reclamation and CDPR 2013).

The San Luis Reservoir SRA is divided into five use areas,[1] Basalt, Dinosaur Point, Los Banos Creek, Medeiros, and San Luis Creek, and one minor use area for off-highway vehicle (OHV) use (see Figure 19-2 below). There are two additional areas designated for wildlife; both allow for hunting and backcountry hiking, along with nature study activities. The primary activities at each use area vary but, collectively, the San Luis Reservoir SRA provides opportunities for boating, swimming, windsurfing, camping, and fishing (Reclamation and CDPR 2013). See Table 19-1 for a detailed description of each use area's primary recreation facilities and opportunities.

Table 19-1. San Luis Reservoir SRA Use Areas

Use Area	Picnicking	Camping		Fishing	Boating/ Water Sports	Boat Ramps	Swimming	Trails	Horseback Riding	Day Use	Toilets	Showers	Other
		# of Sites	RV										
Basalt	X	79	X	X	X	X	X	X		X	X	X	Eight ADA accessible campsites, fish cleaning station, storage lockers, proximity to grocery store and laundry facility.
Dinosaur Point		0		X	X	X	X			X	X		Excellent lake access, parking for 123 vehicles, 5 shade ramadas, public telephone, street luge, and bicycling.
Los Banos Creek	X	14		X	X	X	X	X	X	X	X		All campsites include shade ramadas, equestrian trails, and parking for 40 vehicles with trailers.
Medeiros	X	400	X	X		X	X			X	X		Campsites are mostly undeveloped.

[1] Use areas refer to the designated major public recreation facilities within the San Luis Reservoir SRA (Reclamation and CDPR 2013).

Use Area	Picnicking	Camping		Fishing	Boating/ Water Sports	Boat Ramps	Swimming	Trails	Horseback Riding	Day Use	Toilets	Showers	Other
		# of Sites	RV										
San Luis Creek	X	53	X	X	X	X	X	X		X	X		Six ADA accessible campsites, the only ADA accessible trail, two group campsites, two large beaches, irrigated lawns, fish cleaning station, changing area, and parking for 171 vehicles with trailers or 390 without.

Source: CDPR 2003, Reclamation and CDPR 2013.
Key: RV = Recreational Vehicle

19.1.3.1.1 Park Access

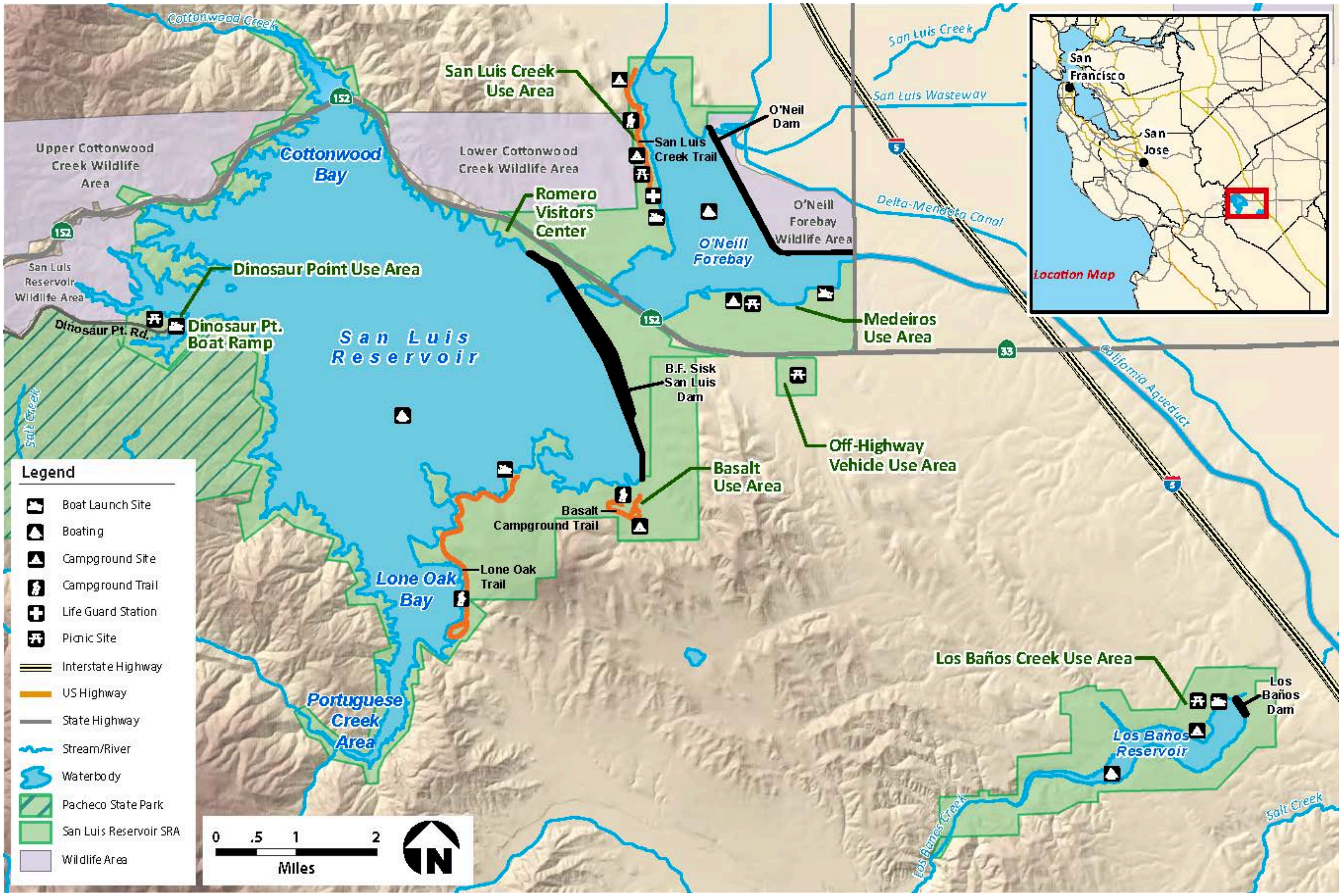
The San Luis Reservoir SRA provides multiple points of access to allow visitors to reach its various use areas. From I-5, visitors can enter the park at Canyon Road to access the Los Banos Creek Use Area. From both SR 33 and SR 152, visitors can access the O'Neill Forebay, as well as the Medeiros and San Luis Creek use areas. SR 152 also provides visitor access to both the Basalt Use Area and OHV area via Basalt and Gonzaga Roads. The Dinosaur Point Use Area can also be accessed via SR 152, at the Romero Visitor Center and the Dinosaur Point Road entrance (CDPR 2006). Dinosaur Point Road also provides primary public access to Pacheco SP.

19.1.3.1.2 Camping and Picnicking Facilities

The San Luis Reservoir SRA provides over 540 campsites for visitor use. The San Luis Reservoir SRA consists of two developed campgrounds, at the Basalt and San Luis Creek use areas. The Basalt campgrounds are the most developed, including toilets, showers, boat ramps, a fish cleaning station, trail access, designated picnic areas, and American with Disabilities Act (ADA) accessible camping accommodations. The only other available ADA accessible campgrounds include six sites at the San Luis Creek Use Area. Other campgrounds, including those at the Medeiros and Los Banos Creek use areas, are underdeveloped with minimal amenities.

Most undeveloped campsites still provide some shade, picnic areas and toilets. No campground accommodations are offered at the Dinosaur Point Use Area (CDPR 2003, Reclamation and CDPR 2013). Figure 19-2 presents the park's existing camping facilities.

All campgrounds include some capacity for picnicking. The San Luis Reservoir SRA also offers five group picnic sites along the O'Neill Forebay shoreline, with day use accommodations in both the North and South Beaches. An additional 200 picnic sites are available along San Luis Creek (CDPR 2017b).



Source: CDPR 2003 and 2006

Figure 19-2. San Luis Reservoir SRA Use Area Map.

19.1.3.1.3 Boating and Water-Related Recreation Opportunities

Boating and other water sports, such as jet skiing and windsurfing, are allowed from sunrise to sunset on San Luis Reservoir, O'Neill Forebay, and Los Banos Creek Reservoir (CDPR 2003). There are boat ramps at all five use areas (Reclamation and CDPR 2013). Within the San Luis Reservoir, boats can be launched at the Dinosaur Point and Basalt boat ramps. Boaters can launch at the San Luis Creek Use Area; however, boats are prohibited at its North Beach. The Los Banos Creek Reservoir, separate from the main San Luis Reservoir and O'Neill Forebay system, has its own boat ramp (CDPR 2003). Within the San Luis Reservoir SRA, boating poses some risks due to existing shallow areas and potential hazards during reservoir drawdown periods. Heavy winds also pose as a hazard in the San Luis Reservoir SRA and can inhibit boating conditions (CDPR 2017b).

19.1.3.1.4 Swimming Opportunities

The only area designated for recreational swimming is in the roped area of the San Luis Creek’s North Bend area. Swimming is allowed throughout the park outside of the designated area. No lifeguards are on duty in the park and swimmers are cautioned to be aware of boats on the water (CDPR 2003).

19.1.3.1.5 Fishing Opportunities

Fishing is a popular recreation activity at the San Luis Reservoir, O'Neill Forebay, and Los Banos Creek Reservoir. Fishing derbies are often held at the O'Neill Forebay for bass, crappie and bluegill (Reclamation and CDPR 2013). Overnight fishing is permitted in specific areas within the San Luis Creek Use Area, but is restricted within the campgrounds. The Medeiros Use Area allows overnight fishing at its campgrounds (CDPR 2003).

19.1.3.1.6 Hiking Opportunities

The San Luis Reservoir SRA provides hiking opportunities at the Basalt, Los Banos Creek, and San Luis Creek use areas. Hiking opportunities are also available at the two designated wildlife use areas. The Basalt Use Area includes two formally designated trails, the Basalt Campground Trail (1.5 mile loop), and the Lone Oak Trail (6 miles round trip). The San Luis Creek trail is the only ADA compliant trail in the SRA (CDPR 2003, CDPR 2017b, Reclamation and CDPR 2013).

19.1.3.1.7 Hunting Opportunities

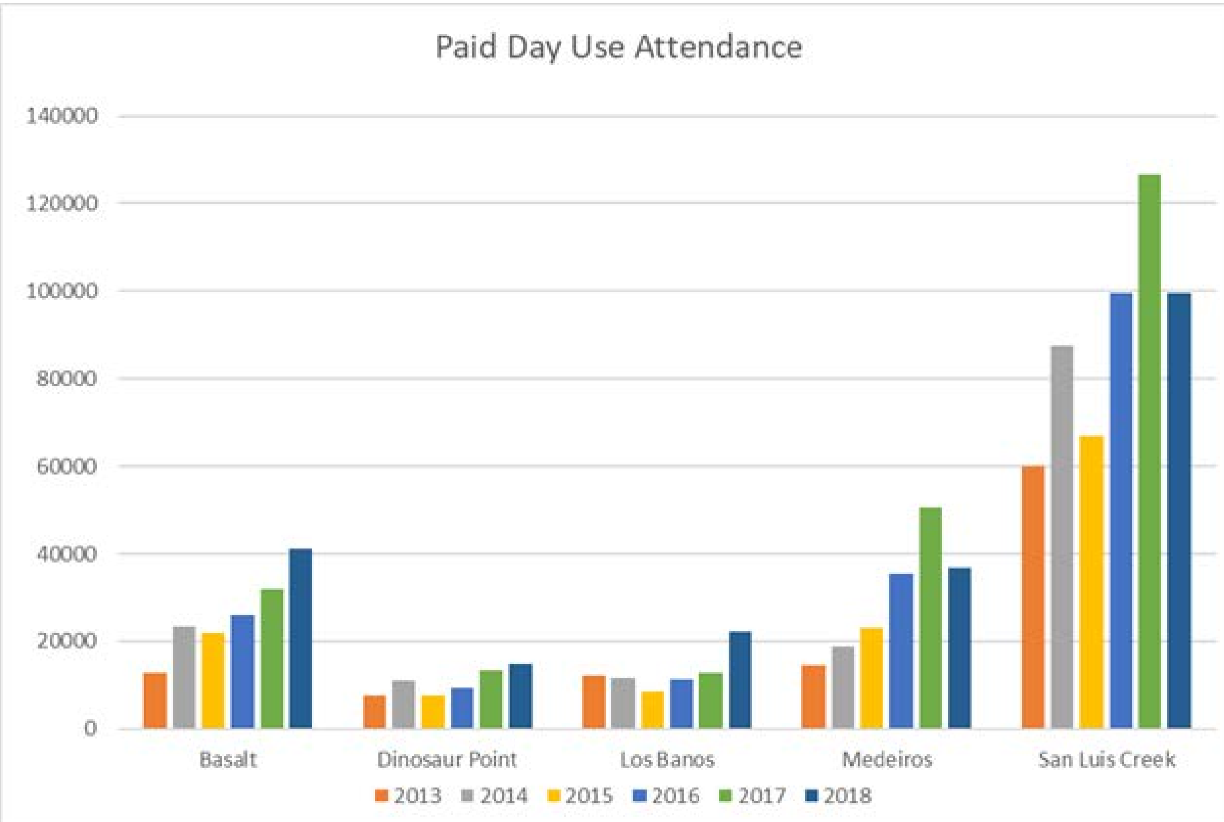
During hunting season, hunting is allowed at the San Luis Reservoir, O'Neill Forebay, and Los Banos Reservoir. Hunting is also allowed in the two designated wildlife use areas. Hunting is not allowed within 500 feet of campgrounds, picnic areas, or dam and water structures (CDPR 2003).

19.1.3.1.8 Visitor Attendance

The CDPR has collected visitor attendance data for the San Luis Reservoir SRA by use area for the years 2013 to 2016. Data are broken down by paid day use, free day use, overnight use and the number of boats launched. Figures 19-3 to

19-5 show visitor attendance trends within the San Luis Reservoir SRA use areas.

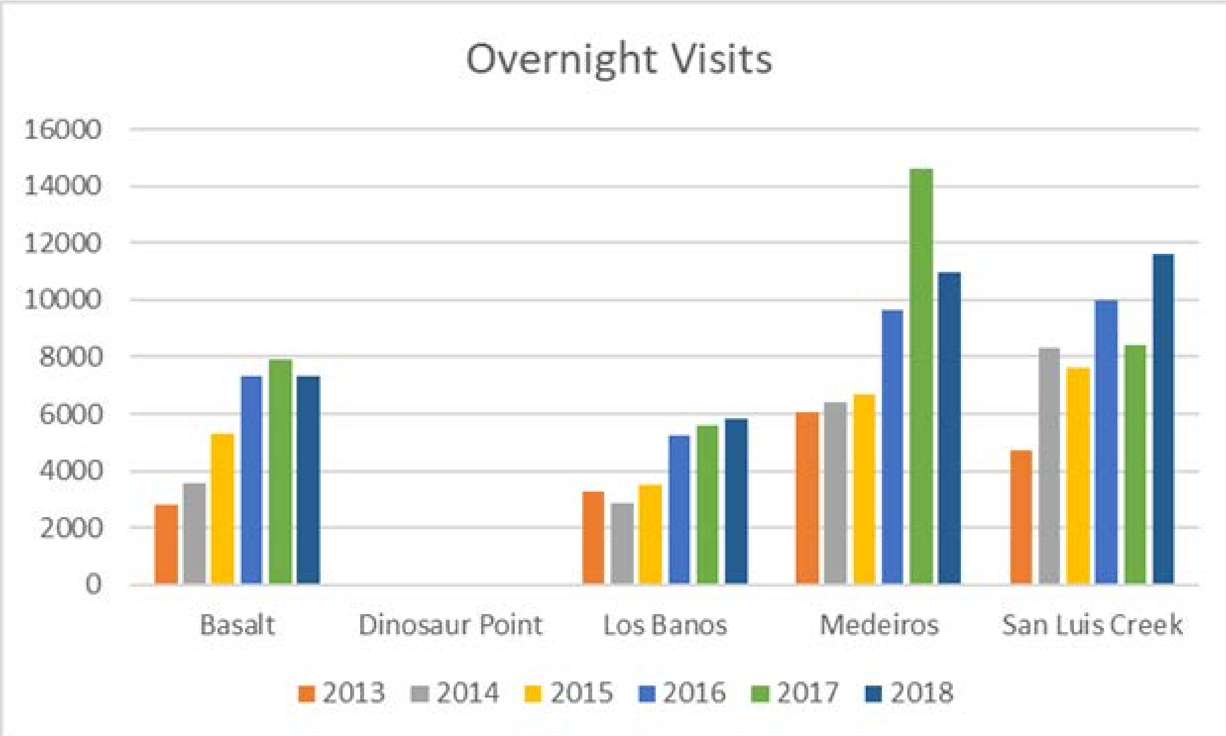
Figure 19-3 shows the paid visitor rate trends for the San Luis Reservoir SRA five use areas. The San Luis Reservoir SRA hosted approximately 210,000 paid visitors in 2018. Of those visitors, the majority visit the area to utilize the recreation resources at the San Luis Creek, Basalt and Medeiros use areas. Historically, the San Luis Creek Use Area has been the most popular. Table 19-1 shows that the San Luis Creek Use Area provides more recreation opportunities when compared to all the use areas. Free day use rate trends are similar to those of paid day use.



Source: CDPR 2018.

Figure 19-3. San Luis Reservoir SRA Paid Visitor Rates

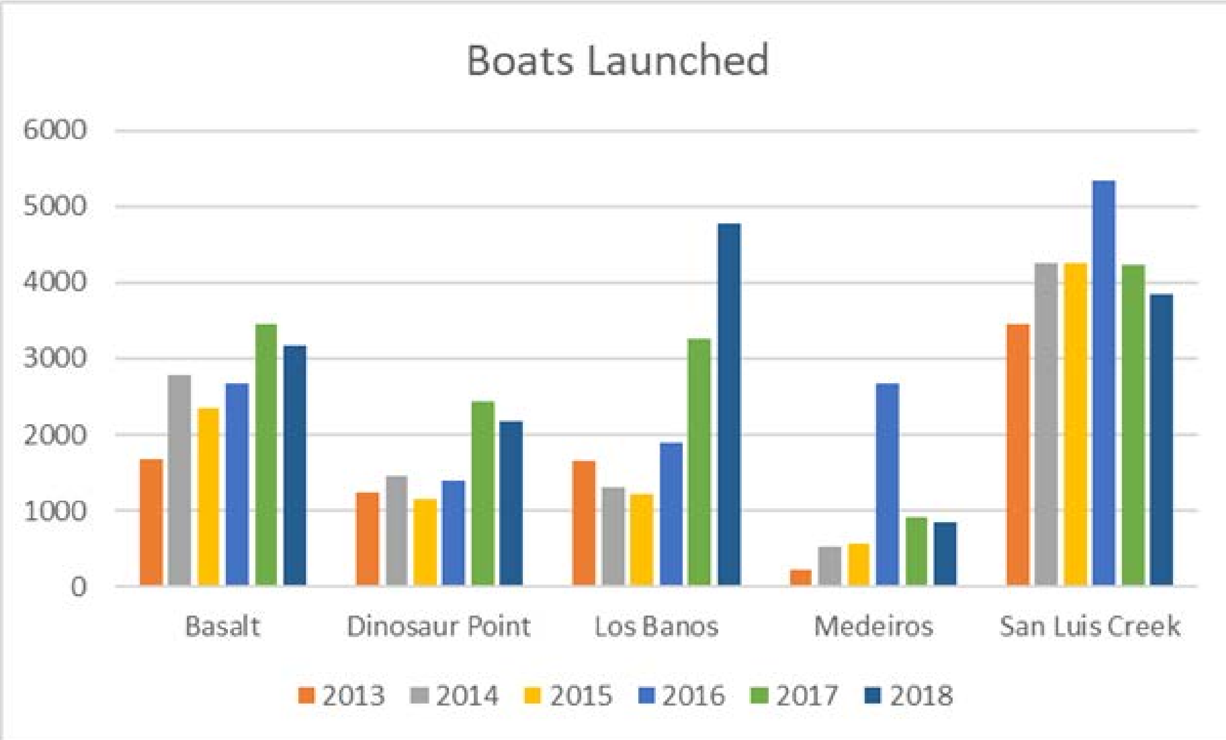
Figure 19-4 shows the overnight visitor rate trends for four of the five San Luis Reservoir SRA use areas. The Dinosaur Point Use Area does not offer camping accommodations, therefore, visitors are not allowed to use its facilities overnight. Overnight use is greatest at the San Luis Creek Use Area; however, the Basalt and Medeiros use areas are also commonly utilized for overnight camping. Table 19-1 shows that these three use areas offer many campsites and the only recreational vehicle (RV) accommodations.



Source: CDPR 2018.

Figure 19-4. San Luis Reservoir SRA Overnight Visitor Rates

Figure 19-5 shows the boat ramp utilization trends for the five San Luis Reservoir SRA use areas. Boat ramps are at all five use areas. On average, the San Luis Creek Use Area has the most consistently used boat ramp. In recent years, the Los Banos Creek Use Area boat ramp has been increasingly utilized, with almost 5,000 boats launched in 2018. Approximately 14,800 boat launches occurred in 2018 within the San Luis Reservoir SRA.



Source: CDPR 2018.

Figure 19-5. San Luis Reservoir SRA Boat Launches

19.1.3.2 Pacheco State Park

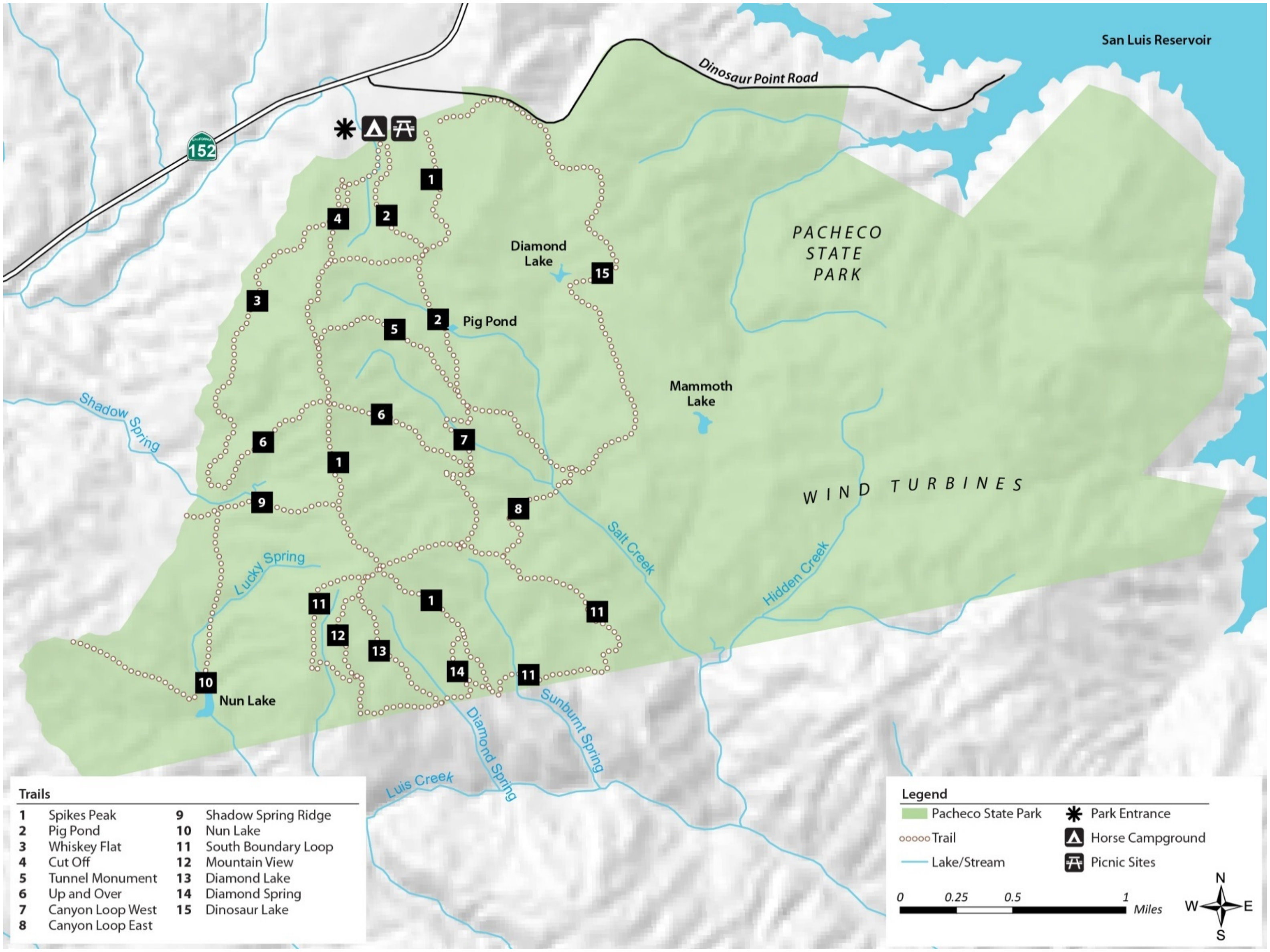
The Pacheco SP lies directly west of the San Luis Reservoir SRA. The park is only partially open to the public for day use recreation. The remainder of the park is used as a horse and cattle ranch, in addition to a wind turbine farm that generates clean energy for 3,500 homes. The public park component is most notable for its rich historic heritage and public education opportunities (CDPR 2017a).

19.1.3.2.1 Park Access

Access to the public components of Pacheco SP is limited to its only public entrance at Dinosaur Point Road, off SR 152. This entrance is shared with the San Luis Reservoir SRA's Dinosaur Point Use Area.

19.1.3.2.2 Hiking, Bicycling, and Equestrian Opportunities

Beyond interpretive and educational resources, Pacheco SP is primarily used as a day use facility for hiking, bicycling, and equestrian activities. The Pacheco SP offers an approximately twenty-eight mile long trail system, including fifteen designated trails. The smallest trails include one mile loops; the largest includes a twenty mile roundtrip. The trail system at Pacheco SP is popular for its views of the San Luis Reservoir and springtime wildflower blooms (CDPR 2006, CDPR 2008, CDPR 2017a). Figure 19-6 below shows Pacheco SPs vast trail systems.



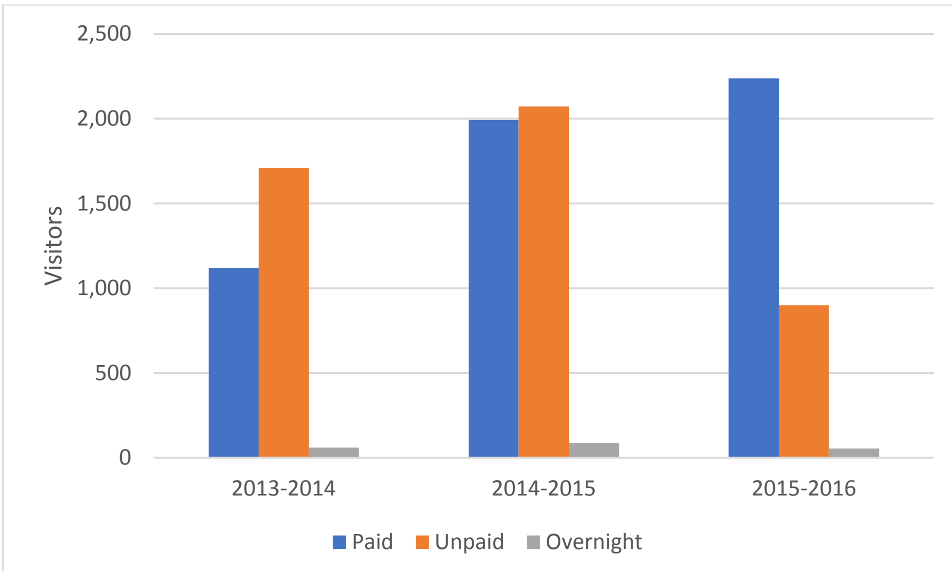
Source: CDPR 2008.

Figure 19-6. Pacheco State Park Trails System

19.1.3.2.3 Camping Facilities

The only campground facilities available at Pacheco SP consist of primitive horse campgrounds; however, tent camping is available for corporate events and is permitted upon request (CDPR 2006, CDPR 2017a).

The CDPR collected visitor attendance data for the Pacheco SP for the years 2013 to 2016. Data are broken down by paid day use, unpaid day use, and overnight use. Data are provided by the *State Park System Statistical Reports* (CDPR 2014a; CDPR 2015; CDPR 2016). Figure 19-7 shows the visitor attendance trends within Pacheco SP.



Source: CDPR 2014a; CDPR 2015; CDPR 2016

Figure 19-7. Pacheco State Park Visitor Attendance

Based on the *State Park System Statistical Reports*, Pacheco SP hosts over 1,000 paid and an average of 1,000 unpaid visitors a year. Due to the lack of campground facilities offered at Pacheco SP, overnight use is fairly limited. The park hosts under 100 overnight campers a year.

19.1.3.3 Anderson Lake County Park

Anderson Park encompasses Santa Clara's largest reservoir, Anderson Reservoir. Anderson Reservoir has a storage capacity of 89,073 acre-feet (AF) (Santa Clara Valley Water District [SCVWD] 2017). In addition, the park includes portions of the Coyote Creek Parkway trail system, the Jackson Ranch historic site, the Moses L. Rosendin Park, and the Burnett Park area. The combination of recreation resources provides a variety of recreation opportunities to the public including boating, picnicking, fishing, hiking, bicycling, and equestrian use (Santa Clara County Parks 2010).

19.1.3.3.1 Picnicking Facilities

Designated picnic areas along Coyote Creek, below Anderson Dam, are provided year-round to the public, on a first-come, first-served basis (Santa Clara County Parks 2017).

19.1.3.3.2 Boating and Water-Related Recreation Opportunities

Anderson Reservoir provides surface lake opportunities including boating, water and jet skiing, and tubing (Santa Clara County Parks 2017). Swimming is not allowed in the reservoir (Santa Clara County Parks 2010).

19.1.3.3.3 Fishing Opportunities

Anderson Park allows fishing in both the Anderson Reservoir and along Coyote Creek; however, fishing in the creek is limited to the normal fishing season (April-November) (Santa Clara County Parks 2010).

19.1.3.3.4 Hiking, Bicycling, and Equestrian Opportunities

Anderson Park, in conjunction with the Coyote Creek Parkway, provides a multitude of hiking, bicycling, and equestrian opportunities through its comprehensive multiuse trail system. The paved trail system that follows Coyote Creek connects the park to additional recreation opportunities at Coyote Hellyer County Park. All trails provide rest areas, equestrian amenities and emergency call boxes. In addition, the park includes a one mile, self-guided nature trail for wildlife viewing (Santa Clara County Parks 2010, Santa Clara County Parks 2017).

19.2 Environmental Consequences/Environmental Impacts

This Environmental Consequences/Environmental Impacts section describes the assessment methods performed to analyze the recreation effects and presents the Proposed Alternatives effects on recreation.

19.2.1 Assessment Methods

This section describes the assessment methods performed to analyze the recreation effects of the alternatives, including the No Action/No Project Alternative.

This analysis assesses impacts to recreation by evaluating closures or access restriction sites at or near the San Luis Reservoir SRA. There should be no closures or access restrictions to either Pacheco SP or Anderson Park. Construction is proposed for the Crest Raise Alternative only. No construction is proposed to occur through the B.F. Sisk Dam SOD Project actions at Pacheco SP and Anderson Park, but are included in this analysis because of their proximity to the proposed construction. Under the Crest Raise Alternative, recreational activities would be suspended for safety reasons during the entire construction schedule at the Basalt Area located on the south reservoir rim of San Luis Reservoir and Medeiros Area located to the south of O’Neill Forebay.

This analysis also assesses impacts to recreation by evaluating potential impacts to recreation during operation of each of the project alternatives. The Reservoir Restriction Alternative has the potential to alter reservoir water levels at the San Luis Reservoir. If reservoir operations were to change and water levels during summer months were reduced, water-based recreation such as boating, fishing, and swimming could be affected.

19.2.2 Significance Criteria

For the purposes of the B.F. Sisk Dam SOD Project EIS/EIR, effects would be significant if they resulted in one or more of the following conditions or situations:

- Recreational use of trails would be substantially reduced as a result of construction;
- Construction activities would substantially reduce access to or close recreation areas;
- Displaced recreation from sites affected by construction would substantially contribute to overcrowding or exceed the facility capacity at other recreation sites; or,
- Operational changes to water levels in recreational water bodies would be reduced to an extent that recreational uses would be substantially affected.

19.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

This section describes potential effects of the No Action/No Project Alternative on recreation in the area of analysis. The No Action/No Project Alternative would result in no change in the area of analysis to recreational trail use, access to recreation facilities or opportunities, or visitor use at other local and regional recreation sites. There would be no change to reduce the risk of dam failure. In the event of dam failure, water based recreational opportunities would be eliminated. **Under the No Action/No Project Alternative, conditions at all of the recreation facilities within the area of analysis would be the same as those experienced under existing conditions.**

19.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

The Reservoir Restriction Alternative would restrict the amount of water stored in the San Luis Reservoir to reduce the likelihood of overtopping if the dam failed during a seismic event. This alternative would reduce the surface elevation of the reservoir by 55 feet from a maximum elevation of 544 feet to a new maximum of 489 feet. This would reduce the maximum area of the reservoir from 19.8 square miles to 17.9 square miles. This alternative would include revegetation around the rim of the lowered reservoir.

Construction of the Reservoir Restriction Alternative could substantially reduce the existing network of trails and their recreational uses. The revegetation the rim of the reservoir would not result in would not result in any changes between this alternative and the No Action/No Project Alterative. The revegetation would only take 1.5 years to complete and would be limited to the rim of the area and would not impact the trail use or availability. **The Reservoir Restriction Alternative would have no impact to recreational use of trails.**

Construction activities could result in temporary closure to recreation facilities, resulting in a substantial loss of recreation opportunities. There would be minimal reduction to access or closure to recreational areas due to construction under this alternative. The revegetation actions would be temporary and would only occur around the rim of the reservoir. These activities would not result in any closures of recreational facilities. **The Reservoir Restriction Alternative would have no construction-related impact to recreational areas.**

Construction activities could displace visitors and substantially contribute to overcrowded conditions at other local and regional recreation sites. There would be no displacement of visitors that would contribute to overcrowded conditions at other recreational sites as the revegetation actions would be temporary and would be limited in their footprint. **Therefore, there would be no impact in comparison to the No Action/No Project Alternative**.

Operational changes to water levels in recreational water bodies under the Reservoir Restriction Alternative could affect recreational uses. The 55-foot reduction in maximum surface elevation of the reservoir would reduce the maximum capacity of the reservoir by approximately 25 percent. This large reduction of reservoir capacity would reduce the availability of boating areas by making some portions of the reservoir too shallow for boats. In addition, boat ramp access at Dinosaur Point and Basalt use areas would be difficult to access in periods of low reservoir levels given the unimproved condition of existing lower elevation boat launch facilities.

Combined, approximately 5,000 boats per year are launched from the Basalt and Dinosaur Point use areas and account for over 32 percent of boat launches at the San Luis Reservoir SRA. Recreation opportunities at the other three use areas within the San Luis Reservoir SRA, Medeiros, Los Banos Creek and San Luis Creek, may experience changes in visitor rates and boat launches due to the reduced reservoir level. In 2016, approximately 2,000 boats were launched from the Dinosaur Point Use Area, 3,500 boats were launched from the San Luis Creek Use Area, and 4,500 boats were launched from the Los Banos Creek Use Area. Due to the already high use of the San Luis Creek and Los Banos Creek boat launches, visitors may choose to recreate outside of the San Luis Reservoir SRA.

The decrease in reservoir levels and capacity would reduce available areas for swimming. The lower levels of water in the reservoir would also make fishing more difficult as there would be less accessible waters and reductions in available fish could occur. Impacts to fish in the reservoir due to the project are further addressed in Chapter 14, Fisheries Resources.

The lower levels of water in the reservoir could displace recreational boaters, swimmers and fishers in the reservoir during occasional periods of high demand at the facilities. The existing boat launch and access sites do continue to support access at lower water surface elevations, however the specific facilities down at these levels are less improved and may become more congested during periods of high use. Other nearby waterbodies, Los Banos Reservoir, O’Neill Forebay, and Anderson Reservoir, would be open to allow for boating, fishing, and swimming. However, these areas may not be able to accommodate all of those who would be displaced and could result in overcrowding, though it is unlikely given the continued access at both these San Luis Reservoir facilities along with the other regional facilities. **Under the Reservoir Restriction Alternative, the lower water levels could reduce water based recreation and result in the displacement of visitors at the Basalt and Dinosaur Point use areas, which could potentially create overcrowded conditions at other local and regional recreation sites. However, as the potential for overcrowding would be unlikely, the impact would be less than significant.**

19.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

In order to implement this alternative, recreational activities within the San Luis Reservoir SRA in close proximity to project construction would be closed to the public for safety purposes during construction. The construction area for the dam raise would include the crest of the dam, the entire downstream slope of the dam, borrow areas, haul routes, site access, and potential construction use areas.

The Basalt and Medeiros use areas would be utilized for construction staging and would be closed for the full construction schedule. The closed Basalt Campground would be used as temporary camping for construction workers. The boat launch at Medeiros may potentially be closed during construction. The Dinosaur Point boat launch would be used to support the recreational use of the reservoir during construction.

Construction associated with the 12-foot crest raise will not require any changes to the reservoir operations or lower reservoir water levels. However, as discussed in Chapter 2, Project Description, implementation of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for 2 seasons, during the period that the berm foundation would be excavated.

The construction period for the Crest Raise Alternative is projected to last 8 to 10 years and, if the shear key option is included, construction would last 10 to 12 years. As was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend this construction schedule to 20 years. Recreation activities in affected areas would be suspended for the entire construction period. Specific impacts to recreation associated with construction of the crest raise are addressed below.

Construction of the Crest Raise Alternative could substantially reduce the existing network of trails and their recreational uses. Under the Crest Raise Alternative, construction to raise B.F. Sisk Dam would result in closure of all recreational trail use at the Basalt Use Area within the San Luis Reservoir SRA. The Basalt Use Area includes two of the three formally designated trails within the San Luis Reservoir SRA, the Basalt Campground Trail and the Lone Oak Trail. The two trails would be closed during the entire construction period. Closure of the Basalt trails would not result in any closure of ADA compliant trails. There are no formally designated recreation trails at the Medeiros Use Area.

Although trails at the Basalt Use Area would be temporarily affected, hiking opportunities within the San Luis Reservoir SRA would still be available for use during project construction. These would include formally designated and primitive trails at both Los Banos Creek and San Luis Creek use areas, and within the designated wildlife use areas. In addition, Pacheco SP, just west of the San Luis Reservoir SRA, offers several public hiking opportunities (see Figure 19-6).

The Crest Raise Alternative would cause a temporary reduction in local recreational trail availability, but recreationist would still have access to a large network of alternate trails that are readily available at neighboring recreation sites in the SRA and at neighboring state parks. Therefore, **the impact on recreational trail use would be less than significant**.

Construction of the Crest Raise Alternative could result in temporary closure to recreation facilities, resulting in a substantial loss of recreation opportunities. Under the Crest Raise Alternative, construction to raise B.F. Sisk Dam would result in closure of all recreation facilities at the Basalt and Medeiros use areas during construction. During construction at the dam, the Basalt and Medeiros use areas would be closed to the public, due to potential public safety hazards at the construction site. The Basalt and Medeiros use areas would be utilized for project staging and as a temporary camping area for construction workers.

Closure of the Basalt Use Area during the construction period would result in a loss of camping, picnicking, fishing, boating and water sports, swimming, and hiking recreation opportunities. About 3,000 boats are currently launched from the Basalt boat ramp each year, which would be closed during construction. Additionally, 79 campsites with RV accessibility, eight ADA accessible campsites, one of two fish cleaning stations in the SRA, and the only public storage lockers would be unavailable to the public during the construction period.

Closure of the Medeiros Use Area would result in a loss of camping, picnicking, fishing, and swimming opportunities. The Medeiros Use Area has the capacity to support approximately 400 unimproved and unassigned camping sites that would be inaccessible during the construction period.

Closure of recreation resources at both the Basalt and Medeiros use areas during construction could be compensated for at the other three use areas within the San Luis Reservoir SRA. However, when the two use areas are closed, the SRA would have only three active boat ramps (San Luis Creek on O’Neill Forebay and Los Banos Creek on Los Banos Reservoir, Dinosaur Point on San Luis Reservoir) and only six ADA accessible campsites; RV accommodations at only one use areas, San Luis Creek; and no public showers. The 400 unimproved camping opportunities at the Medeiros Use Area are currently utilized by approximately 10,000 unique visitors per year. The nearby Pacheco SP (immediately adjacent to the San Luis SRA) offers primitive camping opportunities and Henry Coe SP (approximately 15 miles west of San Luis Reservoir) offers both improved and unimproved camping opportunities that would offset this lost capacity. **The Crest Raise Alternative would cause a significant impact by closing boat launch and ADA facilities at San Luis Reservoir which would reduce recreation opportunities during construction.** Mitigation Measure REC-1 would develop new campsites at the San Luis Creek and Los Banos Creek use area to offset at a 1:1 ratio the lost campsites at the Basalt use area, including six ADA accessible campsites and RV accommodations. Mitigation Measure REC-1 would also include the expansion of the boat launches at the San Luis Creek and Dinosaur Point use areas to help reduce the impacts of the closures of the boat launches at the Medeiros and Basalt use areas. In addition, a fish cleaning station, public storage lockers, and shower facilities would be developed under Mitigation Measure REC-1 to further reduce the impacts of the closure of the Basalt use area. These new campsites and additional facilities would reduce the negative impact of the use area closures due to construction at San Luis Reservoir. **Therefore, Mitigation Measure REC-1 would reduce the severity of impacts on recreational opportunities in the San Luis SRA to a less than significant level.**

Construction activities could displace visitors and substantially contribute to overcrowded conditions at other local and regional recreation sites. Under the Crest Raise Alternative, temporary closure of the Basalt and Medeiros use areas within the San Luis Reservoir SRA would cause the displacement of area visitors to other local and regional recreation sites. Combined, the Basalt and Medeiros use areas annually serve approximately 78,000 day-use and 18,000 overnight visitors and account for over 36 percent of the annual attendance at the San Luis Reservoir SRA.

Recreation opportunities at the other three use areas within the San Luis Reservoir SRA, Dinosaur Point, Los Banos Creek and San Luis Creek, may experience changes in visitor rates during construction at the dam, due to the closure of neighboring recreation facilities and increased construction related traffic. The Dinosaur Point Use Area currently receives approximately 10,000 annual visitors and the Los Banos Creek Use Area receives approximately 10,000 annual visitors and could accommodate a portion of the displaced visitors. The San Luis Creek Use Area currently receives approximately 100,000 annual visitors and currently experiences crowded conditions, which could lead visitors to choose to recreate outside of the San Luis Reservoir SRA during the construction period.

Pacheco SP and Henry Coe SP, both located near the San Luis Reservoir SRA, could experience an increase in visitation. Both SPs could supplement some of the hiking and camping opportunities lost by the closure of both the Basalt and Medeiros use areas. Neither Pacheco nor Henry Coe State Park currently report user capacity issues, and displaced San Luis Reservoir users would not be expected to overcrowd the two SPs. At 87,000 acres and the largest state park in northern California, Henry Coe SP accommodates over 40,000 visitors each year (CDPR 2014b). Henry Coe SP offers opportunities for hiking, fishing, and camping. Approximately 2,000 people visit Pacheco SP each year. Pacheco SP offers opportunities for hiking and camping. In addition, San Luis National Wildlife Refuge in Merced County is approximately 22 miles from San Luis Reservoir and offers fishing, hunting, nature trails, and wildlife viewing. Water based recreation, camping, hiking, and other activities are offered at Coyote Lake Harvey Bear Ranch County Park and Anderson Lake County Park in Santa Clara County, approximately 35 miles from San Luis Reservoir.

Given the implementation of Mitigation Measure REC-1 at the San Luis Creek, Dinosaur Point, and Los Banos Creek use areas to offset lost capacity at the Basalt and Medeiros use areas, it is assumed that only a portion of the 60,000 day-use and 17,000 overnight visitors offset at San Luis Reservoir would shift to the other regional recreation area. As a result, the current capacities at these regional recreation areas would not be exceed. **Therefore, the Crest Raise Alternative would have a less than significant impact on conditions at other local and regional recreation sites.**

Operational changes to water levels in recreational water bodies could affect recreational uses. Under the Crest Raise Alternative, operational changes at the San Luis Reservoir would not affect recreational uses. Water levels at the San Luis Reservoir under the Crest Raise Alternative would be the same as the No Action/No Project Alternative. However, if the shear key option is implemented, the reservoir’s water levels would be lowered for two seasons while the berm foundation would be excavated. These lower water levels could impact recreational uses within the reservoir and could potentially make boating access difficult. **As the lower water levels would only occur for two seasons, the Crest Raise Alternative would result in a less than significant impact to**

recreational facilities or activities due to operational changes at the reservoir.

19.3 Comparative Analysis of Alternatives

Table 19-2 lists the effects of each of the action alternatives and compares them to the existing conditions and the No Action/No Project Alternative. The impacts listed in Table 19-2 are National Environmental Policy Act (NEPA) impacts as well as California Environmental Quality Act (CEQA) impacts, but they are judged for significance only under CEQA.

Table 19-2. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Recreational use on trails would be substantially reduced as a result of project construction.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Project construction could result in temporary closure to recreation facilities, resulting in a substantial loss of recreation opportunities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	S	REC-1	LTS
Project construction could displace visitors and substantially contribute to overcrowded conditions at other local and regional recreation sites.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Operational changes to water levels in recreational water bodies could affect recreational uses.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key: LTS = less than significant; NI = no impact; None = no mitigation required; S = significant; SU = significant and unavoidable; -- = not required per CEQA Guidelines

19.4 Mitigation Measures

The following mitigation measure would reduce the severity of the recreation impacts.

REC - 1: Campsite and Facilities Replacement. Campsites closed at San Luis Reservoir during construction of the Crest Raise Alternative will be replaced at a 1:1 ratio at the San Luis Creek Use Area and then as necessary at the Los Banos Creek Use Area, including six ADA accessible campsites and RV accommodations. These new replacement campsites would be developed consistent with the new facilities considered in the *San Luis Reservoir SRA RMP/GP* and will not exceed the quantities of new facilities considered in the RMP at each Use Area. The new campsites would be constructed concurrent to the crest construction period during a period of low precipitation in order to reduce the risk of accidental leaks or spills, potential for soil contamination and to minimize erosion of loose materials in construction areas, as per Goal RES-WQ4 in the *San Luis Reservoir SRA RMP/GP* (Reclamation and CDPR 2013):

- Design, construct, and maintain buildings, roads, trails, campsites, boat launches and marinas, and associated infrastructure to minimize stormwater runoff, promote groundwater recharge, and prevent soil erosion.

The new campsites would be constructed within the San Luis Creek use area at the SRA on O’Neill Forebay. Reclamation will include this mitigation requirement in bid documents and construction contracts.

In addition, Reclamation will work with CDPR to implement the following measure. The boat launches at the San Luis Creek and Dinosaur Point use areas would be expanded by addition of a launch lane and a boarding float at each area. In addition, a fish cleaning station, public storage lockers, and shower facilities would be developed at San Luis Creek man use area.

19.5 Significant Unavoidable Impacts

None of the action alternatives would result in significant unavoidable impacts on recreation.

Chapter 20
Environmental Justice

This section identifies populations impacted under environmental justice guidelines within the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) area and discusses potential environmental justice effects from the proposed alternatives.

As described in Executive Order (EO) 12898 (Federal Register [FR] 7629), Federal agencies "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." EO 12898 also aimed to "ensure greater public participation" for people in communities potentially affected by program actions. The concept of environmental justice as applied here is that minority and low-income people should not be disproportionately or adversely affected by economic and quality of life impacts associated with the implementation of the Project. Construction-related activities associated with the Project alternatives could disproportionately or adversely affect areas of minority and low-income populations by affecting water quality and supply, increasing air pollution, noise, and traffic in the study area. See Chapter 4, Water Quality; Chapter 5, Surface Water Supply; Chapter 6, Groundwater Resources; Chapter 7, Air Quality; Chapter 11, Noise and Vibration; and Chapter 12, Traffic and Transportation, for additional information on these resource effects.

20.1 Affected Environment/Environmental Setting

This Affected Environment/Environmental Setting section describes the area of analysis, and provides census demographic data regarding environmental justice issues. This section describes the affected environment related to environmental justice, as defined by EO 12898 (59 FR 7629) and Council on Environmental Quality (CEQ) Guidance (1997). Under EO 12898, demographic information is used to determine whether minority populations or low-income populations are present in the areas potentially affected by the range of project alternatives. If so, a determination must be made whether implementation of the program alternatives may cause disproportionately high and adverse human health or environmental impacts on those populations.

20.1.1 Area of Analysis

The environmental justice analysis is divided into regional (county) and local (census tract and block group) level analysis. Regional and local areas included in this analysis are those where associated project construction or construction related traffic would occur, potentially causing an adverse and disproportionately high effect on neighboring minority and low-income populations. At the regional level, this includes Merced County. At the local level, this includes the San Luis Reservoir region.

The San Luis Reservoir is located in Merced County, along Interstate 5 (I-5) and State Route (SR) 152, and within the San Luis Reservoir State Recreation Area (SRA) (see Figure 20-1). The closest community to San Luis Reservoir is Santa Nella, located approximately 1.5 miles east of O'Neill Forebay. Other communities near the San Luis Reservoir include the cities of Trent, Los Banos, Ingomar, and Gustine. The unincorporated town of Santa Nella is located northeast of the reservoir.

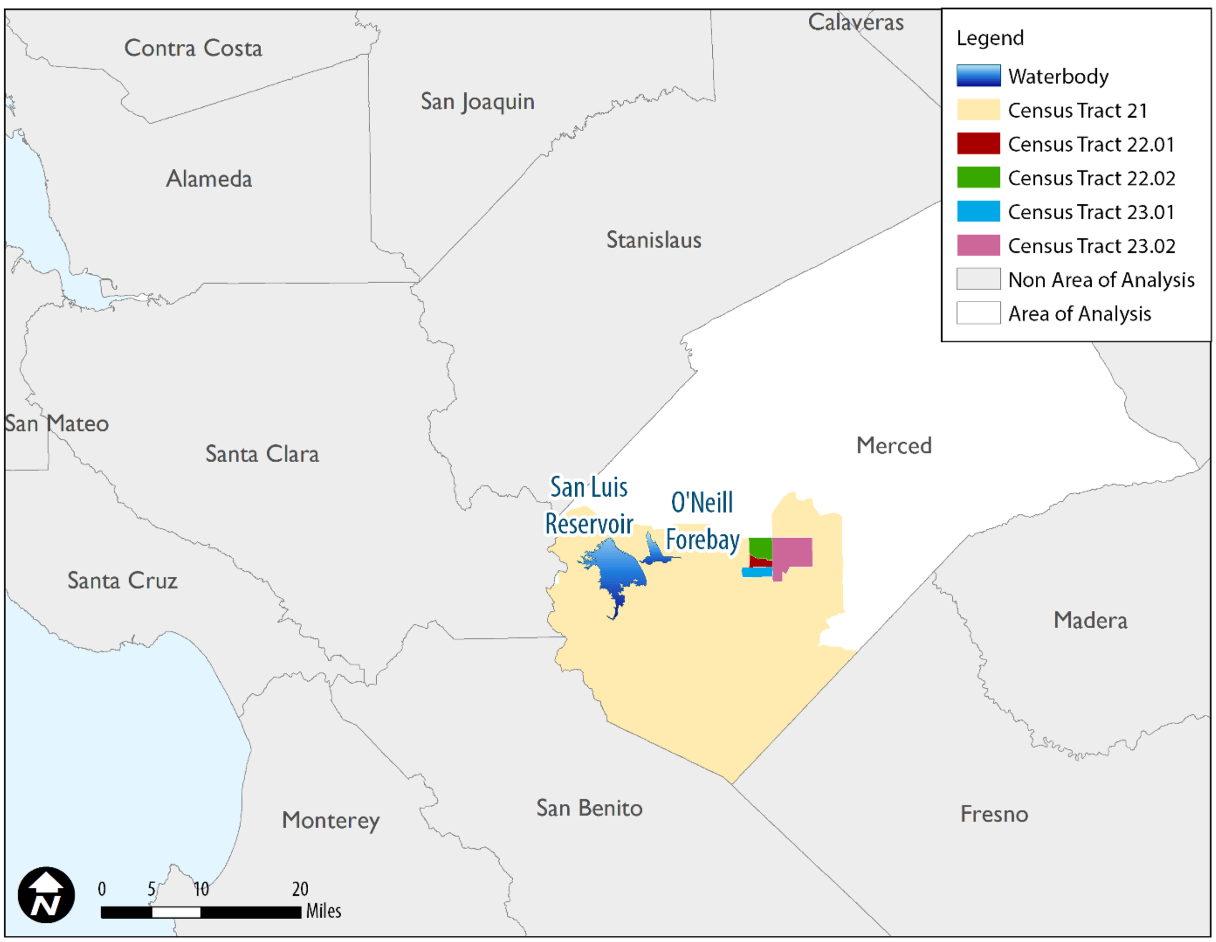


Figure 20-1. Environmental Justice Area of Analysis

20.1.2 Regulatory Setting

The following section describes the applicable laws and rules relating to environmental justice.

20.1.2.1 Federal

The concept of environmental justice is rooted in the Civil Rights Act of 1964 which prohibits discrimination in Federally-assisted programs, and EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, issued February 11, 1994. EO 12898 requires all Federal agencies to conduct “programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color, or national origin.” Section 1-101 of the Order requires Federal agencies to identify and address “disproportionately high and adverse human health or environmental effects” of programs on minority and low-income populations (EO 12898 1994).

The CEQ (1997) states that environmental justice concerns may arise from effects on the natural or physical environment, such as human health or ecological effects on minority or low-income populations, or from related social or economic effects.

In 1998, the United States Environmental Protection Agency (USEPA) issued final guidance on incorporating environmental justice concerns into NEPA analysis (USEPA 1998). The guidance states that an affected area is considered to have a minority or low-income population if the total minority or low-income population is more than 50 percent of the total population in the affected area or “meaningfully greater” than the percentage in the surrounding area (e.g., census tract compared to county, county compared to State). A minority is defined as a member of the following population groups: American Indian/Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), or Hispanic (CEQ 1997).

20.1.2.2 State

California law defines environmental justice as the “fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies,” in Government Code Section 65040.12(e). Section 65040.12(a) designates the Governor’s Office of Planning and Research (OPR) as the coordinating agency in State government for environmental justice programs and requires OPR to develop guidelines for incorporating environmental justice into general plans.

20.1.3 Existing Conditions

This section presents the existing regional and local-level demographic and economic characteristic census data, including race, ethnicity, income, and poverty for the B.F. Sisk Dam SOD Project environmental justice area of analysis. See Section 20.2.1 for definitions and assessment methodology on the identified thresholds to determine a minority or low-income affected area.

20.1.3.1 Regional Demographics

20.1.3.1.1 Merced County

This section describes demographic and economic characteristic data from the 2016 American Community Survey 5-Year Estimates by the United States (U.S.) Census Bureau for Merced County. Information for the State of California as a whole is presented for comparison purposes.

Table 20-1 presents the racial and ethnic composition of Merced County. This data shows that Merced County exhibits a total minority proportion exceeding 50 percent, at 70 percent. Merced's Hispanic population exceeds that of the State average, at 56.9 percent compared to 38.46 percent, suggesting that the high total minority percentage in the region is closely related to the proportion of Hispanic residents.

Table 20-2 presents the median household income, per capita income, and proportion of individuals living below the poverty threshold for Merced County. This data shows that Merced County has a higher proportion of low-income residents higher than that for the State (20.6 percent compared to 11.8 percent).The county has a median household income and per capita income lower than the State average; however, the county does not fall below the U.S. Census Bureau's defined poverty thresholds for a four-person family unit (two adults and two children) or an individual ($24,339 and $12,486, respectively [United States Census Bureau 2016a])

20.1.3.2 Local Demographics

This section describes demographic and economic characteristic data from the 2010 U.S. Census and 2016 American Community Survey 5-Year Estimates by the U.S. Census Bureau at the census tract level. Information for Merced County and the State of California as a whole are also presented for comparison purposes.

Table 20-1. Regional Demographic Characteristics, 2012-2016

		Race[1]							Hispanic Origin[2]		
Geographic Area	**Total Population**	**White**	**Black/ African American**	**American Indian and Alaska Native**	**Asian**	**Native Hawaiian/ Pacific Islander**	**Some Other Race**	**Two or More Races**	**White Alone, Non-Hispanic**	**All Races, Hispanic**	**Total Minority[3]**
Merced Co.	265,001 (100%)	155,239 (58.6%)	8,902 (3.4%)	1,865 (0.7%)	19843 (7.5%)	537 (0.2%)	66,865 (25.2%)	11,750 (4.4%)	78,119 (29.9%)	152,475 (56.9%)	186,882 (70%)
California	38,654,206 (100%)	23,680,584 (61.3%)	2,261,835 (5.9%)	285,512 (0.7%)	5,354,608 (13.9%)	150,908 (0.4%)	5,133,600 (13.3%)	1,787,159 (4.6%)	14,837,242 (38.4%)	14,903,982 (38.6%)	23,816,964 (61.6%)

Source: U.S. Census Bureau 2016b.

Notes:

[1] A minority is defined as a member of the following population groups: American Indian/Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), or Hispanic (U.S. Census Bureau 2012a).

[2] The term "Hispanic" is an ethnic category and can apply to members of any race, including respondents who self-identified as "White." The total numbers of Hispanic residents for each geographic region are tabulated separately from the racial distribution by the U.S. Census Bureau (U.S. Census Bureau 2012a).

[3]"Total Minority" is the "Not Hispanic or Latino: While Alone" category subtracted from the total population.

Key:

Boldface denotes areas with meaningfully greater total minority proportion (more than 50 percent).

% = percent

Table 20-2. Regional Economic Characteristics, 2012-2016

Geographic Area	Median Household Income[1,2]	Per Capita Income	Percent Population Below Poverty Threshold[3]
Merced Co.	$44,397	$19,130	20.6%
California	$63,783	$31,458	11.8%

Source: United States Census Bureau 2016c.

[1] Household income is defined by the United States Census Bureau as “the sum of money income received in the calendar year by all household members 15 years old and over” (United States Census Bureau 2012a).

[2] In 2016 inflation-adjusted dollars.

[3] The census classifies families and persons as *below poverty* “if their total family income or unrelated individual income was less than the poverty threshold” as defined for all parts of the country by the Federal government (U.S. Census Bureau 2012a). For 2014, the Federal weighted average poverty level threshold for an individual was $12,486 and the $24,339 for a family of four (two adults and two children) (U.S. Census Bureau 2016a).

Key:
Boldface denotes areas with incomes meaningfully lower than the State average. Lack of boldface within the table denotes that no low-income areas exist.
$ = dollar amount
% = percent

Census tracts are defined as “small, relatively permanent statistical subdivisions of a county delineated by local participants as part of the U.S. Census Bureau’s Participant Statistical Areas Program” (U.S. Census Bureau 2012b). These areas generally consist of between 1,500 and 8,000 people and are designed to be homogeneous with respect to population characteristics, economic status, and living conditions. The size of census tracts can vary widely depending on the density of a settlement (U.S. Census Bureau 2012b).

The identified census tracts within the B.F. Sisk Dam Project environmental justice area of analysis are listed in Table 20-3 below.

Table 20-3. Environmental Justice Local Area of Analysis Census Tract Numbers

Geographic Area	City(s)	Census Tract Number
Merced County San Luis Reservoir Region	Gustine, Ingomar & Volta	20
	San Luis Reservoir State Recreation Area & Santa Nella	21 and 21, Block Group 1
	Los Banos	22.01, 22.02, 23.01 and 23.02

Source: U.S Census Bureau 2010.

20.1.3.2.1 Merced County - San Luis Reservoir Region

Identified census tracts within the Project area includes the communities of Gustine, Ingomar and Volta (Census Tract 20), the San Luis Reservoir SRA and Santa Nella (Census Tract 21 and Census Track 21, Block Group 1), and Los Banos (Census Tracts 22.01, 22.02, 23.01 and 23.02). Table 20-4 presents the racial and ethnic composition of the San Luis Reservoir region census tract. This data shows that all of the census tracts have total minority proportions exceeding 50 percent, with the largest minority population located within Census Tract 23.01 at 100 percent. All census tracts have Hispanic population proportions exceeding the State average (38.4 percent), suggesting that the high total minority percentages in the Project area is closely related to the proportion of Hispanic residents. All of the census tracts within the Project area are considered minority affected areas. Table 20-5 presents the median household income, per capita income, and proportion of individuals living below the poverty threshold for the San Luis Reservoir region census tract. The data shows that Census Tract 20, Census Tract 21, Block Group 1, and Census Tract 22.02 have a lower proportion of low-income residents than that of the Merced County, but not of the State. Census Tracts 21, 22.01, and 23.02 have a higher proportion of low-income residents than that for both the county and the State. Although these census tracts have high proportions of low-income residents than is observed statewide, they do not surpass the United States Census Bureau's defined poverty thresholds for a four-person family unit (two adults and two children) or an individual (except Census Tract 22.01). Census Tract 22.01 is the only tract that exceeds the United States Census Bureau's defined poverty thresholds for a four-person family unit (two adults and two children) or an individual with a poverty threshold of 39.6 percent. With the exception of Census Tract 23.01, all of the census tracts have median household incomes and per capita incomes lower than that State average, however, these census tracts still do not fall below the U.S. Census Bureau's defined poverty thresholds for a family of four (two adults and two children) or an individual. Census Tract 22.01 has been identified as the only tract in the Project area that will be considered a low-income affected area.

Table 20-4. Local Demographic Characteristics, 2012-2016

Geographic Area	Total Population	Race[1]							Hispanic Origin[2]		Total Minority[3]
		White	Black/ African American	American Indian and Alaska Native	Asian	Native Hawaiian/ Pacific Islander	Some Other Race	Two or More Races	White Alone, Non-Hispanic	All Races, Hispanic	
CT 20	8,814 (100%)	7,968 (90.4%)	353 (0.4%)	176 (0.2%)	441 (0.5%)	0 (0.0%)	546 (6.2%)	203 (2.3%)	3,596 (40.8%)	5,050 (57.3%)	5,218 (59.2%)
CT 21	3,826 (100%)	3,034 (79.3%)	77 (2.0%)	0 (0.0%)	237 (6.2%)	0 (0.0%)	302 (7.9%)	172 (4.5%)	1,198 (31.3%)	2,590 (67.7%)	2,628 (68.6%)
CT 21, Block Group 1	1,635 (100%)	1,473 (90.1%)	6 (3.6%)	28 (1.7%)	126 (7.7%)	0 (0.0%)	30 (1.8%)	9 (0.5%)	761 (46.5%)	800 (48.9%)	874 (53.4%)
CT 22.01	5,670 (100%)	4,746 (83.7%)	454 (0.8%)	170 (0.3%)	397 (0.7%)	113 (0.2%)	641 (11.3%)	164 (2.9%)	1,128 (19.9%)	4,360 (76.9%)	4,542 (80.1%)
CT 22.02	9,895 (100%)	7,619 (77.0%)	119 (1.2%)	594 (0.6%)	218 (2.2%)	0 (0.0%)	1,474 (14.9%)	406 (4.1%)	1,949 (19.7%)	7,531 (76.1%)	7,946 (80.3%)
CT 23.01	6,674 (100%)	1,028 (15.4%)	0 (0.0%)	4,618 (69.2%)	1,028 (15.4)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2,056 (30.8%)	6,674 (100%)
CT 23.02	15,010 (100%)	10,747 (71.6%)	600 (4.0%)	165 (1.1%)	435 (2.9%)	0 (0.0%)	2,431 (16.2%)	615 (4.1%)	2,657 (17.7%)	10,972 (73.1%)	12,353 (82.2%)
Merced Co.	265,001 (100%)	155,239 (58.6%)	8,902 (3.4%)	1,865 (0.7%)	19,843 (7.5%)	537 (0.2%)	66,865 (25.2%)	11,750 (4.4%)	78,119 (29.9%)	152,475 (56.9%)	186,882 (70%)
California	38,654,206 (100%)	23, 680,58 (61.3%)	2,261,835 (5.9%)	285,512 (0.7%)	5,354,608 (13.9%)	150, 908 (0.4%)	5,133,600 (13.3%)	1,787,159 (4.6%)	14,837,242 (38.4%)	14,903,982 (38.6%)	23,816,964 (61.6%)

Source: U.S. Census Bureau 2016b.

Notes:

[1] A minority is defined as a member of the following population groups: American Indian/Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), or Hispanic (U.S. Census Bureau 2012a).

[2] The term "Hispanic" is an ethnic category and can apply to members of any race, including respondents who self-identified as "White." The total numbers of Hispanic residents for each geographic region are tabulated separately from the racial distribution by the U.S. Census Bureau (U.S. Census Bureau 2012a).

[3] Total Minority" is the "Not Hispanic or Latino: While Alone" category subtracted from the total population.

Key:

Boldface denotes areas with meaningfully greater total minority proportion (more than 50 percent).

CT = Census Tract

% = percent

Table 20-5. Local Economic Characteristics, 2012-2016

Geographic Area	Median Household Income[1,2]	Per Capita Income	Percent Population Below Poverty Threshold[3]
CT 20	$46,083	$22,536	15.5%
CT 21	$41,774	$17,434	22.2%
CT 21, Block Group 1	$48,250	$17,209	18%
CT 22.01	$26,997	$13,477	39.6%
CT 22.02	$50,561	$17,156	17%
CT 23.01	$58,871	$24,587	8.1%
CT 23.02	$46,635	$16,303	20%
Merced Co.	$44,397	$19,130	20.6%
California	$63,783	$31,458	11.8%

Source: U.S. Census Bureau 2016c.

Notes:

[1] Household income is defined by the U.S. Census Bureau as "the sum of money income received in the calendar year by all household members 15 years old and over" (U.S. Census Bureau 2012a).

[2] In 2016 inflation adjusted dollars.

[3] The census classifies families and persons as below poverty "if their total family income or unrelated individual income was less than the poverty threshold" as defined for all parts of the country by the Federal government (U.S. Census Bureau 2012a). For 2014, the Federal weighted average poverty level threshold for an individual was$12,316 and $27,820 for a family of four (two adults and two children) (U.S. Census Bureau 2016a).

Key:

Boldface denotes areas with incomes meaningfully lower than the regional and State averages. Lack of boldface within the table denotes that no low-income areas exist.

CT = Census Tract

$ = dollar amount

% = percent

20.2 Environmental Consequences/Environmental Impacts

NEPA requires an analysis of social, economic, and environmental justice effects. While there is no standard set of criteria for evaluating environmental justice impacts, the guidance provides direction to assess the disproportionality of the impacts. For purposes of this Environmental Impact Statement/Environmental Impact Report (EIS/EIR), the No Action/No Project Alternative is the basis of comparison, as required by NEPA.

The section presents assessment methods performed to analyze the environmental justice effects and presents the potential environmental justice effects of the proposed alternatives.

20.2.1 Assessment Methods

This section describes the assessment methods used to analyze potential environmental justice effects of the project alternatives, including the No Action/No Project Alternative.

The CEQ (1997) recommends that the following three factors be considered by the environmental justice analysis to determine whether disproportionately high and adverse impacts may accrue to minority or low-income populations:

- Whether there is or would be an impact on the natural or physical environmental that significantly and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural environment.

- Whether the environmental effects are significant and are, or may be, having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group.

- Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

The methodologies and thresholds used in this analysis are taken from the USEPA's final guidance on incorporating environmental justice concerns into NEPA analysis (USEPA 1998) and help define minority and low-income populations. The guidance states that a minority and/or low-income population may be present in an area if the proportion of the populations in the area of interest are "meaningfully greater" than that of the general population, or where the proportion exceeds 50 percent of the total population.

20.2.1.1 Minority

As mentioned above, the CEQ (1997) defines the term "minority" as persons from any of the following U.S. Census categories for race: Black/African American, Asian, Native Hawaiian or Other Pacific Islander, and American Indian or Alaska Native. Additionally, for the purposes of this analysis, "minority" also includes all other nonwhite racial categories, such as "some other race" and "two or more races." The CEQ also mandates that persons identified through the U.S. Census as ethnically Hispanic, regardless of race, should be included in minority counts (CEQ 1997). Hispanic origin is considered to be an ethnic category separate from race, according to the U.S. Census.

For this analysis, minority populations of individual census tracts were compared against the general population of Merced and the State of California as a whole. Census tracts with minority populations exceeding 50 percent of the total population were considered environmental justice populations. Based on the data in Tables 20-1, 20-2, 20-4 and 20-5, at the regional level, Merced County considered a minority-affected area because the minority population is greater than 50 percent. At the local-level, Census Tracts 20, 21, 21, Block Group 1, 22.01, 22.02, 23.01 and 23.02 are considered a minority-affected areas because the minority population was greater than 50 percent and the State.

20.2.1.2 Low-Income

Persons living with an income below the poverty level are identified as "low-income," according to the annual statistical poverty thresholds established by the U.S. Census Bureau. The U.S. Census Bureau poverty threshold indicates that the poverty level for a family of four (two adults and two children) in 2016 was $24,339 and $12,486 for an individual (United States Census Bureau 2016a). The guidance states that a census tract exhibiting a proportion of people living in poverty two times higher than the State average of 11.8 percent (a total of 23.6 percent was considered to be meaningfully greater for this analysis) are considered environmental justice populations. Census Tract 22.01 has been identified as the only tract in the Project area that will be considered a low-income affected area.

This analysis also considered whether an area's median household and per capita incomes were substantially lower than that of the county and/or State average.

20.2.2 Significance Criteria

NEPA requires an analysis of social, economic, and environmental justice effects; however, there is no standard set of criteria for evaluating environmental justice impacts. For purposes of this EIS/EIR, the No Action Alternative is the basis of comparison, as required by NEPA. However, the No Action Alternative would be very similar to existing conditions because existing conditions for demographics and regional economics are not anticipated to experience substantive changes in the area of analysis. Therefore, existing conditions is used as a proxy for No Action Alternative in the chapter.

Social, economic, and environmental justice effects are not required to be analyzed under CEQA, and therefore a CEQA analysis is not provided in this chapter.

Proposed actions under the alternatives could affect environmental justice areas by conducting construction-related activities in the Project area.

20.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative could expose a minority and/or low-income population to adverse and disproportionately high effects or hazards from project construction. Under the No Action/No Project Alternative, no construction activities associated with the B.F. Sisk Dam would occur; therefore, none of the minority or low-income populations would be exposed to adverse effects or hazards from project-related construction. **The No Action/No Project Alternative would not have an adverse or disproportionate effect on minority and low-income populations.**

20.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

The Reservoir Restriction Alternative could expose a minority and/or low-income population to adverse and disproportionately high effects or hazards from project construction. Construction of the Reservoir Restriction Alternative would take place over a 1.5-year period. Construction activities could result in air quality, noise and traffic impacts. These impacts would be temporary and mitigation measures would reduce these impacts to less than significant levels. Therefore, adverse and disproportionately impacts would not occur to the minority populations surrounding the Project area due to construction. **The Reservoir Restriction Alternative would not have an adverse or disproportionate effect on minority and low-income populations.**

20.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

The Crest Raise Alternative could expose a minority and/or low-income population to adverse and disproportionately high effects or hazards from project construction. The Crest Raise Alternative would require major construction to raise the B.F. Sisk Dam crest an additional 12 feet to a new crest elevation of 566 feet. All construction activities would take place in Merced County, and within the boundaries of the San Luis Reservoir SRA. Construction would last approximately 8 to 10 years. With the addition of the shear key option, construction is expected to last approximately 10 to 12 years. As was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend this construction schedule to 20 years. These construction activities would result in significant impacts in Merced County and, specifically, the San Luis Reservoir region.

Minority populations were identified in Merced County and in Census Tracts 20, 21, 21, Block Group 1, 22.01, 22.02, 23.01 and 23.02. Census Tract 22.01 was determined to be the only low-income affected area.

Potential effects from construction would be temporary and would be reduced with mitigation measures discussed in Chapter 11, Noise and Vibration, and

Chapter 12, Traffic and Transportation. Following the implementation of the mitigation measures described in these sections, temporary construction effects associated with the Crest Raise Alternative could still cause an adverse effect on low-income and minority affected areas. These effects would however be shared across all inhabitants of the communities identified in Section 20.1.3, that all supported similar income and minority demographics. As a result, these construction effects would not be disproportionately focused on any low-income and minority affected areas in the study area. **The Crest Raise Alternative would have a temporarily adverse effect on minority and low-income populations but those effects would not be disproportionately focused on these populations.**

20.3 Comparative Analysis of Alternatives

Table 20-6 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative.

Table 20-6. Summary of Impacts – Environmental Justice

Potential Impact	Alternative	Effects Determination
Expose a minority and/or low-income population to adverse or disproportionately high effects or hazards from project construction.	Alternative 1 - No Action/No Project	No Impact
	Alternative 2 - Reservoir Restriction	Adverse and Disproportionate Effect Would Not Occur
	Alternative 3 - Crest Raise	Potential Adverse Effect (minority populations) but not Disproportionate

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Chapter 21
Indian Trust Assets

This chapter presents the Indian Trust Assets (ITAs) within the area of analysis. ITAs are defined as legal interests in property held in trust by the United States (U.S.) government for Indian tribes or individuals, or property protected under U.S. law for Indian tribes or individuals. An Indian trust has three components: 1) the trustee, 2) the beneficiary, and 3) the trust asset. ITAs can include land, minerals, Federally-reserved hunting and fishing rights, Federally-reserved water rights, and in-stream flows associated with a reservation or Rancheria. Beneficiaries of the Indian trust relationship are federally-recognized Indian tribes with trust land. By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval of the U.S. The characterization and application of the U.S. trust relationship have been defined by case law that supports Congressional acts, executive orders, and historic treaty provisions.

21.1 Affected Environment/Environmental Setting

This section presents the area of analysis, regulatory requirements, and environmental setting for ITAs.

21.1.1 Area of Analysis

The area of analysis includes Merced County, which has the potential to be affected by construction and/or operations of the proposed alternatives. Figure 21-1 shows the area of analysis for ITAs.

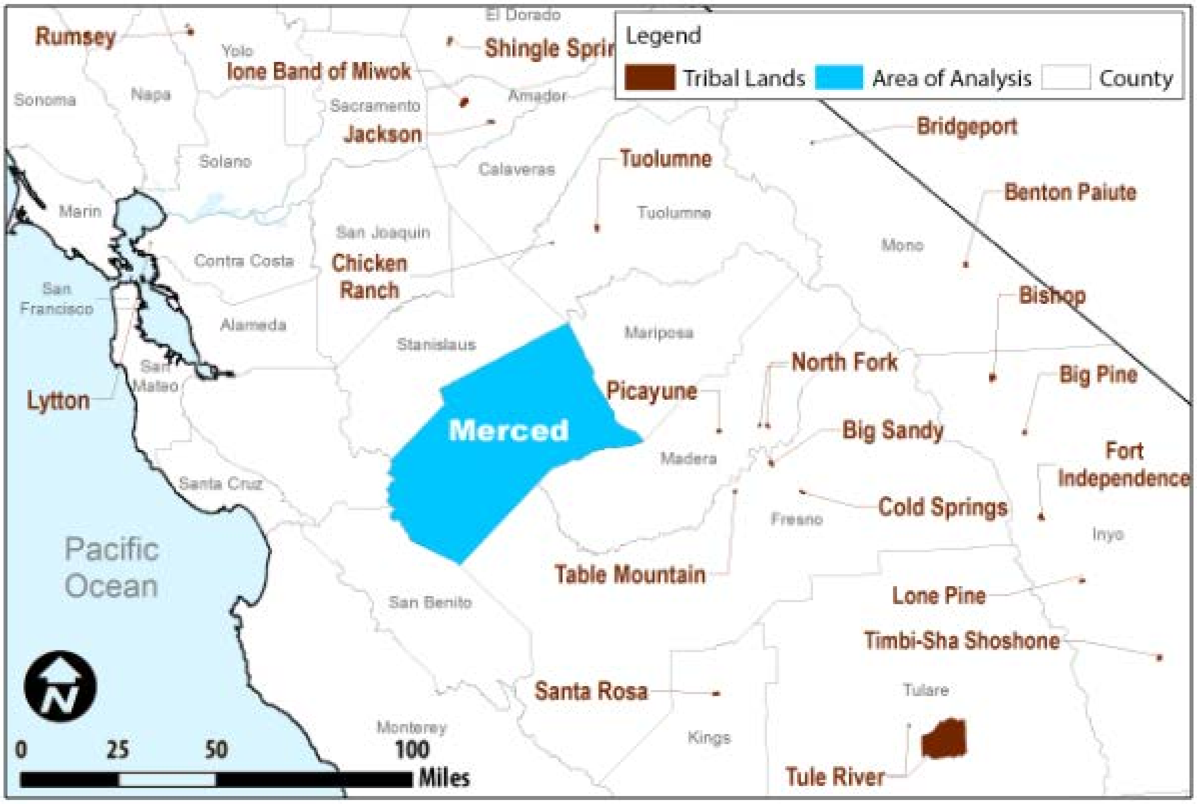
21.1.2 Regulatory Setting

The following laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Memorandum of April 29, 1994, “Government-to-Government Relations with Native American Tribal Governments”
- Secretarial Order number 3215, *Principles for the Discharge of the Secretary’s Trust Responsibility*

The United States Department of the Interior, Bureau of Reclamation (Reclamation) is responsible for assessing whether the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) would have the potential to affect

ITAs. Reclamation complies with procedures contained in Departmental Manual Part 512 (DOI 1995), guidelines which protect tribal resources and require Secretary of the Interior approval before sale of land, natural resources, water, or other assets. Federally-reserved water rights held in trust for tribes by the U.S. are ITAs that are restricted from being separated from tribes and individual Indians without the approval of the Secretary of the Interior.



Source: United States Census Bureau 2010.

Figure 21-1. ITAs Near the B.F. Sisk Dam Project Area

21.1.3 Existing Conditions

Figure 21-1 shows that there are no ITAs within or adjacent to the area of analysis. The ITAs in closest proximity to the area of analysis are northeast and slightly southeast of Merced County in Madera and Tuolumne Counties. Since no ITAs are present in the area of analysis, there would be no impact to ITAs from B.F. Sisk Dam SOD Project actions; thus, no further analysis is required.

Chapter 22
Public Utilities, Services, and Power

This chapter presents an overview for the area of analysis, regulatory setting, and existing conditions associated with public utilities including power, water, and waste, services including police, fire, emergency medical, schools. Additionally, it presents the environmental consequences and mitigation as they pertain to the implementation of the action alternatives.

Many utilities and service systems are covered to some degree in previous chapters. A discussion of surface water supply, distribution facilities, and operations is provided in Chapter 4, Water Quality, and Chapter 5, Surface Water Supply. Information on recreational facilities is provided in Chapter 19, Recreation.

22.1 Affected Environment/Environmental Setting

This section provides an overview of the regulatory setting associated with utility standards and provides a description of the existing utilities and service systems with the potential to be affected by the action alternatives.

22.1.1 Area of Analysis

The area of analysis for public utilities includes existing public utilities and services in local jurisdictions associated with the action alternatives where construction related activities could occur. Proposed construction activities would occur in Merced County. The public utilities and service area of analysis is illustrated in Figure 22-1.

22.1.2 Regulatory Setting

The following section describes the regulatory setting for utilities and service systems in the public utilities and services area of analysis.

22.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Federal Energy Regulatory Commission (FERC)
- United State Energy Acts

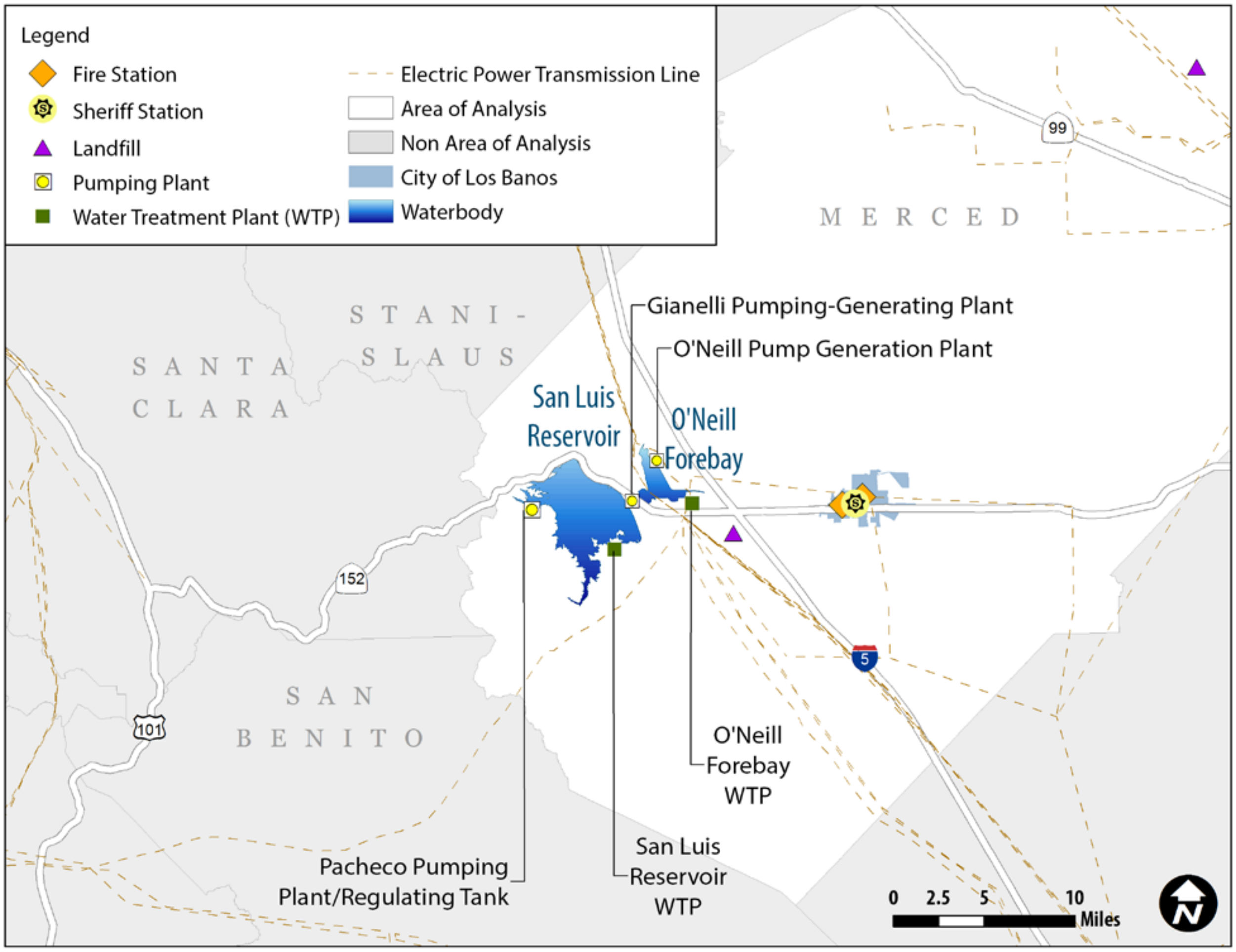


Figure 22-1. Public Utilities and Service Systems in the vicinity of the B.F. Sisk Dam Project area.

22.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Integrated Waste Management Act
- California Public Utilities Commission
- California Department of Resources Recycling and Recovery
- California Department of Parks and Recreation
- San Luis Reservoir State Recreation Area Final Resource Management Plan (RMP)/General Plan (GP) and Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR)

22.1.2.3 Regional/Local

The following county/local laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Merced County General Plan

22.1.3 Existing Conditions

The following section describes the existing public utilities, services, and power resources in the area of analysis.

22.1.3.1 San Luis Reservoir Region

22.1.3.1.1 Merced County

Public Services Police services in the unincorporated county are provided by the Sheriff's Department. The Merced County Fire Department is responsible for providing services ranging from fire protection and response to responding to medical emergencies and the exposure to hazardous materials (Merced County 2013).

Within the county, there are 20 school districts and 90 schools, one community college district with two campuses, and one public university. The Merced County Office of Education oversees the provision of primary public education within the county (Merced County 2013).

Utilities and Power Water supply in Merced County is provided by 12 water supply districts (Merced County Local Agency Formation Commission [LAFCO] 2007). The districts vary widely in size and service population. Almost all of the districts that provide water service rely exclusively on groundwater wells. Santa Nella Community Services District purchases the majority of its raw water from the San Luis Water District. Water for the San Luis Water District is diverted from the Delta-Mendota Canal (DMC) and the San Luis Canal (Merced County LAFCO 2007).

In unincorporated as well as incorporated parts of the county, wastewater and sanitary services are provided by 10 special districts including community service districts, water districts, and sanitary districts. Some areas of the county lack sewer infrastructure; these areas are served by septic systems (Merced County LAFCO 2007). Table 22-1 summarizes the water and wastewater service providers in Merced County.

Table 22-1. Summary of Water and Wastewater Service Providers

Provider	Water Service	Wastewater Service
Ballico Community Services District	X	
Country Club County Water District	X	
Delhi County Water District	X	X
Hilmar County Water District	X	X
Le Grande Community Services District	X	X
Midway Community Services District	X	X
North Dos Palos Water District	X	
Planada Community Services District	X	X
Santa Nella County Water District	X	X
South Dos Palos County Water District	X	X
Volta Community Services District	X	
Winton Water and Sanitary District	X	
Franklin County Water District		X
Snelling Community Services District		X

Source: Merced County LAFCO 2007.

Stormwater drainage in the county is provided by constructed drainage systems maintained by the county (Merced County 2013).

Solid waste in the county is collected through drop boxes and curbside collection. Within Merced County, there are two active solid waste disposal-landfill facilities owned by Merced County and operated by the Merced County Association of Governments Regional Waste Management Authority. The Merced County Department of Public Works Solid Waste Division is under contract to operate the Highway (HWY) 59 Landfill, which serves the eastern end of the county, and the Billy Wright Landfill, which serves the western end of the county. Both the HWY 59 Landfill and Billy Wright Landfill are defined as Class III landfills and accept mixed municipal solid waste. HWY 59 also accepts green materials, wood waste, tires, and other hazardous materials, while Billy Wright Landfill accepts construction/demolition waste (California Department of Resources Recycling and Recovery [CalRecycle] 2017a and CalRecyle 2017b). The HWY 59 Landfill is projected to have a remaining capacity of 28,025,334 cubic yards (CalRecycle 2017a). The Billy Wright site has a remaining capacity of 11,370,000 cubic yards (CalRecycle 2017b).

Electric services in the county are provided by Pacific Gas and Electric (PG&E) and the Merced and Turlock Irrigation Districts. PG&E provides natural gas within the county (Merced County 2013).

22.1.3.1.2 San Luis Reservoir

Public Services Fire protection and emergency medical response at the reservoir are provided by California Department of Forestry and Fire Protection's (CalFire) station south of Gonzaga Road and east of the San Luis Reservoir State Recreation Area (SRA) Administrative Offices. CalFire provides fire protection to State and privately-owned wildlands, and contracted services to many local governments within California (CalFire 2012). Park rangers and lifeguards are also trained for emergency medical response. Merced County also provides supplemental fire protection services to the SRA as needed. Security services at the SRA are provided by the California Department of Parks and Recreation (CDPR) using park rangers and lifeguards. Daily patrols are conducted at use areas and shifts vary according to the seasonal needs. A patrol boat is operational during high use seasons on the weekends and is on call the rest of the year (United States Department of the Interior, Bureau of Reclamation [Reclamation] and CDPR 2013).

Utilities and Power Public utilities serving the SRA include sewage and water treatment, water storage facilities, power transmission and distribution lines and propane. Sewage and water treatment is provided to day use areas and campgrounds. The San Luis Reservoir Water Treatment Plant (WTP) provides treatment for 72,000 gallons per day (gpd) at the Basalt Use Area serving the campground and dump station. A 100,000 storage tank provides storage for the San Luis Reservoir WTP. The O'Neill Forebay WTP in the San Luis Creek Use Area provides treatment for 72,000 gpd serving day use areas and campgrounds in the vicinity. Two water storage tanks providing a combined storage capacity of 260,000 gallons are located at the San Luis Creek Area and store water from the O'Neill Forebay WTP. Sewage treatment exists for both areas where waste is routed through sewer grinders and moved to evaporation/percolation ponds with lift station pumps. In addition to the sewage treatment facilities, pumper trucks are used to service chemical and vault toilets within the SRA (Reclamation and CDPR 2013).

Drinking and irrigation water is stored in two separate 1,000 gallon tanks at Dinosaur Point Use Area. Two 1,400 gallon and two 1,000 gallon drinking water storage tanks exist at the Medeiros Use Area. A 3,000 gallon drinking water tank serves the residences at Los Banos Creek Use Area, and two 3,000 gallon tanks storing drinking water for the boat launch and campgrounds at the Los Banos Creek Use Area (Reclamation and CDPR 2013).

Propane tanks are located at the SRA Administrative Offices, the Basalt Campground and the Los Banos Creek residences (Reclamation and CDPR 2013).

There is no formal stormwater system at the San Luis Reservoir. Runoff from the campgrounds, parking grounds, and boat ramps flows overland into area water bodies or percolates into the groundwater. The *San Luis Reservoir SRA Final Resource Management Plan (RMP)/General Plan (GP) and Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR)*includes Goal RES-WQ4 and associated guidelines to design and construct park infrastructure to minimize stormwater runoff, infiltrate stormwater for groundwater recharge and prevent soil erosion. The Los Banos Creek Reservoir was built to prevent local area creeks from flooding the California Canal and San Luis Aqueduct (Reclamation and CDPR 2013).

PG&E provides electricity to the SRA to serve the facilities. PG&E provides natural gas and electricity in northern and central California (70,000 square miles) to approximately 16 million people (PG&E 2017a). Power distribution lines serving the San Luis Creek entrance station kiosk and the Medeiros Use Area enter the site from the north and travel parallel to the western boundary to the kiosk. Additional distribution lines provide power to the San Luis Reservoir WTP and Quien Sabe wind warning lights entering the Basalt Use Area from the east. The residence area at Los Banos Creek is serviced by distribution lines along Canyon Road. No power service is provided to Dinosaur Point. PG&E provides natural gas service to the surrounding area, although not the SRA. A natural gas pipeline runs generally northwest-southeast between Interstate 5 and O'Neill Forebay, and intersects with another pipeline that runs east on Henry Miller Road (PG&E 2017b).

Certain water supply facilities in the reservoir area, that are part of the State and Federal joint San Luis Unit Project, use power to transport water and generate power. These facilities include:

- **O'Neill Pumping Plant** - This is a Federal facility and consists of an intake channel leading off the DMC and six pumping-generating units. The pumping-generating units lift water from 45 to 53 feet into the O'Neill Forebay. Each unit operates with a 6,000 horsepower (4,412 kilowatts [kW]) motor and is capable of discharging 700 cubic feet per second (cfs). When water is released from the forebay into the DMC, the pumping-generating units act as generators. Each generator has a capacity of approximately 4,200 kW, for a total installed capacity of 25,200 kW.

- **William R. Gianelli Pumping-Generating Plant** - This is a joint Federal/State facility that lifts water from O'Neill Forebay to San Luis Reservoir. During the irrigation season, water released from San Luis Reservoir through B.F. Sisk Dam generates energy as it flows back through the pump turbines to the forebay. Each of the eight pumping-generating units has a 63,000-horsepower (46,336 kW) motor and a capacity of 53,000 kilowatts as a generator, for a total installed capacity of 424,000 kW (Reclamation 2011). Reclamation is proposing to issue a 30-year Land Use Authorization to San Luis Renewables for construction and operation of the San Luis Solar Project on land surrounding San Luis Reservoir and O'Neill Forebay (Reclamation 2015).

22.2 Environmental Consequences/Environmental Impacts

The purpose of this section is to evaluate the environmental consequences of the alternatives on public utilities. The section describes the methodology, criteria for determining significance of impacts, and environmental consequences and mitigation measures associated with each of the alternatives.

22.2.1 Assessment Methods

Impacts to public services, utilities, and power resources could occur during construction of the action alternatives due to the use of construction equipment. The significance of these impacts is assessed qualitatively.

Implementation of the action alternatives would not result in long-term changes in land use or increases in population above expected growth rates that would impact public services including fire, police, emergency response, or schools. There would also be no long-term impacts to wastewater or stormwater utilities. Water supply impacts are discussed and analyzed in Chapter 5, Surface Water Supply.

Potential long-term impacts to energy use and power in the area of analysis could result from changes in water supply sources and the operation of water supply facilities. These changes are analyzed qualitatively based on the energy impact guidance in CEQA Appendix F: Energy Conservation. Specific significance criteria are described below.

22.2.2 Significance Criteria

The significance criteria described below were developed consistent with the CEQA Guidelines to determine the significance of potential impacts in relation to public utilities, services, and power. Impacts related to public utilities, services, and power would be considered potentially significant if the project would:

- Result in substantial adverse physical or environmental impacts associated with the provision of new or physically altered governmental services or facilities including fire protection, police protection, and schools;
- Require or result in the construction of new water, wastewater, or stormwater treatment/drainage facilities, the construction of which could cause significant environmental effects;
- Exceed the capacity of a landfill designated to accommodate the project’s solid waste disposal needs;
- Result in the need for additional capacity of local or regional energy supplies;
- Result in adverse effects related to the depletion of local or regional energy supplies; or,
- Result in wasteful, inefficient, or unnecessary consumption of energy.

22.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

Under the No Action/No Project Alternative, there would be no structural or operational changes to the B.F. Sisk Dam. The B.F. Sisk Dam would not be improved, and no new structures would be installed to protect the dam from potential seismic activities. There would be no construction activities that would result in adverse impacts related to the provision of new or physically altered governmental facilities. The No Action/No Project Alternative would not require new water, wastewater, or stormwater facilities to be constructed. Further, the No Action/No Project Alternative would not produce solid waste and would not result in increased energy use or the need for additional energy supply capacity. **There would be no impacts related to public utilities, services, or power in the area of analysis.**

22.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

22.2.4.1 Construction

Construction activities could affect the provision of governmental services or facilities. Construction actions are limited to revegetation of the reservoir rim between the maximum pool elevation and the proposed maximum restricted reservoir water surface planned with the Reservoir Restriction Alternative. Construction activities at San Luis Reservoir would require the presence of workers, and in the case of an emergency situation, could require emergency services from local fire or police responders. Construction is expected to last approximately 1.5 years. As described in the analysis of geological and materials hazards (Chapter 13, Hazards and Hazardous Materials, Chapter 19, Recreation, and Chapter 25, Geology and Soils), the impact of hazardous conditions during construction would be less than significant. Emergency response or remediation and containment plans would be implemented, if required, and Occupational Safety and Health Administration (OSHA) standards would be maintained. In addition, construction activities in the project area would comply with industry safety regulations required by the California Labor Code (Title 8 California Code of Regulations [CCR]), which would help to reduce the likelihood of construction accidents. Thus, there would not be a substantial adverse impacts related to the need for emergency services during construction. **Overall, effects to the provision of governmental services would be less than significant.**

Construction activities could result in the need for new water, wastewater, or stormwater facilities. Construction activities for the Reservoir Restriction Alternative would not generate increased demands for water supply in the San Luis Reservoir Region. Construction activities would not result in the need for additional water treatment or expansion of wastewater treatment facilities. Potable water and wastewater handling capacity demands generated by construction activities and the presence of construction workers would be met by existing local facilities and temporary/portable drinking water and waste disposal facilities brought onsite and serviced by the Lead Agencies. **There would be no impact.**

Construction activities could generate solid waste in excess of permitted land fill capacity. Construction activities associated with the Reservoir Restriction Alternative would require the limited transportation and offsite disposal of solid waste associated with packaging material used to deliver the seed and fiber mulch solids mixed with locally sourced water. Hydroseeding would require approximately 6,840,000 pounds (lbs) of mulch and seed materials[1] that would be delivered by truck in approximately 137,000 separate 50 lbs waterproof plastic bags that would be gathered in disposal trucks. The plastic wrapping material from these packages would be transported to the closest solid waste landfill, Billy Wright, which has remaining capacity of 11,370,000 cubic yards. **Hydroseeding activities would have a less than significant effect on landfill capacity in the San Luis Reservoir Region.**

Construction activities could result in adverse impacts associated with the use and/or depletion of local or regional energy supplies. During construction, power for construction demands would be supported through portable or trailer mounted generators. Thus, construction activities would not cause stress to, or lead to the depletion of, existing power supplies at the reservoir. **Impacts of construction activities associated with the Reservoir Restriction Alternative would be temporary and less than significant.**

Construction activities could result in wasteful, inefficient, or unnecessary consumption of energy. Construction of the Reservoir Restriction Alternative would increase energy consumption in the form of fuel use increases from the operation of hydroseeding equipment and vehicle trips to and from the construction sites. As was noted in Chapter 7, Air Quality, all onsite equipment and worker vehicles to be used for the Reservoir Restriction Alternative will be required in any construction contracts issued to meet Tier 4 emissions standards (2015 model year or newer) to meet emissions requirements. This requirement on model years would also help to avoid potentially wasteful fuel use during construction of the Reservoir Restriction Alternative given the corresponding improvements in fuel efficiency with newer model year vehicles. **Although construction of the Reservoir Restriction Alternative would result in the increased use of fuel, the use of new model year vehicles and construction equipment would limit the magnitude of these increases. Therefore, impacts would be less than significant.**

22.2.4.2 Operations

Operation of the Reservoir Restriction Alternative would lower the water level and change the amount of water pumped in and out of the reservoir. However,

[1] Hydroseeding requires approximately 1,800 pounds of seed and mulch material per acre (Fibramulch 2018). The new exposed area created by lowering the maximum reservoir surface elevation would be approximately 2,500 acres in size. The application of hydroseeding materials would require an initial application to the full area and second reapplication of those materials on roughly 50% of that area for a total of 3,800 acres.

all physical infrastructure would remain the same and there would be no need for additional governmental services and facilities, water infrastructure, or solid waste generation and disposal.

The long-term operation of the Reservoir Restriction Alternative could result in wasteful, inefficient, or unnecessary consumption of energy. Operation of the Reservoir Restriction Alternative would decrease the amount of electricity generated by the release of water at the Gianelli Pumping-Generating Plant given the decrease in the total amount of water released. However, the alternative would also decrease electricity use at the CVP and SWP Pumping Plants given the decrease in the total amount of water pumped. As discussed in Chapter 4, Water Quality, Delta exports would be reduced and therefore, use of the Delta pumps and infrastructure would be slightly reduced. Operation of the smaller reservoir would decrease the amount of electricity produced while also decreasing electricity use at the pumping plants. **This impact would be less than significant.**

Operation of the Reservoir Restriction Alternative could result in increases in stormwater runoff and the need for new stormwater drainage facilities. The Reservoir Restriction Alternative would not add any additional areas of impervious surfaces around the reservoir. Therefore, long-term operations would not increase stormwater runoff and would not exceed the capacity of the existing stormwater drainage system. **There would be no impact.**

22.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

22.2.5.1 Construction

Construction activities could adversely affect the provision of governmental services or facilities including fire and police protection, and schools. Construction activities at San Luis Reservoir would require the presence of workers, and in the case of an emergency situation, could require emergency services from local fire or police responders. Construction duration is based on 76 anticipated workers onsite both without and with the shear key option. Construction is expected to last approximately 8 to 10 years without the shear key option and 10 to 12 years with the addition of the shear key option. However, as was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend this construction schedule to 20 years. As described in the analysis of geological and materials hazards (Chapter 13, Hazards and Hazardous Materials, Chapter 19, Recreation, and Chapter 25, Geology and Soils), the impact of hazardous conditions during construction would be less than significant. Emergency response or remediation and containment plans would be implemented, if required, and OSHA standards would be maintained. In addition, construction activities in the project area would comply with industry safety regulations required by the California Labor Code (Title 8 CCR), which would help to reduce the likelihood of construction accidents. Thus, there would not be a substantial adverse impacts related to the need for emergency services during construction.

The construction workforce would be expected to be drawn from the local area and, for some staff, non-local construction workers that would establish permanent residence. Given the 8 to 12 year construction schedule, the Crest Raise Alternative could generate an influx of new permanent residents in Merced County. However, it is expected that 25 percent, or a maximum of 19 workers, would be non-local which would not result in a long term impact on public schools. **Overall, effects to the provision of governmental services would be less than significant.**

Construction activities could result in the need for new water, wastewater, or stormwater facilities. Construction activities for the Crest Raise Alternative would not generate increased demands for water supply in the San Luis Reservoir Region. Construction activities would not result in the need for additional water treatment or expansion of wastewater treatment facilities. Potable water and wastewater handling capacity demands generated by construction activities and the presence of construction workers would be met by existing local facilities and temporary/portable drinking water and waste disposal facilities brought onsite and serviced by the Lead Agencies.

Construction activities for the Crest Raise Alternative could lead to the generation of polluted stormwater runoff during excavation and earth moving activities, including the placement of additional fill material on the dam embankment to raise the dam crest, installation of two traffic signals, and potential use of a conveyor belt system (See Chapter 4, Water Quality). However, the National Pollutant Discharge Elimination System (NPDES) Program requires projects that would result in ground disturbance of greater than one acre to obtain coverage under a General Construction Activity Stormwater Permit. The NPDES General Construction Activity Stormwater Permit will require the Lead Agencies to prepare a Stormwater Pollution Prevention Plan (SWPPP) that describes the best management practices (BMPs) that will be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. The SWPPP will be prepared by the construction contractor prior to initiating construction activities. Specific BMPs that shall be incorporated into the SWPPP shall be site-specific and shall be prepared in accordance with the Regional Water Quality Control Board field manual. Common SWPPP objectives are described in Section 2.3.1. **Overall, construction of the Crest Raise Alternative would have less than significant impacts to water, wastewater, and stormwater facilities.**

Construction activities could generate solid waste in excess of permitted land fill capacity. The Crest Raise Alternative would require the transport and disposal of approximately 4,200 cubic yards of construction solid waste during the construction period. The solid waste material would be transported to the closest solid waste landfill, Billy Wright, which has remaining capacity of

11,370,000 cubic yards (CalRecycle 2017b). Offsite material disposal at area landfills will include concrete from the existing spillway, the 8-inch-diameter clay tile pipes from the existing toe drains, and steel and other materials from the removed transmission towers.

This solid waste would have a negligible impact on the permitted capacity at landfills within the B.F. Sisk Dam Project area given the current available landfill capacity of approximately 15 million cubic yards at the Billy Wright [78 percent remaining capacity]) and 28 million cubic yards at the HWY 59 Landfill [93 percent remaining capacity] (CalRecycle 2017a and CalRecycle 2017b). **Construction of the Crest Raise Alternative would have a less than significant effect on landfill capacity in the San Luis Reservoir Region.**

Construction activities could result in adverse impacts associated with the use and/or depletion of local or regional energy supplies. Construction of the Crest Raise Alternative would require the removal of one of the nine transmission towers near Gianelli Pumping-Generating Plant. Prior to removal, a reconfiguration of the transmission lines would be required, or reoperation of Gianelli Pumping-Generating Plant would occur for the approximate one year needed to excavate and construct the berm at the north valley section. The eight other transmission towers would remain operational and continue to transmit power. After completion of the north valley section berm, the removed transmission tower would be replaced. This would result in a temporary reduction of energy reclaimed as water is released.

During construction, temporary power facilities would be needed for construction equipment, welding, and trailers located at B.F. Sisk Dam, near Gianelli Pumping-Generating Plant. Of these new power demands, only the construction trailers would require connection via temporary distribution lines connected to existing local power supply lines at the Gianelli Pumping-Generating Plant. Power for all of the other construction demands would be supported through portable or trailer mounted generators. The new power demand generated by the construction trailers would be similar to a small residential home and would not exceed the capacity of the medium voltage distribution lines that serve power connections in the study area. Thus, construction activities would not cause stress to, or lead to the depletion of, existing power supplies at the reservoir. **Impacts of construction activities associated with the Crest Raise Alternative would be temporary and less than significant.**

Construction activities could result in wasteful, inefficient, or unnecessary consumption of energy. Construction of the Crest Raise Alternative would increase energy consumption in the form of fuel use increases from the operation of construction equipment and vehicle trips to and from the construction sites. As was noted in Chapter 7, Air Quality, all onsite equipment and off site delivery and haul truck and worker vehicles to be used for the Crest Raise Alternative will be required in any construction contracts issued to meet

Tier 4 emissions standards (2015 model year or newer). This requirement on model years would also help to avoid potentially wasteful fuel use during construction given the corresponding improvements in fuel efficiency with newer model year vehicles. **Although construction of the Crest Raise Alternative would result in the increased use of fuel, the use of new model year vehicles and construction equipment would limit the magnitude of these increases. Therefore, impacts would be less than significant.**

22.2.5.2 Operations

Under the Crest Raise Alternative, there would be no change to water supply operations. As a result, there would be no long-term impacts to governmental services and facilities, water supply and wastewater infrastructure, or solid waste generation and disposal.

The long-term operation of the Crest Raise Alternative could result in wasteful, inefficient, or unnecessary consumption of energy. There would be no change in operations under the Crest Raise Alternative. Operation of the Crest Raise Alternative would not change electricity use at the Pacheco Pumping Plant or at the Gianelli Pumping-Generating Plant. **There would be no impact.**

Operation of the Crest Raise Alternative could result in increases in stormwater runoff and the need for new stormwater drainage facilities. The Crest Raise Alternative includes planned permanent stormwater control structures to be constructed at the dam. The stormwater control structures would collect any additional stormwater runoff generated by the additional impervious surfaces of the dam. The analysis in Chapter 4, Water Quality, describes that there would be no long-term impact related to stormwater runoff. **Although construction of the Crest Raise Alternative would add impervious surfaces, planned stormwater controls would reduce the impact to existing stormwater drainage to less than significant.**

22.3 Comparative Analysis of Alternatives

Table 22-2 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 22-2 are National Environmental Policy Act (NEPA) impacts as well as California Environmental Quality Act (CEQA) impacts, but they are judged for significance only under CEQA.

Table 22-2. Comparative Analysis of Alternatives

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measures	Level of Significance After Mitigation
Construction activities could affect the provision of governmental services or facilities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could create the need for new stormwater facilities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could generate solid waste in need of disposal, which could exceed the capacity of landfills.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could use and/or depletion of local or regional energy supplies.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could result in wasteful, inefficient, or unnecessary consumption of energy.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Long-term operations could result in wasteful, inefficient, or unnecessary consumption of energy	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	NI	None	NI
Operations could result in increases in stormwater runoff and the need for new stormwater drainage facilities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS

Key:
NI = No Impact
None = no mitigation required
LTS = Less than significant
-- = Not Applicable

22.4 Mitigation Measures

No significant public utility impacts were identified for the action alternatives and no mitigation measures have been developed.

22.5 Significant Unavoidable Impacts

None of the action alternatives would result in significant unavoidable impacts on public utilities, services, and power.

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Chapter 23
Cultural Resources

Cultural resources may include prehistoric and historic period archaeological sites or isolated finds; buildings, structures, and objects within the historic period built environment; and resources of traditional importance to Native American tribes and other cultural groups. They are typically identified through surface survey, subsurface testing, documentary evidence, and/or oral history. This chapter focuses on cultural resources associated with the proposed alternatives under the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project). It describes the affected environment and potential environmental impacts associated with each alternative. It also presents a comparative analysis of anticipated impacts to cultural resources for each alternative, mitigation measures that would be implemented to lessen or avoid those impacts, and an analysis of potential cumulative effects to cultural resources.

23.1 Affected Environment

23.1.1 Area of Analysis

The cultural resources area of analysis includes all areas that may be impacted by the proposed alternatives considered in this EIS/EIR as well as surrounding 0.25 mile buffer areas that were subject to archival and record searches for prior cultural resource studies and known cultural resource locations (see Figures 23-1 and 23-2). The cultural resources area of analysis, also referred to in this chapter as the Project area, fully subsumes the area of potential effects (APE) for each action alternative. The APE is defined as the geographic area or areas within which a proposed alternative may directly or indirectly cause alterations to significant cultural resources (36 Code of Federal Regulations [CFR] Part 800.16[d]).

23.1.1.1 No Action/No Project Alternative

The No Action/No Project Alternative serves as the baseline against which each action alternative is examined, and it reflects current and expected future conditions in the Project area if no action is taken. Under the No Action/No Project Alternative, current operations at the San Luis Reservoir would remain unchanged. No structural alterations would take place, and there would be no changes to reservoir water storage levels. No new impacts to known cultural resources are anticipated under the No Action/No Project Alternative.

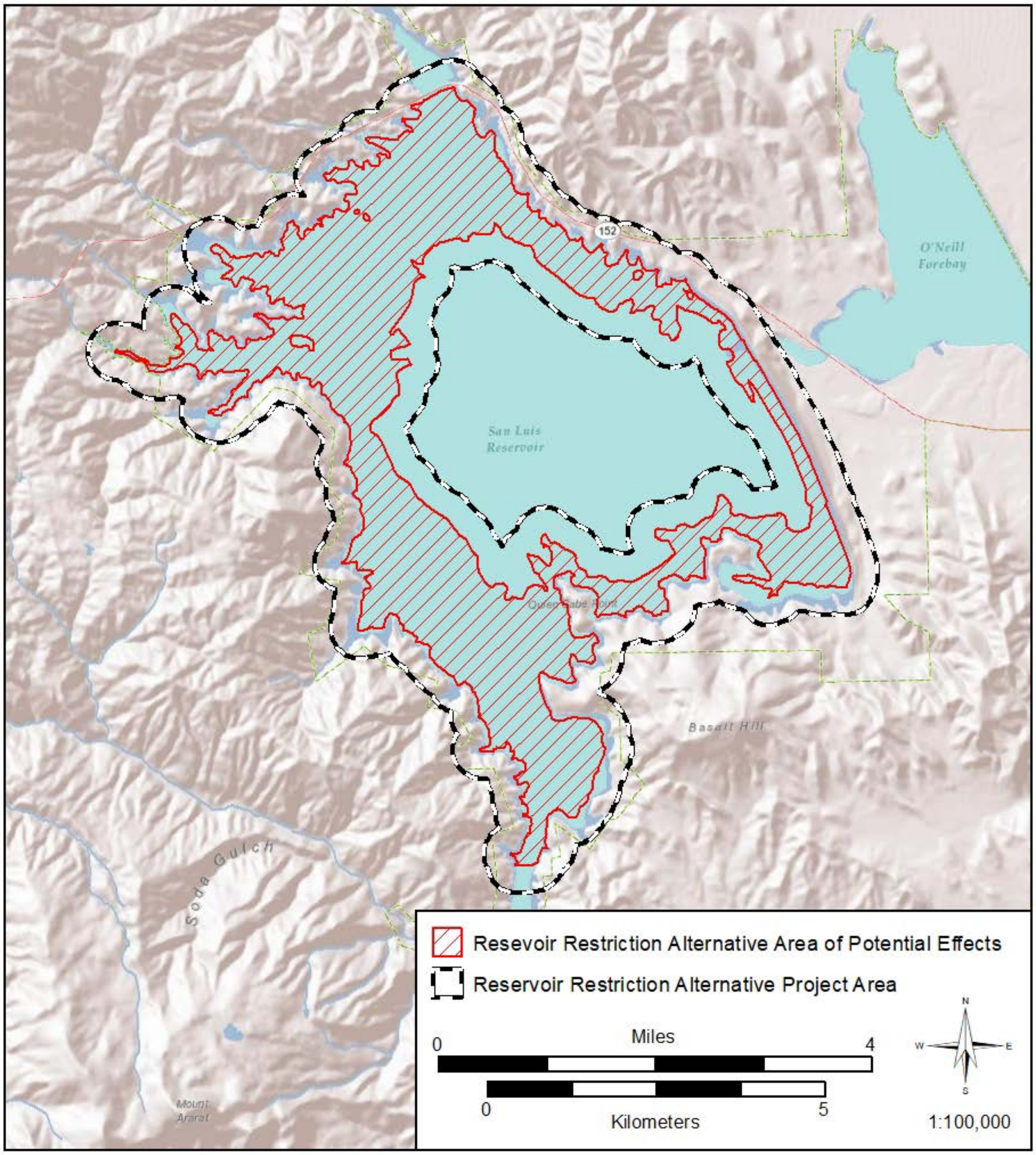
23.1.1.2 Reservoir Restriction Alternative

Under the Reservoir Restriction Alternative, the storage capacity of the San Luis Reservoir would be limited by restricting its maximum water level. As detailed in Appendix B, Modeling Technical Report, it would involve a 55 foot reduction from the current maximum surface elevation of 544 feet to a new maximum of 489 feet, thus reducing the storage capacity of the reservoir from 2,027,840 acre feet (AF) to 1,383,000 AF. Although the Reservoir Restriction Alternative would not meet all of the objectives of the Proposed Action, it would lower the probability of dam failure because there would be an increase in the amount of slumping that could occur during a seismic event before overtopping. The total amount of potential floodwater that would be released from the dam following its failure from a seismic event also would be reduced. In addition to restricting the maximum water level of the San Luis Reservoir, the Reservoir Restriction Alternative also would include the construction of a temporary access road to allow hydroseeding equipment to access the perimeter of the reservoir. This road would be established approximately 5 feet upslope of the maximum water level in areas that are currently too steep to accommodate vehicular access. The temporary access road would be returned to its pre-construction condition after hydroseeding actions are completed.

Since 1997, the surface elevation of the San Luis Reservoir has ranged from its current maximum of 544 feet to a minimum of 351 feet during severe drought conditions—a difference of 192 feet (California Department of Water Resources [DWR] 2017). The APE for lake fluctuations under the Reservoir Restriction Alternative would occupy a subset of that elevation zone. It would include all areas within the reservoir that would be exposed or subject to consistent wave action following water capacity reductions. The APE would encompass approximately 6,040.5 acres between the proposed maximum surface elevation of 489 feet and the new projected minimum elevation of 348 feet (see Appendix B, Modeling Technical Report). The Project area for the Reservoir Restriction Alternative, which was subject to archival and record searches in 2012 and 2016, consists of a 0.25 mile buffer surrounding the 348-489 foot elevation zone and all proposed temporary access road areas (see Figure 23-1).

23.1.1.3 Crest Raise Alternative

The Crest Raise Alternative, which is the preferred alternative and meets the requirements under the Proposed Action, would reduce the likelihood of overtopping if slumping were to occur during a seismic event by increasing the height of the B.F. Sisk Dam. This alternative would not prevent dam failure or cracking but would allow the reservoir to continue to operate at its current maximum storage elevation by adding embankment material, stability berms, and downstream crack filters to the existing structure. The Crest Raise Alternative would raise the dam crest an additional 12 feet to a new elevation of 566 feet. Downstream stability berms would be constructed by excavating

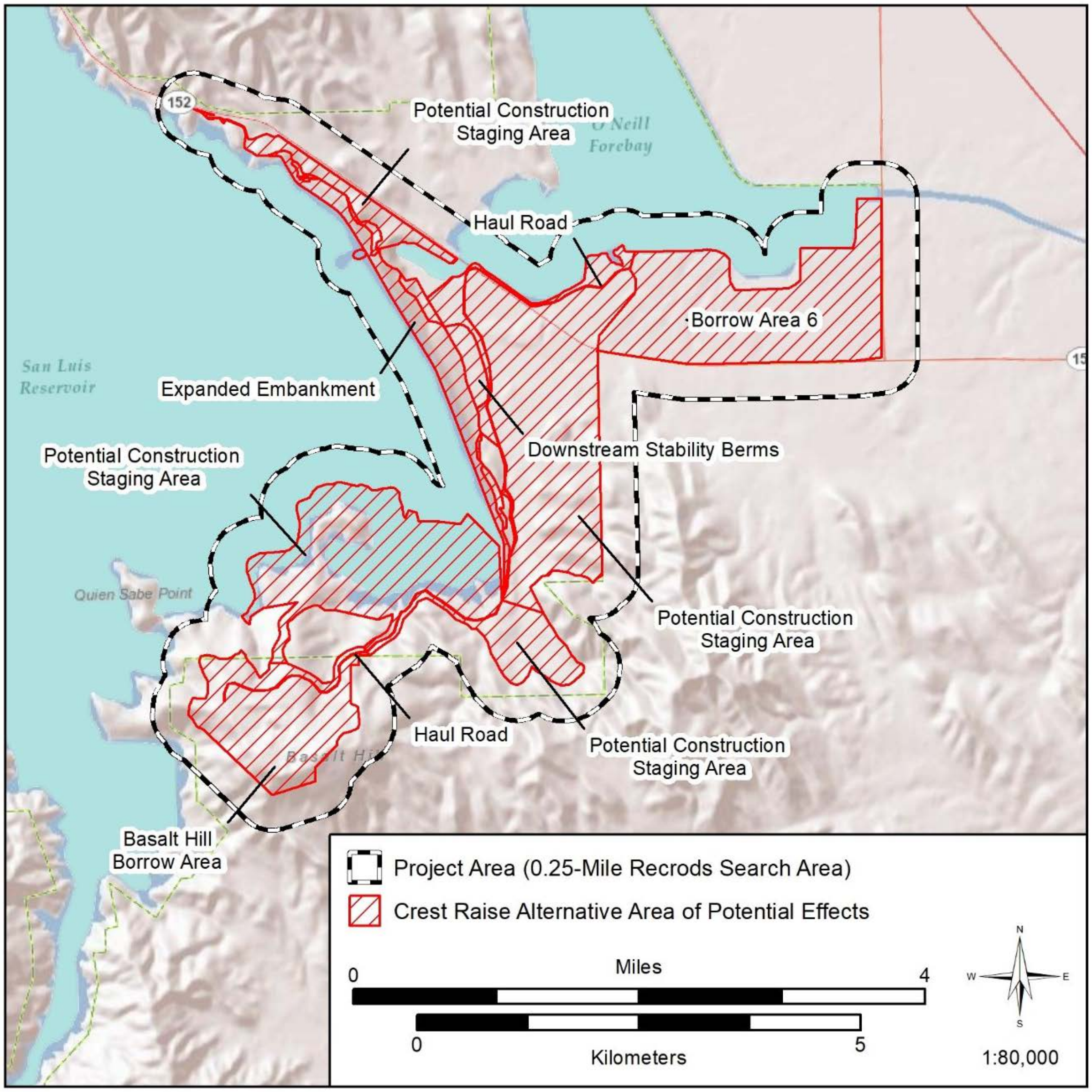


Source: Pacific Legacy, Inc. 2018.

Figure 23-1. Reservoir Restriction Alternative Area of Potential Effects and Project Area

existing foundation soils to bedrock. The development of a foundation shear key also is under consideration as an optional feature of this alternative.

The APE for the Crest Raise Alternative includes several areas centered on the B.F. Sisk Dam that will be subject to direct impacts, specifically the Basalt Hill Borrow Area, Borrow Area 6, three construction staging areas, upstream and downstream stability berms or fill impact areas, expanded embankment areas, haul roads, and possibly a tunnel under SR 152 that would accommodate a conveyor system. Cumulatively, these areas total 3,914 acres. A 0.25 mile buffer surrounding the APE was established as the Project area for the Crest Raise Alternative and was subject to archival and record searches in 2012 and 2016 (see Figure 23-2).



Source: Pacific Legacy, Inc. 2018.

Figure 23-2. Crest Raise Alternative Area of Potential Effects and Project Area

23.1.2 Regulatory Setting

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) serves as the Federal Lead Agency for the B.F. Sisk Dam SOD Project under the National Environmental Policy Act (NEPA), and DWR serves as the State Lead Agency under the California Environmental Quality Act (CEQA).

23.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- National Historic Preservation Act

23.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- California Environmental Quality Act Guidelines
- California Office of Historic Preservation
- California Natural Resources Agency

23.1.2.3 Regional/Local

The following Regional/Local laws, policies, and regulations are applicable to the B.F. Sisk Dam SOD Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Merced County General Plan

23.1.3 Environmental Setting

Information on cultural resources within the San Luis Reservoir vicinity was collected through archival and record searches, an examination of current literature, cultural resource inventory survey data, and an analysis of buried cultural resource sensitivity. This information was detailed fully in a recent technical report supporting the B.F. Sisk Dam SOD Project EIS/EIR and is briefly summarized below (Pacific Legacy 2018).

23.1.3.1 Project Area Prehistoric and Ethnographic Context

The cultural history of the San Joaquin Valley spans the Paleo-Indian (11,550-8,550 before Christ [BC]) through the Emergent (anno domini [AD] 1000-historic) periods (Rosenthal et al. 2007), though more localized chronological sequences have been established for the San Luis Reservoir vicinity by linking distinct artifact assemblages and mortuary practices with radiocarbon dates. These sequences include the Positas (3300-2600 BC), Pacheco (2,600 BC-AD

300), Gonzaga (AD 300-1000), and Panoche (AD 1500-1850) complexes (Olsen and Payen 1969; Moratto 1984).

The earliest evidence for human occupation of the San Luis Reservoir vicinity dates to the Positas Complex, which was noted through deposits at archaeological site CA-MER-94 within the Reservoir Restriction Alternative APE. The Positas Complex was distinguished by small, shaped mortars; short cylindrical pestles; millingstones; perforated flat cobbles; and spire-lopped *Olivella* beads (Moratto 1984, Olsen and Payen 1969). The Pacheco Complex also was represented at CA-MER-94. It was marked by two phases, one pre-dating and the other post-dating 1,600 BC. The first was distinguished by a proliferation of *Olivella* bead types; perforated canine teeth; bone awls, whistles, and saws; stemmed and side-notched projectile points; and abundant millingstones, mortars, and pestles. The second was marked by leaf-shaped bifaces, rectangular *Haliotis* ornaments, and thick *Olivella* beads. Fan and floodplain deposition during the Upper Archaic Period created many of the surface soils observable today. Expressions of the Gonzaga Complex were noted at CA-MER-94, CA-MER-3, and CA-MER-14. CA-MER-3 lay outside of the APE for both alternatives, but CA-MER-14 was originally recorded in the current footprint of the B.F. Sisk Dam within the Crest Raise Alternative APE. The Gonzaga Complex was characterized by extended and flexed burials; bowl mortars and shaped pestles; squared and tapered-stem projectile points; bone awls and grass saws; distinctive *Haliotis* ornaments; and thin rectangular, split-punched, and oval *Olivella* beads. The later Panoche Complex was distinguished by the remains of large, circular structures; flexed burials or primary and secondary cremations; millingstones; varied mortar and pestle types; bone awls, saws, whistles, and tubes; side-notched projectile points; clamshell disk beads; *Haliotis* disk beads; and *Olivella* lipped, side-ground, and rough disk beads (Moratto 1984).

The ethnographic tribes who occupied the San Luis Reservoir vicinity at the time of European contact were known as the Northern Valley Yokuts. The Yokuts were hunter-gatherers who divided themselves into tribelets organized by kin and shared dialects (Kroeber 1925; Wallace 1978). Tribelets were typically centered on a principal village surrounded by satellite communities located along watercourses such as Los Banos and Panoche creeks. Archaeological contexts have yielded a diverse array of Yokuts material culture. Mortars and pestles, handstones and millingslabs, and bedrock mortars were used for processing acorns, nuts, seeds, and berries while flaked stone arrow points, knives, and scraping implements made from locally available toolstone were used to hunt or process small to large game (Wallace 1978). Bone tools, particularly awls, were prevalent and were widely used in basketry production. Little evidence for Northern Valley Yokuts basketry has been recovered archaeologically, though it was likely similar to ethnographically known examples from the Southern Valley Yokuts who produced cooking containers, winnowing trays, water bottles, seed beaters, and other items (Wallace 1978). The Northern Valley Yokuts also played an active role in pre- and post-contact trade, which was facilitated by natural access routes such as Pacheco Pass (Arkush 1993).

23.1.3.2 Project Area Historic Context

By the mid-to-late 18th century, the Spanish had begun to expand northward from Mexico into Alta California by establishing a network of religious missions, military presidios, and civilian pueblos. The interior of Alta California, including the northern portion of the San Joaquin Valley, remained largely unexplored until 1806 when an expedition led by Gabriel Moraga ventured from San Juan Bautista to the San Joaquin River and north through Pacheco Pass to the Mokelumne River (Hoover et al. 1990:198). After Mexico gained its independence from Spain, Alta California became a part of the Mexican frontier. In 1843, José Maria Mejia and Juan Perez Pacheco petitioned the Mexican government for the rights to approximately 48,000 acres in and around Pacheco Pass. That land grant, *Rancho San Luis Gonzaga*, bordered *Rancho Ausaymas y San Felipe*, which was owned by Pacheco's father. By the mid-19th century, the Pacheco family had expanded its holdings to include more than 150,000 acres. *Rancho San Luis Gonzaga* was devoted largely to cattle grazing, and an adobe and *rancho* complex were constructed on the property in 1844.

Following the Mexican-American War and the signing of the Treaty of Guadalupe Hidalgo in 1848, Alta California became a part of the U.S. With the advent of the California Gold Rush in 1849 and a brief, unsuccessful gold rush in the Pacheco Pass area in 1851, the pass witnessed a dramatic increase in traffic from settlers and would-be miners. An adobe and *rancho* complex built by Pacheco became an important stage stop, and ultimately transitioned into a gas station and cafe (Beck and Haase 1974). In 1851, *Rancho San Luis Gonzaga* was leased to Pacheco's son-in-law who devoted the land to cattle operations in support of growing communities in the San Francisco Bay region and the Sierra Nevada foothills.

Following the decline of the Gold Rush, agriculture and ranching became increasingly important within the western San Joaquin Valley. During the late 19th century, however, the aridity of the western San Joaquin Valley began to pose problems for the region's farmers and ranchers. Wells were used initially, but as groundwater was depleted, canal projects were undertaken to convey water from the San Joaquin River. Henry Miller and his partner Charles Lux, who acquired vast landholdings throughout the region in support of their ranching operations, led early attempts to develop localized irrigation systems (Outcalt 1925). These systems provided much of the irrigation for Miller and Lux's properties and for local agriculture.

During the 1930s, the Federal government, through the Bureau of Reclamation, began the Central Valley Project (CVP), a massive irrigation scheme that involved building dams throughout California. America's entry into World War

II increased demand for agricultural products and further depleted groundwater in the western San Joaquin Valley (Reclamation 2011). By the 1950s, the region had become the focus of both the Federal CVP and the newly formed State Water Project (SWP) (Stene 2011). A 1954 Federal investigation identified the area along Pacheco Pass in the Diablo Range foothills as the ideal site for the San Luis Reservoir (Reclamation 2011). A California State bond measure to fund irrigation in the western San Joaquin Valley was narrowly passed in 1960. To avoid the unnecessary expense of parallel aqueducts, the State of California agreed to partner with the Federal government in the creation of the San Luis Unit of the CVP in 1961 (Stene 2011). The San Luis Reservoir would be filled with water supplied by the Federal Delta-Mendota Canal and the State's California Aqueduct (Stene 2011). A ground breaking ceremony officiated by John. F. Kennedy marked the start of construction on the B.F. Sisk Dam in 1962, and all construction was completed for the project by 1967. Typically, water from the Delta is pumped into the reservoir in winter and early spring and released in summer when water supplies are low (DWR 1974).

23.1.3.3 Archival and Record Searches

Archival and record searches of the Reservoir Restriction Alternative and Crest Raise Alternative Project areas were conducted at the Central California Information Center (CCIC) of the California Historical Resources Information System (CHRIS) in 2012 and 2016. These searches were performed in support of the San Luis Low Point Improvement Project (SLLPIP). Currently on hold, the SLLPIP is an undertaking proposed by Reclamation and the Santa Clara Valley Water District to increase the quantity and reliability of water supplies to contractors and consumers dependent on the San Luis Reservoir (Reclamation and Santa Clara Valley Water District [SCVWD] 2017). The Project area extents of the SLLPIP alternatives fully encompassed the Reservoir Restriction Alternative and Crest Raise Alternative Project areas, and all cultural resources data collected and processed as a part of the SLLPIP have been integrated in analyses for the B.F. Sisk Dam SOD Project.

23.1.3.3.1 Reservoir Restriction Alternative

Archival and record searches revealed that 20 prior cultural resource studies have been carried out within the Reservoir Restriction Alternative Project area and that seven of those studies overlapped portions of the APE. Twenty-seven cultural resources have been previously recorded within the Reservoir Restriction Alternative Project area. Of those, 12 were identified within the APE. These included the B.F. Sisk Dam System; a prehistoric archaeological district (P-24-000489) that intersects the APE but circumscribes sites that lie outside of the APE; seven prehistoric sites (CA-MER-17, CA-MER-19, CA-MER-24, CA-MER-26, CA-MER-41, CA-MER-42, and CA-MER-94), most containing midden, flaked stone, and groundstone; and three historic period resources, one consisting of rock features (CA-MER-261H), the second comprising segments of the old Pacheco Pass Highway (CA-MER-477H), and the third encompassing the location of the former Harris Ranch as noted through historic period topographic maps. Two of these resources have been previously evaluated for listing in the NRHP and/or the CRHR. One was the B.F. Sisk Dam System. Key elements of the system, specifically the B.F. Sisk Dam, the San Luis Reservoir, the O'Neill Dam and Forebay, the William R. Gianelli Pumping-Generating Plant, and the San Luis Operation and Maintenance Center, were recommended eligible for listing in the NRHP under Criterion A and in the CRHR under Criterion 1 in a draft report that was not finalized (ICF International 2013). More recently, these same elements of the B.F. Sisk Dam System have been collectively recommended eligible for listing in the NRHP under Criterion A and in the CRHR under Criterion 1 as contributing elements to the "B.F. Sisk Dam/San Luis Reservoir Historic District" (JRP 2018). Elements of the district were recommended not eligible for individual listing in the NRHP or the CRHR but taken together were found to be significant within the context of water resource development in California and an integral part of both the CVP and SWP (JRP 2018). The other resource was the San Luis Gonzaga Archaeological District (P-24-000489), an arbitrarily defined area listed in the NRHP and CRHR that encompasses five prehistoric midden sites (CA-MER-107, CA-MER-126 CA-MER-130, CA-MER-134, and CA-MER-135) that lie well outside of the APE.

23.1.3.3.2 Crest Raise Alternative

Archival and record searches revealed that 38 prior cultural resource studies have been carried out within the Crest Raise Alternative Project area and that 29 of those studies overlapped portions of the APE. Twelve cultural resources have been previously recorded within the Crest Raise Alternative Project area. Of those, five were identified within the APE. These included two prehistoric sites (CA-MER-14 and CA-MER-437) and three historic period resources (CA-MER-451H, CA-MER-521H, and the B.F. Sisk Dam System). Two of these five resources have been previously evaluated for listing in the NRHP and/or the CRHR. One was the B.F. Sisk Dam System, which was noted above (ICF International 2013; JRP 2018). The other was CA-MER-521H, a historic period livestock watering locale, which has been determined not eligible for listing in the NRHP with SHPO concurrence (Polanco 2018).

23.1.3.4 Native American Resources

No Native American cultural resources were identified by the NAHC in 2013 through a search of the Sacred Lands Inventory as it encompasses the APE for the Reservoir Restriction Alternative and Crest Raise Alternative. In November 2017, Reclamation requested consultation with Native American tribal representatives identified by the NAHC in advance of geotechnical investigations within the Crest Raise Alternative APE. The Dumna Wo Wah Tribal Government responded in December 2018 with a request for further information about the Project, and Reclamation responded to that request in January 2018. No Native American cultural resources were identified in the

Crest Raise Alternative APE through these efforts, though Reclamation will continue to consult with Native American tribal representatives for the B.F. Sisk Dam SOD Project pursuant to Section 106 of the NHPA. In coordination with Reclamation, DWR is consulting with Native American tribal representatives identified by the NAHC in accordance with CEQA, EO B-10-11, AB 52, and DWR Tribal Engagement Policy.

23.1.3.5 Cultural Resource Inventory Surveys

Cultural resource inventory surveys of the APE for the Reservoir Restriction Alternative and Crest Raise Alternative were conducted in 2012 and 2016 (Pacific Legacy 2017). The APE for both alternatives was examined using a survey interval of no more than 12-15 meters, and all previously recorded and newly discovered cultural resources were documented as appropriate. An architectural field survey of the B.F. Sisk Dam and its appurtenant features was conducted in 2018 in support of its evaluation for listing in the NRHP and the CRHR (JRP 2018).

23.1.3.5.1 Reservoir Restriction Alternative APE

The Reservoir Restriction Alternative APE encompasses all areas between the proposed maximum reservoir elevation of 489 feet and the projected minimum of 348 feet as well as areas approximately 5 feet upslope of the maximum water level in areas that will be graded to accommodate vehicular access for hydroseeding. Approximately 394 acres were examined between the 560 foot contour along the reservoir shoreline downslope for 50 meters. Roughly 5,646.5 acres were inundated or inaccessible and were not examined. Much of the area that was inundated during the inventory surveys will remain so under the No Action/No Project Alternative (California DWR 2017). Many areas along the current shoreline had been subject to wave action, resulting in shallow, stepped, cut terraces, particularly to the west of the B.F. Sisk Dam. Recreational activities in the same area had resulted in the construction of hundreds of rock features, including fishing rod supports that appeared as cairns or rock piles; rock alignments in linear or semi-circular shapes; and other rock accumulations.

Six of 12 cultural resources that were previously recorded in the Reservoir Restriction Alternative APE were relocated during the inventory surveys. They included a multi-component site with a previously recorded prehistoric midden and lithic scatter and a newly recorded historic period earthen dam and stock pond (CA-MER-26/H); two prehistoric midden sites with lithic scatters (CA-MER-42 and CA-MER-94); a historic period road segment (CA-MER-477H); a historic period rock pile feature within a site that formerly contained three rock features (CA-MER-261H); and the B.F. Sisk Dam System. One site that was originally recorded outside of the Reservoir Restriction Alternative APE was found to lie within it. It consisted of a prehistoric habitation site with pictographs, milling features, cleared areas, midden, and lithic tools (CA-MER-15). The recorded locations of five cultural resources that were not relocated

(CA-MER-17, CA-MER-19, CA-MER-24, CA-MER-41, and Harris Ranch vicinity) were fully or partially inundated at the time of the inventory surveys. The San Luis Gonzaga Archaeological District (P-24-000489), an arbitrarily defined area that encompasses five prehistoric sites that lie well outside of the APE, also was not relocated. Three resources consisting of one or more historic period road segments (CA-MER-489H, CA-MER-493H, and CA-MER-519H) and one historic period isolated find (P-24-001983) were newly recorded.

23.1.3.5.2 Crest Raise Alternative APE

The APE for the Crest Raise Alternative encompasses construction impact and staging areas, upstream and downstream stability berms or fill impact areas, expanded embankment areas, haul roads, and possibly a tunnel under SR 152 to accommodate a conveyor system. Cumulatively, these areas total 3,914 acres. Approximately 3,120 acres were examined while 468 acres were inaccessible due to safety concerns or inundation. A further 326 acres were defined as a part of the APE after inventory surveys were completed and so were not examined. Wave action and recreational activities have visibly impacted much of the potential construction staging area just west of the dam. Other areas, such as the potential construction staging area east of the dam have been disturbed by prior dam and facility construction activities.

Two of the five cultural resources previously recorded within the Crest Raise Alternative APE were found to be destroyed or non-cultural. One was originally recorded within the footprint of the B.F. Sisk Dam and was presumably destroyed by its construction (CA-MER-14). Another was found to be a natural feature (CA-MER-437). Remnants of a historic period ranch complex (CA-MER-451H) lay within an area that was added to the APE after the inventory surveys were completed and was not examined. Two known resources that were relocated included a historic period livestock watering locale (CA-MER-521H) and the B.F. Sisk Dam System. During the inventory surveys, 12 historic period archaeological sites or built environment resources were newly recorded and five isolated finds were discovered. The historic period archaeological sites or built environment resources included five road segments (CA-MER-491H, CA-MER-493H, CA-MER-494H, CA-MER-495H, and CA-MER-513H); the Basalt Hill Quarry (CA-MER-509H), which was used during dam construction; an industrial resource used for riprap separation (CA-MER-492H) that was connected via conveyer belt to the Basalt Hill Quarry; a concrete equipment pad (CA-MER-510H); a water tank on railroad ties within a corral (CA-MER-511H); a helicopter pad located near the dam (CA-MER-512H); a ditch segment (CA-MER-514H); and a series of survey markers and monitoring wells associated with dam maintenance and construction (CA-MER-520H). A historic period well head (P-24-002166), metal can (P-24-002167), and concrete foundation (P-24-002172) were recorded as isolated finds, along with one isolated prehistoric core (P-24-001990) and one biface fragment (P-24-001991).

23.2 Environmental Consequences/Environmental Impacts

The following sections describe the potential environmental consequences or impacts of the Reservoir Restriction Alternative and the Crest Raise Alternative on cultural resources. This analysis has been developed based on archival and record search information as well as data collected through systematic inventory surveys conducted within the APE for both alternatives.

23.2.1 Assessment Methods

Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties and affords the ACHP an opportunity to comment on such undertakings (see Section 23.1.2). Implementing regulations at 36 CFR Part 800 outline steps that must be taken to comply with Section 106 of the NHPA. The criteria for evaluating cultural resources for listing in the NRHP are defined at 36 CFR Part 60.4. A formal determination of NRHP eligibility is made when the SHPO concurs with an evaluation made by the Federal lead agency. Alternatively, the evaluation of a historic property may be submitted to the Keeper of the NRHP for a formal determination of NRHP eligibility.

The analysis of potential impacts to historic properties employs the criteria of adverse effect as developed by the ACHP in its regulations for the Protection of Historic Properties (36 CFR Part 800.5). Adverse effects can occur when an undertaking alters, directly or indirectly, any of the characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that diminishes the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Examples of adverse effects include but are not limited to physical destruction or damage; alteration, including restoration, rehabilitation, maintenance, or remediation; removal of a property from its historic location; change in the character of the property’s use or setting as it contributes to the property’s historic significance; the introduction of elements that diminish the property’s integrity; neglect of a property resulting in its deterioration or destruction; and, transfer, lease, or sale of a property out of Federal ownership or control without adequate restrictions to ensure long-term preservation of the property’s historic significance. The resolution of adverse effects to historic properties under Section 106 of the NHPA is outlined in 36 CFR Part 800.6.

CEQA requires State and local public agencies to identify potential impacts to historical resources, determine if those impacts will be significant, and identify alternatives and mitigation measures that will substantially reduce or eliminate significant impacts to historical resources. Similar provisions are established for unique archaeological resources under PRC 21083.2(b). Pursuant to PRC Section 21084.1, an impact is considered significant if a project would cause a substantial adverse change in the significance of a historical resource. Demolition, replacement, substantial alteration, and relocation are examples of actions that would alter the significance of a cultural resource included in or eligible for inclusion in the CRHR. The criteria for evaluating cultural resources for listing in the CRHR are based on NRHP criteria and are defined at PRC Section 5024.1. A resource is listed in the CRHR once an eligibility nomination has been vetted by the SHPO and approved by the California State Historical Resources Commission.

23.2.2 Significance Criteria

For the purposes of the B.F. Sisk Dam SOD Project EIS/EIR, Project impacts would be significant if they would result in adverse effects to a cultural resource included in or eligible for inclusion in the NRHP and/or the CRHR. In the sections that follow, environmental consequences/environmental impacts to cultural resources are examined for each of the alternatives examined under the B.F. Sisk Dam SOD Project EIS/EIR.

23.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

Under the No Action/No Project Alternative, none of the action alternatives under consideration would be implemented. The structural components and physical characteristics of the B.F. Sisk Dam would remain unaltered, and the maximum storage elevation of the San Luis Reservoir would remain 544 feet. Absent implementation of either action alternative, reservoir elevations would continue to fluctuate based on operational needs and environmental conditions. While cultural resources within the reservoir pool would continue to be exposed to wave action, weathering, and potential disturbance from inadvertent or intentional human activities, no new effects would occur. **The No Action/No Project Alternative would result in no new impacts to historic properties, historical resources, or other cultural resources.**

23.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

The Reservoir Restriction Alternative would cause no adverse effects/significant impacts to historic properties and/or historical resources. Archival and record searches and inventory surveys of accessible portions of the Reservoir Restriction Alternative APE revealed three prehistoric archaeological sites (CA-MER-15, CA-MER-42, and CA-MER-94), one site featuring prehistoric and historic period components (CA-MER-26/H), and six historic period resources (CA-MER-261H, CA-MER-477H, CA-MER-489H, CA-MER-493H, CA-MER-519H, and the San Luis Reservoir, a component of the larger B.F. Sisk Dam System). Elements of the B.F. Sisk Dam System were recommended eligible for listing in the NRHP under Criterion A and in the CRHR under Criterion 1 in a 2013 draft report (ICF International 2013). More recently, these same elements of the dam system have been collectively recommended eligible for listing in the NRHP under Criterion A and in the CRHR under Criterion 1 as contributing elements to the B.F. Sisk Dam/San Luis Reservoir Historic District (JRP 2018). Survey level NRHP and CRHR eligibility recommendations were offered for many of the remaining cultural resources in a technical study conducted for the SLLPIP (Pacific Legacy 2017), though some cannot be evaluated without further assessment. Five historic period resources (CA-MER-261H, CA-MER-477H, CA-MER-489H, CA-MER-493H, and CA-MER-519H) were recommended not eligible for listing in the NRHP and/or the CRHR, as was the historic period component of a sixth resource (CA-MER-26/H). The prehistoric component of that resource (CA-MER-26/H) and two additional prehistoric archaeological sites (CA-MER-15 and CA-MER-42) cannot be evaluated without further investigation. One prehistoric site (CA-MER-94) was recommended eligible for listing in the NRHP and CRHR on the basis of its data potential as revealed through extensive prior excavations (Olsen and Payen 1969) (see Section 23.1.3).

No direct impacts to historic properties and/or historical resources are anticipated if the Reservoir Restriction Alternative is implemented, and no new indirect impacts are expected. Under the Reservoir Restriction Alternative, the proposed maximum surface elevation of the reservoir would be 489 feet, while the projected minimum would be 348 feet (see Appendix B, Modeling Technical Report). Over the past 20 years, the surface elevation of the reservoir has fluctuated between a maximum of 544 feet and a minimum of 351 feet (California DWR 2017). Known or potential historic properties and/or historical resources within that elevation zone have already been exposed to wave action, weathering, and potential disturbance from inadvertent or intentional human activities (Pacific Legacy 2017). Ongoing impacts may be more pronounced if persistent wave action is confined to the projected, narrower elevation zone, however such differences are not expected to be significant. As under existing conditions, effects under the Reservoir Restriction Alternative will be most apparent at archaeological sites containing highly portable artifacts (e.g., flaked stone tools, historic period cans or bottles, etc.). The proposed road for hydroseeding that would be established in areas too steep for vehicular access will be designed to avoid historic properties and/or historical resources.

As noted above, the Reservoir Restriction Alternative would not meet all of the objectives of the Proposed Action and thus is not the preferred alternative. Access issues relating to inundation and reservoir operations precluded a complete inventory survey of the Reservoir Restriction Alternative APE. For these reasons, a full analysis of the potential effects of ongoing wave action, weathering, disturbance from human activities, and proposed road grading to support hydroseeding is not considered in this EIS/EIR. Should the Reservoir Restriction Alternative be selected for implementation, further analysis of impacts under this alternative would be undertaken to meet the requirements of Section 106 of the NHPA and CEQA.

Under the Reservoir Restriction Alternative, there would be no direct impacts to historic properties, historical resources, or other cultural resources and indirect impacts would be less than significant when compared to existing conditions or the No Action/No Project Alternative.

23.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - the Crest Raise Alternative

The Crest Raise Alternative could cause adverse effects and/or significant impacts to historic properties and/or historical resources. Archival and record searches and inventory surveys revealed 14 historic period archaeological sites or built environment resources within the Crest Raise Alternative APE. In addition to the B.F. Sisk Dam System, these included five road segments (CA-MER-491H, CA-MER-493H, CA-MER-494H, CA-MER-495H, and CA-MER-513H); two industrial sites associated with construction of the B.F. Sisk Dam (CA-MER-492H and CA-MER-509H); a concrete equipment pad (CA-MER-510H); two livestock watering locales (CA-MER-511H and CA-MER-521H); a helicopter pad (CA-MER-512H); a ditch segment (CA-MER-514H); and a series of survey markers and monitoring wells associated with dam construction and maintenance (CA-MER-520H).

As noted above, key elements of the B.F. Sisk Dam System have been recommended not eligible for listing in the NRHP or the CRHR as individual resources but have been recommended as contributing elements to the B.F. Sisk Dam/San Luis Reservoir Historic District under NRHP Criterion A and CRHR Criterion 1 (JRP 2018). CA-MER-492H and CA-MER-509H, both industrial resources that were used in the construction and development of the B.F. Sisk Dam System, have been recommended not eligible for listing in the NRHP or the CRHR as individual resources and are regarded as non-contributing elements of the B.F. Sisk Dam/San Luis Reservoir Historic District (JRP 2018). All of the remaining resources noted above were recommended not eligible for listing in the NRHP and the CRHR (Pacific Legacy 2017). To date, the SHPO has concurred with the NRHP recommendations for seven of those resources (CA-MER-510H, CA-MER-511H, CA-MER-512H, CA-MER-513H, CA-MER-514H, CA-MER-520H, and CA-MER-521H) (Polanco 2018).

The Crest Raise Alternative would reduce safety concerns for the downstream public by increasing the height of the B.F. Sisk Dam, thereby reducing the likelihood of overtopping if slumping were to occur during a seismic event. Although approximately 80 percent of the Crest Raise Alternative APE was subject to inventory survey, certain areas (i.e., within the Basalt Hill Borrow Area, near the B.F. Sisk Dam, and along the immediate reservoir shoreline) remained inaccessible due to safety constraints or inundation (see Section 23.1.3.6). It is assumed that most portions of the APE that remained inaccessible will not be used as staging or stockpiling locations during construction, though some areas (e.g., along the base of the existing dam) will be capped by fill materials, subject to stabilization measures, or used as borrow areas (e.g., the Basalt Hill Borrow Area). Two historic period road segments (CA-MER-493H and CA-MER-494H) will be improved and the Basalt Hill Quarry (CA-MER-509H) will be re-activated as a part of the Crest Raise Alternative. The northern edge of an industrial resource (CA-MER-492H) associated with the Basalt Hill Quarry intersects a potential construction staging area but will be avoided. Five cultural resources within the Basalt Hill Borrow Area or Borrow Area 6 (CA-MER-494H, CA-MER-509H, CA-MER-510H, CA-MER-511H, and CA-MER-521H) will be directly impacted because both areas will be used to supply fill materials for the enlarged dam embankment. Direct impacts will occur to the B.F. Sisk Dam System as stability berms are constructed, the dam embankment is enlarged, and the height of the dam is raised. No indirect impacts to historic properties and/or historical resources are anticipated under the Crest Raise Alternative. Construction is not expected to remove, alter, or add elements or features within the surrounding landscape that are incongruent with the current setting or with the B.F. Sisk Dam System, and JRP (2018) concluded that the Crest Raise Alternative would result in no adverse effects to the historic district or its contributing elements.

Under the Crest Raise Alternative, there would be direct and indirect impacts to known historic properties, historical resources, and other cultural resources. These impacts would be less than significant when compared to existing conditions or the No Action/No Project Alternative. **Under NEPA and CEQA, direct and indirect impacts to known historic properties and/or historical resources would be less than significant.** Identification efforts are unable to be fully completed prior to the approval of the Project, and direct or indirect impacts may occur to previously unidentified historic properties, historical resources, and other cultural resources under the Crest Raise Alternative. **Implementation of Mitigation Measure CR-1 (see Section 23.4) would reduce these impacts to a less than significant level under NEPA and CEQA.**

Under this alternative, there is the potential for adverse effects as described in 36 CFR Part 800.5. Formal NRHP evaluations and eligibility determinations for all unevaluated cultural resources within the APE will need to be completed prior to implementation of this alternative. **Reclamation will ensure that historic properties are identified, and any adverse effects to such properties are resolved (i.e., avoided, minimized or mitigated) through completion of the Section 106 process.**

23.3 Comparative Analysis of Alternatives

Table 23-1 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 23-1 are NEPA impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 23-1. Comparative Analysis of Alternative Impacts to Known Cultural Resources

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Project implementation could lead to adverse effects/significant impacts to historic properties and/or historical resources	Alternative 1- No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	Avoidance, minimization of impacts, and/or mitigation measures—determined through completion of the Section 106 process—will be required prior to implementation of this alternative.	LTS
	Alternative 3 - Crest Raise	LTS	Avoidance, minimization of impacts, and/or mitigation measures—determined through completion of the Section 106 process—will be required prior to implementation of this alternative.	LTS

Key:
LTS = less than significant
NI = no impact
None = no mitigation required
S = significant
-- = not required per CEQA Guidelines

23.4 Mitigation Measures

Mitigation Measure CR-1: Implement a formal agreement document to govern NHPA Section 106 compliance and resolve any adverse effects/significant impacts to cultural resources

The Reservoir Restriction Alternative fails to meet one of three critical objectives under the Proposed Action because it would result in a reduction in San Luis Reservoir storage capacity that would adversely impact water supply deliveries to CVP and SWP contractors. The Crest Raise Alternative, which is the preferred alternative, meets each of the Proposed Action objectives. No adverse effects/significant impacts to historic properties, historical resources, or other cultural resources were identified under the Reservoir Restriction Alternative. As efforts to identify historic properties are unable to be fully completed, and effects on historic properties cannot be fully determined prior to the approval of the Project, an agreement document will be negotiated to satisfy NHPA Section 106 compliance. Additional surveys are needed to identify potential historic properties within the APE. These surveys will be managed under the agreement document. Due to the need for additional surveys, potential adverse effects/significant impacts to historic properties are not fully known.

Once an alternative is selected and prior to signing a Record of Decision, Reclamation will complete the additional historic property identification and evaluation efforts under the negotiated agreement document, and any adverse effects to historic properties will be “resolved” through the completion of the Section 106 process, which will satisfy Federal lead agency requirements with respect to NEPA. A process to avoid, minimize impacts to, and/or mitigate adverse effects to historic properties will be formalized in an agreement document in compliance with 36 CFR Part 800.6(c). DWR will be a party to this agreement document, and implementation of measures identified to avoid, minimize impacts to, and/or mitigate adverse effects to historic properties will satisfy State lead agency obligations with respect to CEQA consistent with CCR Section 15126.4.

23.5 Significant Unavoidable Impacts

No significant, unavoidable impacts are anticipated under the Reservoir Restriction Alternative or Crest Raise Alternative following mitigation.

Chapter 24
Population and Housing

This chapter describes the existing population and housing conditions within the area of analysis and discusses potential effects on population and housing from the proposed alternatives.

24.1 Affected Environment/Environmental Setting

This section provides the area of analysis, the regulatory setting, and a description of the population and housing that may be affected by the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) Environmental Impact Statement/Environmental Impact Report (EIS/EIR) action alternatives.

24.1.1 Area of Analysis

Table 24-1 lists the area of analysis for population and housing. The area of analysis includes the communities at or directly adjacent to the proposed project sites, as well as those within commuting distance to the project sites (less than 40 miles away).

Table 24-1. Area of Analysis for Population and Housing

City/Town	County
Los Banos	Merced
Newman	Stanislaus
Gilroy	Santa Clara
Gustine	Merced
Santa Nella	Merced

24.1.2 Regulatory Setting

Regulations at the Federal, State, and local levels regarding housing are mainly concerned with the proper construction, provision, and siting of housing for a variety of incomes. The action alternatives would not involve the construction of new homes, or the demolition of existing homes, and given the size of the workforce required to construct the action alternatives this project would not indirectly generate new housing construction. Therefore, the regulations pertaining to housing would not apply.

24.1.3 Existing Conditions

The following section describes existing population and housing in the area of analysis.

24.1.3.1 San Luis Reservoir Region

All work on the Crest Raise Alternative would occur at San Luis Reservoir in Merced County. While the reservoir is in an unincorporated part of Merced County, it is within commuting distance to several communities. Table 24-2 below presents the 2016 population and housing characteristics for the communities nearest to San Luis Reservoir that would be expected to supply local workers and provide housing for non-local workers.

Table 24-2. Population and Housing for Communities near San Luis Reservoir (Estimated 2012-2016)

Population and Housing	Los Banos	Newman	Gilroy	Gustine	Santa Nella	Total
2016 Population	37,012	10,808	52,576	5,684	1,965	**108,045**
Total Housing Units	11,272	3,403	15,802	2,129	630	**33,236**
Total Occupied	10,698	3,195	15,386	1,960	606	**31,845**
Total Vacant	574	208	416	169	24	**1,391**
Vacant: For Rent	199	164	96	0	0	**459**
Vacant: For Sale	53	0	43	0	6	**102**

Source: United States (U.S.) Census Bureau 2016.

24.2 Environmental Consequences/Environmental Impacts

These sections describe the environmental consequences/environmental impacts associated with each project alternative.

24.2.1 Assessment Methods

This analysis considers whether or not an action alternative would result in a substantial increase in population, and if there would be sufficient housing available to accommodate this population increase. The vegetation actions of the Reservoir Restriction Alternative, with a duration of approximately 1.5 years and the construction of the Crest Raise Alternative, with a duration of approximately 8 to 12 years, could result in impacts to population and housing equivalent to what would be generated by a permanent increase in local population. As was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend the construction of the Crest Raise Alternative to 20 years.

It is assumed that about 75 percent of the labor could be supplied locally during construction. The remaining 25 percent of workers needed during construction would have to be brought in from other, more distant locations. Table 24-3, presents the number of construction workers that would be needed during peak construction, including the number of local workers and the number of non-local workers for each of the action alternatives.

Table 24-3. Construction Workers by Alternative

Alternative		Maximum Construction Workers	Number of Local Workers (75%)	Number of Non-Local Workers (25%)	Years of Construction
Reservoir Restriction Alternative		**20**	15	5	1.5
Crest Raise Alternative	No Shear Key	**76**	57	19	8 to 10
	With Shear Key	**76**	57	19	10 to 12

Table 24-4 lists the communities that are assumed to provide the local construction labor and their typical commute distances to the project site. Local workers are not expected to require housing accommodations because of their relatively short commute distances.

Table 24-4. Typical Commute Distances[1] (miles)

Local Communities Providing Labor	Estimated Distance of Community to Project Site (miles)
Los Banos	19
Newman	30
Gilroy	28
Gustine	27
Santa Nella	6

Note:
[1] Distances were approximated using Google Maps, and are accurate to within 5 miles

In addition to the local workforce, it is likely that some non-local workers would be necessary for specialized tasks. These workers would come from farther distances and would require accommodations during construction. For the purposes of analysis, it is assumed that one housing unit would be required per non-local worker and that this housing would be provided by the existing housing stock and that no new housing would be constructed for these workers.

For long-term maintenance activities, it is assumed that all workers would be provided locally. No non-local workers would be required and no population or housing impacts would occur.

24.2.2 Significance Criteria

For the purposes of the B.F. Sisk Dam SOD Project EIS/EIR, impacts on population and housing would be considered significant if they would:

- Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure); or
- Displace substantial numbers of people or existing housing, necessitating the construction of replacement housing elsewhere.

24.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

The No Action/No Project Alternative could induce substantial population growth or housing in the area of analysis. There would be no population and housing impacts with the implementation of the No Action/No Project Alternative. The impact of not implementing the B.F. Sisk Dam SOD Project and not conducting the associated construction activities would not change current or future population or housing trends. Population and housing growth would continue at a rate similar to existing conditions. **Therefore, the No Action/No Project Alternative would have no impact on population growth or housing resulting from growth inducement.**

The No Action/No Project Alternative could displace substantial numbers of people or existing housing. Without implementation of the B.F. Sisk Dam SOD Project, operations at the San Luis Reservoir would remain the same as existing conditions. **The No Action/No Project Alternative would have no impact on population or housing due to displacement.**

24.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

24.2.4.1 Construction

Construction of the Reservoir Restriction Alternative could have the potential to temporarily induce population growth in the area of analysis. The Reservoir Restriction Alternative would require a maximum of 20 workers at peak construction, including construction workers and construction truck delivery personnel. Approximately 5 of these workers are assumed to come from long distances and would require some type of accommodation for the duration of construction. This small number of workers would increase populations in the surrounding communities for the duration of construction, which this evaluation considers a long term effect. As shown in Table 24-2 above, there are estimated to be 459 total housing units available for rent in the surrounding communities, with 199 available in Los Banos, and 120 total housing units for sale, with 53 available in Los Banos. Non-local workers are assumed to most likely reside in Los Banos given its proximity to the construction site and availability of units available for rent and purchase, but the surrounding communities also have housing stock sufficient to provide accommodations for the non-local workers. Given the availability of housing in Los Banos along with other surrounding communities, no new housing would be required.

While the Reservoir Restriction Alternative would likely result in non-local workers travelling to the area and could increase the local community populations, increases in population would be minimal and temporary and there would be sufficient housing available to accommodate these construction workers. **Impacts on population and housing from growth inducement associated with construction would be less than significant.**

Construction of the Reservoir Restriction Alternative could displace people or houses and could require construction of replacement housing. There are currently no permanent residents or housing units in the Reservoir Restriction Alternative construction area and implementation of the reservoir restriction would not cause the displacement of any people or homes. **There would be no impact to population or housing due to displacement associated with construction.**

24.2.4.2 Operations

Operation of the Reservoir Restriction Alternative could induce population growth or housing in the area of analysis. With the implementation of the Reservoir Restriction Alternative, operations at the San Luis Reservoir would remain similar to the existing conditions, but at a lower capacity and would not induce population growth or housing in the area of analysis. Long-term maintenance of the Reservoir Restriction Alternative would not increase operation and maintenance requirements at B.F. Sisk Dam beyond what is currently required. **There would be no impact to population or housing resulting from growth inducement associated with operations.**

Operation of the Reservoir Restriction Alternative could displace people or houses and could require construction of replacement housing. Operations at the reservoir for the Reservoir Restriction Alternative would remain similar to the existing conditions, but at a lower capacity. This would not displace any people or housing. **There would be no impact to population or housing resulting from displacement associated with operations.**

24.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

24.2.5.1 Construction

Construction of the Crest Raise Alternative could have the potential to temporarily induce population growth in the area of analysis. The Crest Raise Alternative would require a maximum of 76 workers at peak construction, including construction workers and construction truck delivery personnel. Approximately 19 of these workers are assumed to come from long distances and would require some type of accommodation for the duration of construction. This small number of workers would increase populations in the surrounding communities for the duration of construction, which this evaluation considers a long term effect. As shown in Table 24-2 above, there are estimated to be 459 total housing units available for rent in the surrounding communities, with 199 available in Los Banos, and 102 total housing units for sale, with 53 available in Los Banos. Non-local workers are assumed to most likely reside in Los Banos given its proximity to the construction site and availability of units available for rent and purchase, but the surrounding communities also have housing stock sufficient to provide accommodations for the non-local workers. Given the availability of housing in Los Banos along with other surrounding communities, no new housing would be required.

While the Crest Raise Alternative would likely result in non-local workers travelling to the area and could increase the local community populations, increases in population would be minimal and temporary and there would be sufficient housing available to accommodate these construction workers. **Impacts on population and housing from growth inducement associated with construction would be less than significant.**

Construction of the Crest Raise Alternative could displace people or houses and could require construction of replacement housing. There are currently no permanent residents or housing units in the Crest Raise Alternative construction area and implementation of the raise would not cause the displacement of any people or homes. **There would be no impact to population or housing due to displacement associated with construction.**

24.2.5.2 Operations

Operation of the Crest Raise Alternative could induce population growth or housing in the area of analysis. The Crest Raise Alternative would operate San Luis Reservoir in the same way it is currently operated and would not induce population growth or housing in the area of analysis. Long-term maintenance of the Crest Raise Alternative would not increase operation and maintenance requirements at B.F. Sisk Dam beyond what is currently required. **There would be no impact to population or housing resulting from growth inducement associated with operations.**

Operation of the Crest Raise Alternative could displace people or houses and could require construction of replacement housing. Operation of the Crest Raise Alternative would not change compared to the No Action/No Project Alternative. This would not displace any people or housing. **There would be no impact to population or housing resulting from displacement associated with operations.**

24.3 Comparative Analysis of Alternatives

Table 24-5 lists the effects of each action alternative and compares them to existing conditions and the No Action/No Project Alternative. The impacts listed in Table 24-5 are National Environmental Policy Act (NEPA) impacts as well as California Environmental Quality Act (CEQA) impacts, but they are judged for significance only under CEQA.

Table 24-5. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction could temporarily induce population growth in the area of analysis, and potentially require new housing to accommodate this growth.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction could displace people or houses, and potentially require construction of replacement housing.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operation could induce substantial population growth or housing in the area of analysis.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Operations could displace a number of people or houses, and potentially require construction of replacement housing.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI

Key:
LTS = less than significant
NI = no impact
None = no mitigation required
-- = not required per CEQA Guidelines

24.4 Mitigation Measures

There would be no significant impacts; therefore no mitigation measures are required**.**

24.5 Significant Unavoidable Impacts

None of the action alternatives would result in significant unavoidable impacts to population or housing.

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Chapter 25
Geology, Seismicity, and Soils

25.1 Affected Environment/Environmental Setting

This section analyzes the project's potential effects related to geology, soils, and geologic hazards, including earthquakes and landslides. Related discussions about water-related and air-related soil erosion are presented in Chapter 4, Water Quality, and Chapter 7, Air Quality.

25.1.1 Area of Analysis

The area of analysis is based on the location of potential impacts, which differs depending on the alternative. The area of analysis for geology, seismicity, and soil impacts is located within Merced County. Figure 25-1 depicts the area of analysis.

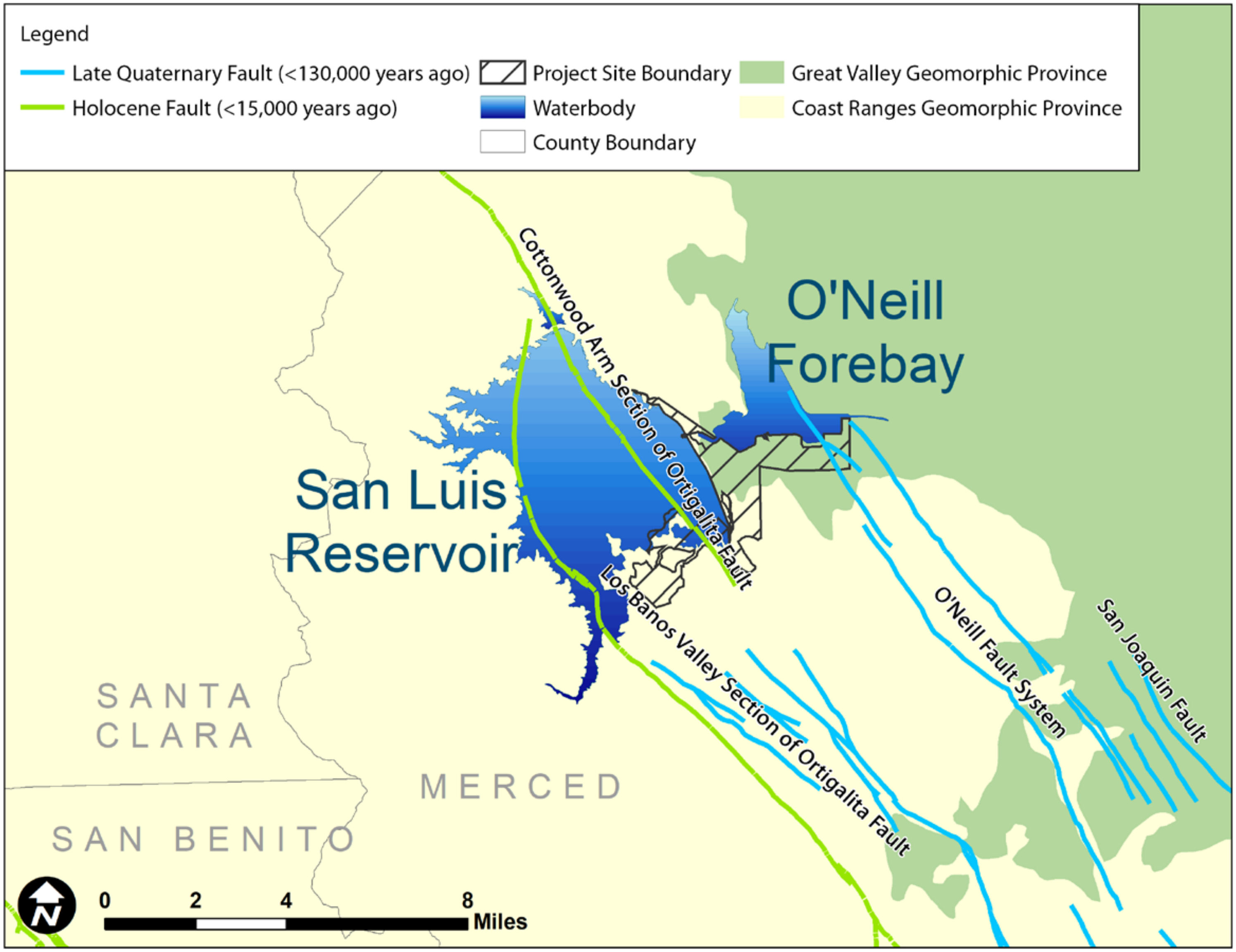
25.1.2 Regulatory Setting

Several Federal, State, and local regulations are applicable to geology, seismicity, and soils. These include the State's Alquist-Priolo Earthquake Fault Zoning Act and Seismic Hazards Mapping act as well as county regulations that address geologic hazards related to construction standards, structural integrity, and grading and erosion during construction.

25.1.2.1 Federal

The following Federal laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- United States Department of the Interior, Bureau of Reclamation (Reclamation) Safety of Dams Act
- Earthquake Hazard Reduction Act of 1977



Source: California Geological Survey 2002a; United States Geological Survey 2017

Figure 25-1. Geology, Faults, and Soils Area of Analysis

25.1.2.2 State

The following State laws, policies, and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- Seismic Hazards Mapping Act
- Surface Mining and Reclamation Act of 1975
- California Buildings Standards Code
- Alquist-Priolo Earthquake Fault Zoning Act
- California Department of Water Resources (DWR), Division of Safety of Dams

25.1.2.3 Regional/Local

Local jurisdictions typically regulate construction activities through a multi-stage permitting process that may require preparation of a site-specific geotechnical investigation. The purpose of a site-specific geotechnical investigation is to provide a geologic basis for the development of appropriate project design. Geotechnical investigations typically assess bedrock and Quaternary (recent) geology, geologic structure, soils, and previous history of excavation and fill placement. They may also address the requirements of the Alquist-Priolo Earthquake Fault Act, the Seismic Hazards Mapping Act, and/or local regulations.

The following local policies and regulations are applicable to the B.F. Sisk Dam Safety of Dams Modification Project and are described in Chapter 28, Consultation, Coordination, and Compliance.

- 2030 Merced County General Plan – Health and Safety Element and Natural Resources Element
- Merced County Code
- Guide to Building Permits and Inspections in Merced County (unincorporated areas)

25.1.3 Existing Conditions

The following sections describe some general soil properties as well as the existing geology, seismicity, and soils conditions within the area of analysis.

25.1.3.1 Soils

Soil types in the area of analysis include expansive soils, dispersive soils, and soils susceptible to hydro compaction. Dispersive soils and soils susceptible to hydro compaction are present east of B.F. Sisk Dam. Dispersive clays have been problematic along Reclamation and DWR's canals and other features in the vicinity of B.F. Sisk Dam.

Expansive soils are soils with the potential to experience considerable changes in volume, either shrinking or swelling, with changes in moisture content. Shrink-swell classes are based on the change in the length of an unconfined clump as its moisture content is decreased or increased. This change is often expressed as a percent and the value is called a linear extensibility percent. In soil surveys, the percent represents the overall change for the whole soil (United States Department of Agriculture [USDA], Natural Resources Conservation Service [NRCS] Nd.).

Soils composed primarily of sand and gravel are not considered expansive (i.e., the soil volume does not change with a change in moisture content). Soils containing silts and clays may possess expansive characteristics. The magnitude of shrink-swell capacity in expansive soils is influenced by:

- Amount of expansive silt or clay in the soil;
- Thickness of the expansive soil zone;
- Thickness of the active zone (depth at which the soils are not affected by dry or wet conditions);
- Climate (variations in soil moisture content as attributed to climatic or man-induced changes); and
- Confining pressure.

Soils are classified as having low, moderate, high, and very high potential for volume changes. The linear extensibility is expressed by percentages; the range of valid values is from 0 to 30 percent (USDA, NRCS Nd.). Table 25-1 summarizes shrink-swell classes and the associated linear extensibility percentage. If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures (USDA, NRCS Nd.).

Table 25-1. Shrink-Swell Class and Linear Extensibility

Shrink-Swell Class	Linear Extensibility
Low	< 3%
Moderate	3-6%
High	6-9%
Very High	≥ 9%

Source: USDA, NRCS Nd.

25.1.3.2 Regional Geology and Topography

California is divided into 11 defined geologic regions, called geomorphic provinces. The San Luis Reservoir and O’Neill Forebay are near the boundary of the Great Valley (San Joaquin Valley portion) and the Coast Ranges geomorphic provinces (California Geological Survey [CGS] 2002a).
Figure 25-1 depicts the area of analysis relative to these geomorphic provinces.

The Coast Ranges Province is a northwest-trending region that ranges in elevation between 2,000 to 4,000 feet above sea level with some areas reaching 6,000 feet above sea level (CGS 2002a). It extends approximately 50 miles in an east-west direction from the Pacific Ocean to the Great Valley. The Coast Ranges extend about 500 miles in a north-south direction stretching from the Transverse Ranges Province (in the south) to the Oregon border (CGS 2002a). The Coast Ranges run sub parallel to the San Andreas Fault, which is more than 700 miles long. The San Andreas Fault re-emerges in the Coast Ranges at Shelter Cove and extends northward on land for approximately 7 miles. This segment is referred to as the “Shelter Cove Section” (CGS 2002a). The Coast Ranges are composed of thick Mesozoic and Cenozoic sedimentary strata while the northern and southern ranges are separated by a depression containing the San Francisco Bay.

The Great Valley Province is an alluvial plain about 50 miles wide and 400 miles long in the central part of California (CGS 2002a). The Great Valley is geologically monotonous and forms a trough in which sediments have been deposited almost continuously since the Jurassic period (about 160 million years ago). The valley represents the alluvial, flood, and delta plains of its two major rivers, the Sacramento and San Joaquin, and their tributaries (Fuller et al. 2015). The only two topographic breaks in the province are remnants of an isolated Pliocene volcano located in the Sacramento Valley (CGS 2002a), and the Kettleman Hills on the western and southern sides of the San Joaquin Valley (Fuller et al. 2015). The southern and southwest portions of the San Joaquin Valley contain oil fields.

The boundary between these two provinces is roughly marked by the Ortigalita Fault and the O’Neill Fault System, which pass underneath and to the south of the San Luis Reservoir and O’Neill Forebay, see Figure 25-1 (Jennings and Bryant 2010; United States Geological Survey [USGS] 2011). The Ortigalita fault separates bedrock units of the upper Cretaceous marine and Plio-Pleistocene non-marine and the Recent overlying fan and basin deposits of the Great Valley (located to the east of the fault) from the upper Jurassic/lower Cretaceous Franciscan Complex bedrock units that make up the Diablo Range portion of the Coast Ranges Province (located to the west of the fault) (Dibblee 1975, Rogers 1966). These and other geologic units in the San Luis Reservoir region are described in more detail below. Faults and other potential geologic hazards in the region are described in more detail below in Section 25.1.3.3.3, Geologic Hazards.

25.1.3.3 Merced County - San Luis Reservoir Region

25.1.3.3.1 Geology

The *San Luis Reservoir State Recreation Area (SRA) Resource Management Plan (RMP)/General Plan (GP) Environmental Impact Assessment/Environmental Impact Report (EIS/EIR)*, describes the four geologic formations in the area around San Luis Reservoir. These include:

- **The Franciscan formation:** This formation is along the entire western side and southern tip of the reservoirs shoreline. This rock formation is the oldest in western Merced County and is composed of a thick assemblage of sedimentary, igneous, and metamorphic rocks. The sedimentary rocks consist of sandstone, shale, chert, and small amounts of conglomerate.

- **The Panoche formation:** This formation is along most of the eastern shore of the San Luis Reservoir with some intrusion of the Plio-Pleistocene nonmarine and fan deposits of the Great Central Valley. Portions of B.F. Sisk Dam is founded on the Panoche formation. The formation consists of arenaceous shale and thinly bedded sandstone, approximately 25,000 feet thick. The sedimentary sequence of the formation consists of lenses of coarse-grained conglomerate of boulders, cobbles, and pebbles of porphyritic and granite rock.

- **The Tulare formation:** This formation is found on the shore of O’Neill Forebay and adjacent to the forebay dam. This section of the formation varies in depth from 8 to 42 feet and overlies all of the older formations. In addition, the central portion of B.F. Sisk Dam is founded in the Tulare formation. The formation is approximately 150 feet thick below the maximum section of B.F. Sisk Dam. The Tulare formation consists of nonmarine gravel, sand, silt, and clay and is derived from rocks from the Franciscan formation. Stream terraces are also found in this formation. Briggs (1953 as cited in Herd 1979) also noted a dark gray to light gray colored diatomaceous clay in the O’Neill Forebay area.

25.1.3.3.2 Soils

This section describes the soil associations and properties of soils in the vicinity of the San Luis Reservoir.

There are several soil associations that occur around the San Luis Reservoir. The *RMP/GP* for the San Luis Reservoir SRA describes that Denverton, Kettleman, and Altamont clay associations occupy 2,650 acres of the lands surrounding the reservoir (Reclamation and California Department of Parks and Recreation [CDPR] 2013). Rough stony land is the second most common soil type in the reservoir area, occupying approximately 2,000 acres mostly on the western side of the reservoir. Other minor soil associations include the Rincon-

Pleasanton association composed of Pleasanton gravelly sandy loam, Los Banos clay loams, Rincon clay, and Rincon loam; Altamont-Kettleman loam to the northeast shore of O'Neill Forebay; Sobrante, Vallecitos, and Contra Costa loams; Herdlyn clay loam and Solano silt loam; Herdlyn clay loam on the southern and eastern shores of O'Neill Forebay; and Sorrento, Mocho, and Esparto loams in scattered areas at the reservoir (Reclamation and CDPR 2013). The reservoir area RMP/GP also describes that the majority of developed lands in the vicinity of the reservoir, including most recreation areas, have slight or moderate erosion potential. Many of the undeveloped areas along the western, northern, and southern shorelines are categorized as having severe erosion hazard.

The USDA, Soil Conservation Service (SCS; renamed the NRCS) published the most recent soil survey of western Merced County in 1990. The general soil map defines the following soils on the alluvial fans, foothills, and terraces of the San Joaquin Valley, and the foothills, mountains, and valleys of the Coast Range. The following soils all occur in the vicinity of San Luis Reservoir (USDA, SCS 1990).

- **Woo-Stanislaus:** These soils are to the east of O'Neill Forebay. They are very deep, nearly level to gently sloping, well drained soils and are located on alluvial fans. These soils have a loam, clay loam, sandy clay loam, and clay surface texture and mainly used for irrigated agriculture. The main limitations of these soils are the high shrink-swell potential.

- **Damluis-Bapos-Los Banos:** These soil units are along the eastern and southern shores of O'Neill Forebay. They are very deep, nearly level to strongly sloping, well drained soils and are located on terraces. Surface textures in this soil group include clay loam, and sandy clay loam. Smaller areas are comprised of soils with surface textures of extremely gravelly, gravelly clay loam, gravelly sandy loam, sandy loam, and loam. These soils are mainly used for irrigated and non-irrigated crops, rangeland, and recreation. The main limitation of these soils is the high shrink-swell potential.

- **Oneil-Apollo:** The Oneil-Apollo soil unit is along the eastern shore of San Luis Reservoir extending to the north and south. These soils are moderately deep and deep, gently sloping to steep, and well-drained with high organic matter content. The surface texture of these soils is a combination of calcareous silt loam, clay loam, clay, sandy clay loam, and sandy loam. These soils are generally used for rangeland with some areas suitable for agriculture, recreation, and wildlife habitat. These soils are not noted for high shrink-swell potentials.

- **Arburua-Wisflat:** These soils are south of San Luis Reservoir in the vicinity of Los Banos Reservoir. They are shallow and moderately deep, gently sloping to very steep, and well drained soils located along the foothills. The surface texture includes loam, sandy loam, clay loam, and calcareous clay. These soils are mainly used for rangeland and wildlife habitat and the main limitations are erosion hazards and steepness of slope. These soils are not noted for having high shrink-swell potentials.

- **Franciscan-Quinto-Rock outcrop:** These soils are to the north of San Luis Reservoir. They described as being shallow and moderately deep, steep to very steep, and found on rock outcrops and mountains. The surface texture is sandy loam, gravelly sandy loam, clay, and loam. The soils are mainly used for rangeland and wildlife habitat. The main limitation of these soils is steepness and erosion hazard. These soils are not noted for having high shrink-swell potentials.

- **Millsholm-Fifield-Honker:** These soils border the western edge of San Luis Reservoir and are described as shallow and moderately deep, and moderately sloping to very steep. They are generally well drained soils located on mountains. The surface texture is comprised of loam, sandy loam, and very stony clay. The soils are mainly used for rangeland and wildlife habitat and the main limitation is steepness of slope. These soils are not noted for having high shrink-swell potentials.

- **Peckham-Ararat-Laveaga:** There is a small area of these soils bordering the southern end of San Luis Reservoir. They are also found to the west of the reservoir along the border between Merced County and San Benito County and are found on volcanic mountains. This soil group is moderately deep and deep, gently sloping to very steep and well drained. The surface textures of the soils in this group include cobbly loam, extremely stony loam, sandy clay loam, clay loam, very stony clay loam and clay, clay, and clay loam. These soils are mainly used for rangeland and wildlife habitat and the main limitations are steepness of slope and a stony and cobbly surface. These soils are not noted for having high shrink-swell potentials.

Figure 25-2 depicts the arrangement of the major soil textures in the area of analysis. Figure 25-3 depicts the shrink-swell potential of soils in the area of analysis.

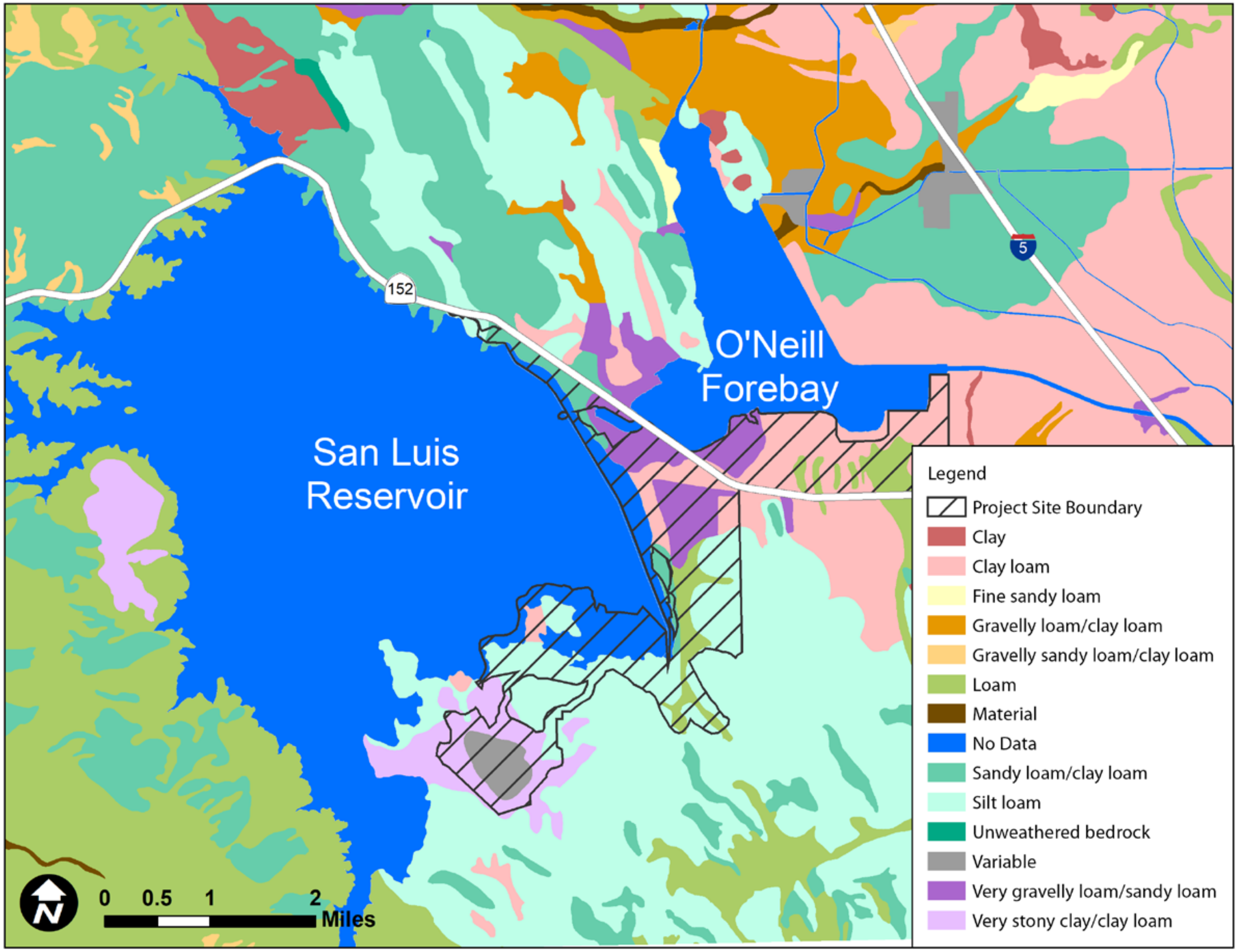


Figure 25-2. Soil Surface Texture Map – Merced County

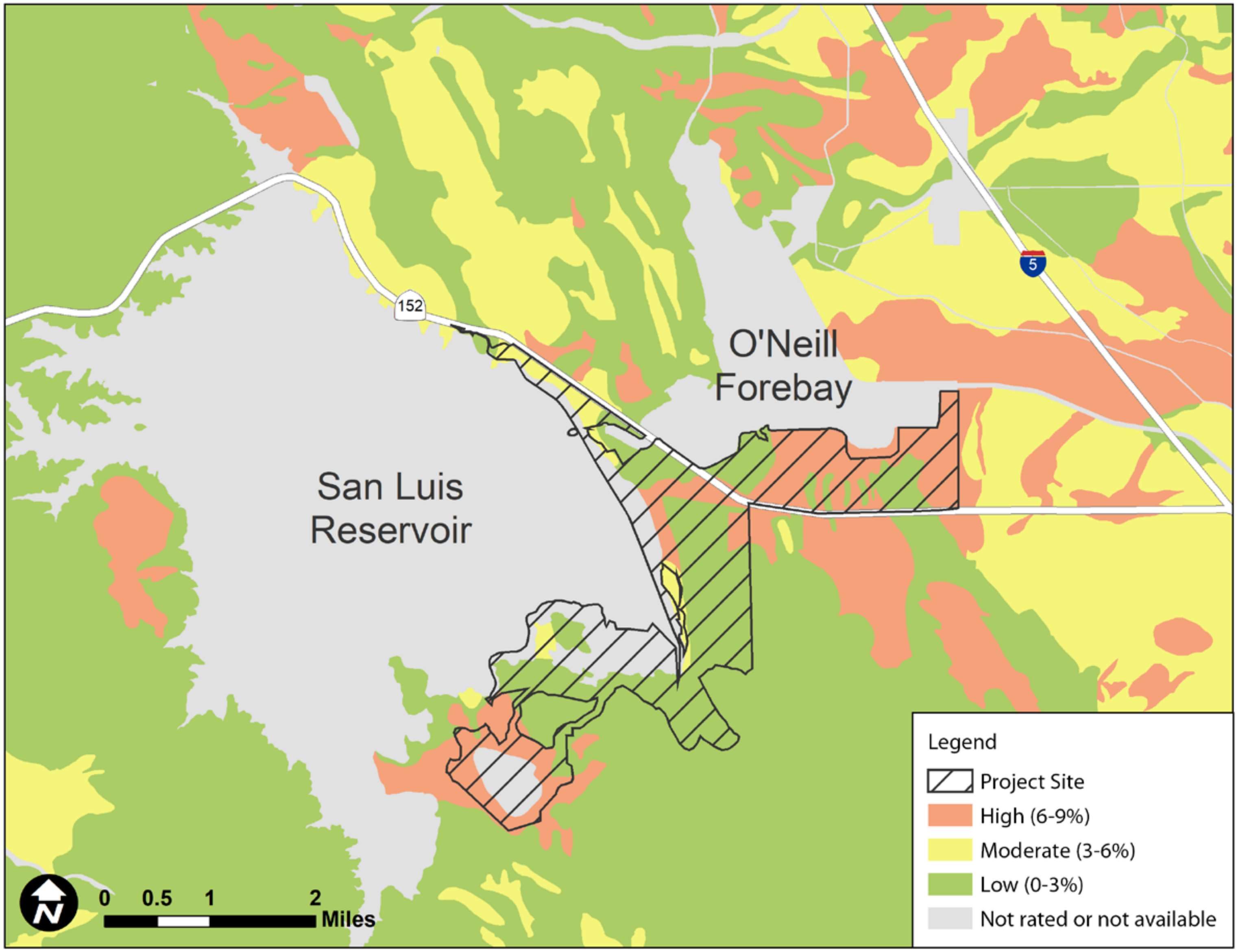


Figure 25-3. Shrink-Swell Potentials – Merced County

Soil types on the reservoir floor were characterized in geologic borings conducted by Reclamation in 1959. The San Luis and Cottonwood Creeks once flowed beneath the central area of B.F. Sisk Dam. The creeks meandered and deposited fluvial alluvium, creating the Patterson and San Luis Rach formation. These two formations consist of alternating layers of clayey soils and sandy/gravelly soils. Directly underlying these two formations is the Los Banos formation (alluvium) and/ or Tulare formation (alluvium and lacustrine deposits), which also consist of alternating layers of clayey soils and sandy/gravelly soils. The Panoche formation (bedrock), consisting of alternating layers of sandstone, shale, and conglomerate, underlies the Tulare formation. The maximum section of the dam is founded on soils from the four alluvial and lacustrine formations. Coarse grained soils from these formations are susceptible to liquefaction, that could cause the dam embankment to slump/ deform and be overtopped by reservoir water. Fine grained clayey soils from these formations may be sufficiently weak such that they could shear and allow the dam embankment to slide (given a sufficient shaking during a seismic event). Furthermore, portions of the dam embankment are founded on clayey colluvium (slopewash), that presents the same seismic risk as fine grained clayey soils (Reclamation 2010).

25.1.3.3.3 Geologic Hazards

San Luis Reservoir is in a seismically active area and is close to several faults and fault systems. The Ortigalita fault passes under the reservoir in two locations, one is along the western shore of the reservoir crossing over Lone Oak Bay to the east and the other runs from Cottonwood Bay close to the eastern shore of the reservoir on the eastern side of Basalt Hill, shown above in Figure 25-1 (Reclamation and CDPR 2013 and USGS 2011). A detailed geologic study to characterize all the potential seismic sources[1] in the area of B.F. Sisk and O'Neill Forebay dams was conducted by Reclamation in 1999 and 2000. That study identified 9 faults as being potentially significant sources of seismic shaking, including:

- Strike Slip faults of the Ortigalita and San Andreas faults;
- West-dipping bedding-plane reverse faults within the Great Valley Sequence; and
- West-dipping blind thrust faults along the uplift margin of the Diablo Range (Reclamation 2009).

Reclamation also performed an evaluation of Quaternary Stratigraphy and Possible Quaternary Fault Displacement for B.F. Sisk dam in Technical Memorandum (TM) 86-68330-2009-01 (Reclamation 2010). According to TM

[1] CGS describes seismic sources (faults) as (1) Active, which describe historical and Holocene faults with displacements within the past 11,000 years; (2) Potentially Active, which describes faults with evidence of displacements during the Quaternary (the past 1.6 million years); (3) Inactive, which are pre-Quaternary age. Seismic events and displacements may still take place along an inactive fault; however, the chance of that happening are considered low

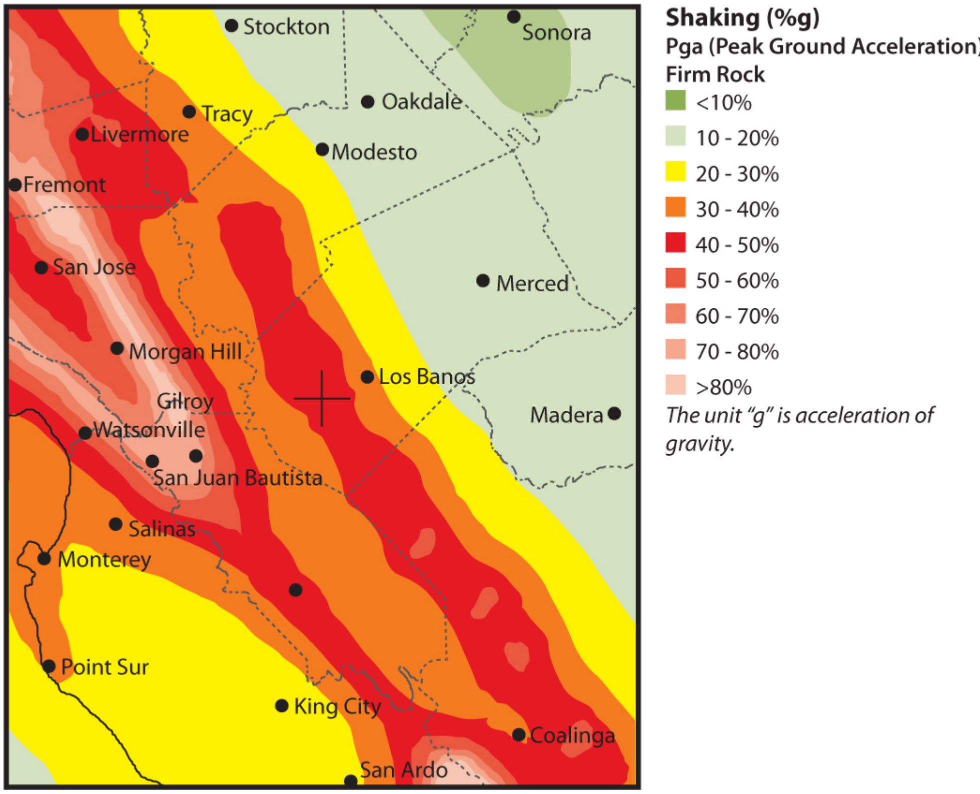
86-68330-2009-01, the numerous faults and shears present in the dam foundation are thought to be older than late Quaternary (130,000 years). There is no evidence of repeated seismic activity in the Quaternary (less than 2.6 million years ago), which was taken into consideration for this probabilistic analysis (Reclamation 2010).

Located in the eastern part of the San Andreas Fault system, the Ortigalita Fault in the vicinity of the reservoir has two sections, the Los Banos Valley section and the Cottonwood Arm section, see Figure 25-1 (roughly corresponding to the locations described above [USGS 2011 and Bryant and Cluett 2000a]). The Los Banos Valley section is in Merced County. Bryant and Cluett (2000b) do not report any recent (historic) earthquakes and the most recent prehistoric deformation (defined as the most recent prehistoric surface rupturing or surface deforming earthquake) was the latest Quaternary (around 15,000 years ago). The Cottonwood Arm section is in Merced and Stanislaus Counties. There are no records of recent earthquake activity along this section of the Ortigalita fault zone. The most recent prehistoric deformation was around 15,000 years ago (Bryant and Cluett 2000a).

The O'Neill Fault System runs south and east of O'Neill Forebay and south of San Luis Reservoir, see Figure 25-1 (USGS 2011). The most recent prehistoric deformation at this fault system was around 130,000 years ago (USGS 2011).

The Calaveras and San Andreas faults are 23 and 28 miles away, respectively (Reclamation and CDPR 2013). These faults can cause earthquakes at or near San Luis Reservoir given that fault offsets can take place either along a single, or multiple fault planes. During a seismic event, secondary fault rupture and displacements can take place on neighboring faults, which had been considered to be less than active.

The CGS publishes maps of the probabilistic seismic hazards in the State. Figure 25-4 shows the probabilistic seismic ground shaking in Merced County near San Luis Reservoir. The peak ground acceleration in firm rock in the area of the reservoir is approximately 0.4g ("g" is the acceleration of gravity). As illustrated in the figure, the western part of Merced County would be subject to higher ground shaking than the eastern part of the county in the case of an earthquake. This peak acceleration has a 10 percent probability of being exceeded in 50 years.



Source: CGS 2012.

Figure 25-4. Site Peak Ground Acceleration – Merced County

The 2007 Working Group on California Earthquake Probabilities developed earthquake rupture forecasts to predict the likelihood of a magnitude 5 or greater earthquake occurring in the next 30 years (USGS, California Department of Conservation [DOC] and CGS 2008). Table 25-2 summarizes the group's findings relative to Type A faults (defined as faults known to be active) in the area of analysis.

Table 25-2. 30-Year Probability of Magnitude 6.7 Events on Type A Faults

Fault	Mean Probability
South San Andreas	59%
Calaveras	7%

Source: USGS and CGS 2008

There are 11 major dams either in Merced County or adjacent to the county with known populations in their inundation areas (i.e., areas inundated when dams fail) and dam failure is heightened in areas of greater seismic activity. The general plan notes that B.F. Sisk Dam is the one dam in the county that has the possibility of being subject to seismic activity; however, the siting of the dam in the vicinity of the Ortigalita fault has been compensated for by structural design (Merced County 2013). The dam was constructed to withstand a magnitude 8.3

occurrence; however, this does not completely eliminate the possibility of dam failure and related flooding (Merced County 2013). A 2009 study by Reclamation investigated the unconsolidated Quartenary geologic units that large portions of B.F. Sisk Dam was built on and the potential for liquefaction of these deposits during a seismic event and concluded that “it seem[ed] prudent to assume that limited ‘secondary’ fault displacement could occur within the foundation of B.F. Sisk Dam during a major earthquake on either the Ortigalita fault or a nearby buried thrust fault” (Reclamation 2009). The study further concluded that the probability of fault displacement in the foundation “appear[ed] to be low, primarily because of the abundant evidence which indicates that no major Quaternary faults, and probably no faults with late Quaternary displacement, are present within the dam foundation” (Reclamation 2009).

The B.F. Sisk Dam inundation area extends from the dam northeast and southeast covering the towns of Santa Nella, Los Banos, and Gustine. The dam inundation area for O’Neill Forebay is somewhat smaller following a western arch over Santa Nella and then north running along the western side of Gustine (Merced County 2013).

The *2030 Merced County General Plan Background Report* notes that there is potential for liquefaction and related hazards throughout the San Joaquin Valley area where unconsolidated sediments and a high water table coincide. These areas include the county’s wetland areas which are generally adjacent to the San Joaquin River and extend west to the Southern Pacific Railroad and east toward State Highways 99 and 59 south (Merced County 2013). There are two wetland areas identified in the *2030 Merced County General Plan Background Report*; however, these are located to the southwest of the reservoir (Merced County 2013). As described above, other wetland areas are closer to State Highways 99 and 59 in the eastern part of the county and not in the area of analysis.

Liquefaction can also occur as a result of earthquakes, if susceptible sediments are saturated during ground shaking. If the soil liquefies, it loses its ability to support structures and they may settle into the ground causing damage that can range from minor displacement to total collapse (Merced County 2013).

In 2006, as a response to studies that determined B.F. Sisk Dam poses a potential risk of seismic failure, Reclamation initiated a Safety of Dams (SOD) Modification Project (Project) with DWR to determine a course of action to reduce the risk of dam failure, resulting in the development of this EIS/EIR.

Landslides are common within the Coast Ranges, specifically, the west side of Merced County due to steep slopes, unstable terrain and proximity to earthquake faults (Merced County 2013). As mapped by the county, the eastern portion of San Luis Reservoir including O’Neill Forebay is in a low potential landslide zone while the western portion of the reservoir is in a medium potential landslide zone (Merced County 2013).

25.1.3.3.4 Naturally Occurring Asbestos

There are no reported asbestos occurrences, former asbestos mines, or former asbestos prospects mapped in Merced County.

The USGS, CGS, and California Department of Conservation (California DOC), Division of Oil, Gas & Geothermal Resources (DOGGR) have mapped historic mines and natural occurrences of asbestos throughout California (California DOC, DOGGR 2000; USGS, DOC and CGS 2011). There are known occurrences of ultramafic rock outcrops in the western part of the county. Ultramafic rocks are formed in high temperatures below the surface of the earth and change to metamorphic rock by the time they are exposed at the surface by uplift or erosion. These rocks can then form chrysotile asbestos or tremolite-actinolite asbestos in bodies of ultramafic rock or along their boundaries (California DOC, DOGGR 2000). Ultramafic rock is known to occur in Merced County near the border of Stanislaus County north of San Luis Reservoir and near the border of Fresno County to the south of the reservoir (California DOC, DOGGR 2000; USGS, DOC and CGS 2011). Neither of these sites would be within the area of construction for the Crest Raise Alternative.

25.1.3.3.5 Mineral Resources

As part of the Surface Mining and Reclamation Act of 1975 (described in Chapter 28, Consultation, Coordination, and Compliance), the CGS produces mineral land classification maps and reports. Part of the mineral land classification involves the mapping of aggregate availability throughout the State. Aggregate is defined as construction aggregate which is composed of alluvial sand and gravel or crushed stone that meets standard specifications for use in Portland cement concrete or asphalt concrete (Kohler 2006a). The statewide map of aggregate availability shows the location of aggregate mines in Merced County; however, none are located in the vicinity of San Luis Reservoir. The general location of the mine(s) is southwest of Los Banos on the east side of Interstate 5 (Kohler 2006b).

The CGS also maps the location of historic and active gold mines throughout the State (CGS 2002b and 2000). There are no active gold mines in Merced County. Historically active gold mines are located in the far eastern area of the county and are not near San Luis Reservoir (CGS 2000).

The California DOC, DOGGR identified one dry hole well near the eastern edge of the O’Neill Forebay near the connection to the California Aqueduct. This well was abandoned in 1937 (California DOC, DOGGR 2010).
Figure 25-5 shows the location of this abandoned well.

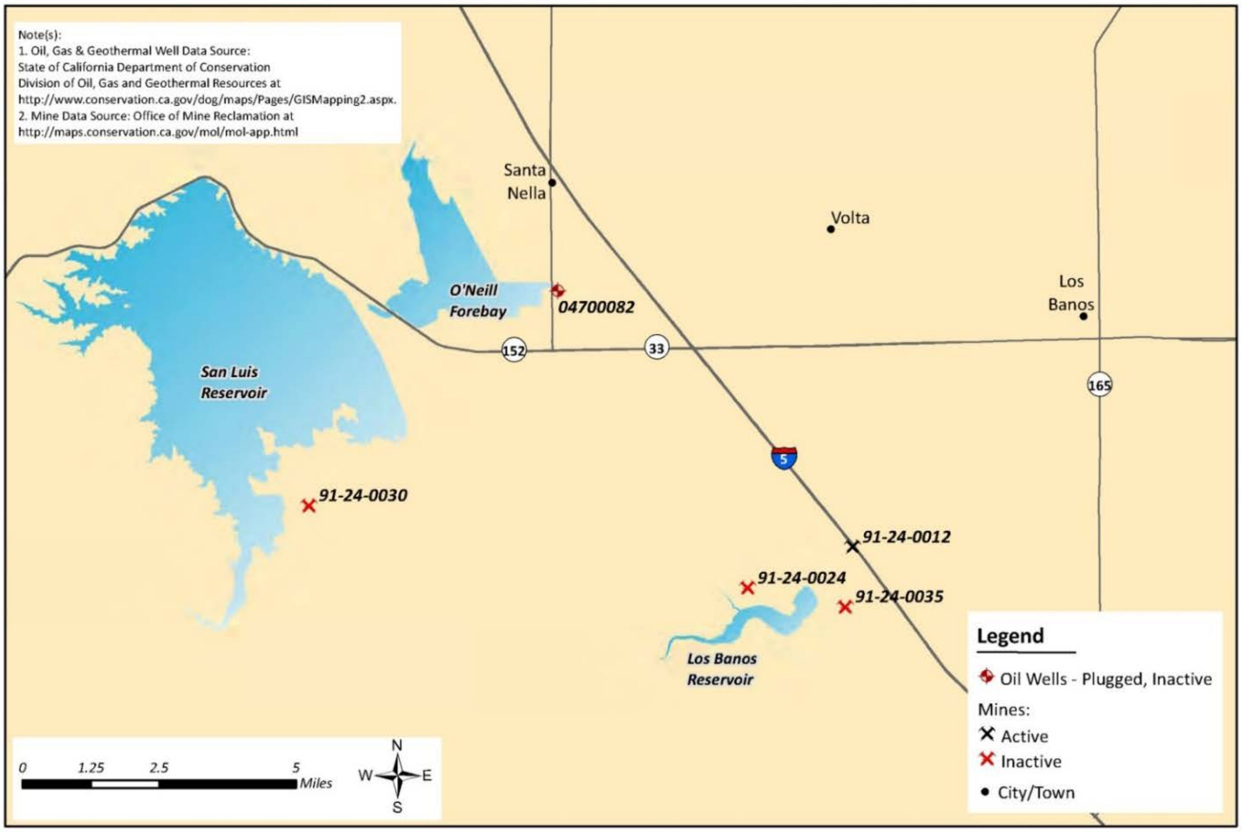


Figure 25-5. Abandoned Wells and Mines near San Luis Reservoir

The Office of Mine Reclamation maps inactive and active mines throughout the State. There is one mine in the vicinity of San Luis Reservoir and three mines located near Los Banos SRA (California DOC, Office of Mine Reclamation 2012). Table 25-3 summarizes the information about the mines in Merced County near the area of analysis.

Table 25-3. Mine Sites Near Area of Analysis – Merced County

Mine ID	Latitude/ Longitude	Location	Description	Status	Commodity
91-24-0030	37° 1' 19.9194"/ -121° 5' 49.92"	Southern shore of San Luis Reservoir	Basalt Quarry – DWR Resources	Inactive	Rock
91-24-0024	37° 0' 0"/ -120° 57' 38.1594"	North of Los Banos SRA	San Luis Water District	Inactive	Rock
91-24-0035	36° 59' 30.12"/ -120° 55' 0.12"	East of Los Banos SRA	Pfitzer Pit	Inactive	Rock
91-24-0012	37° 0' 21.96"/ -120° 54' 57.96"	East of Los Banos SRA	Canyon Rock Pit	Active	Rock

Source: California DOC, Office of Mine Reclamation 2012

25.2 Environmental Consequences/Environmental Impacts

The following sections describe the environmental consequences/environmental impacts associated with each alternative.

25.2.1 Assessment Methods

The environmental consequences of the proposed alternatives were analyzed qualitatively, based on a review of the soil and geologic data presented above. Analysis of potential impacts focuses on the alternatives' potential to increase the risk of personal injury, loss of life, and damage to property, including project facilities, as a result of geologic conditions in the area of analysis.

25.2.2 Significance Criteria

The significance criteria described below were developed consistent with the California Environmental Quality Act (CEQA) Guidelines to determine the significance of potential impacts in relation to geology, seismicity, and soils that could result from implementation of the project. Impacts related to geology, seismicity, and soils would be considered potentially significant if the project would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, based on substantial evidence of a known fault.
  - Strong seismic ground shaking.
  - Seismic-related ground failure, including liquefaction.
  - Landslides.
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (UBC) (1994), creating substantial risk to life or property;
- Result in the loss of topsoil;
- Result in the loss of availability of a known mineral resource that would be of value to the region and residents of the State; and,
- Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

Substantial soil erosion resulting in the loss of topsoil is a potential criterion because it is listed in CEQA Guidelines Appendix G; however, soil erosion is also addressed in detail in Chapter 4, Water Quality, and Chapter 7, Air Quality. Because of the mitigation measures incorporated into the project, the impacts to soil erosion that are evaluated in detail in Chapter 4, Water Quality, and Chapter 7, Air Quality, and as a result the potential for loss of topsoil were minor and less than significant; therefore loss of soil is not addressed further in this section.

25.2.3 Environmental Consequences/Environmental Impacts of Alternative 1 - No Action/No Project Alternative

Under the No Action/No Project Alternative, current operations at San Luis Reservoir would remain unchanged. There would be no construction activities and there would be no impact on geology and soils in the area of analysis. There would be no change to reduce the risk of dam failure. A dam failure can cause loss of life, damage to property, and other related hazards. **There would be no change to the existing significant impact when compared to existing conditions.**

25.2.4 Environmental Consequences/Environmental Impacts of Alternative 2 - Reservoir Restriction Alternative

25.2.4.1 Construction

Construction activities could expose people or structures to adverse effects related to the rupture of a known earthquake fault, liquefaction or landslides, could take place on expansive soils, or could result in the loss of availability of a known mineral resource. Construction actions are limited to revegetation of the reservoir rim between the current maximum pool elevation and the proposed maximum restricted reservoir water surface proposed with the Reservoir Restriction Alternative. Revegetation efforts are relying on hydroseeding. This process would rely on specialized machinery, similar to a loaded truck, spraying a blend of seed, fertilizer, mulch, tackifing agent, and water onto the reservoir rim. While these hydroseeding actions could result in ground disturbing effects, the results from these actions would reduce the severity of any impact from ground disturbance. **Therefore, impacts to geology, soils, or mineral resources, in relation to construction, would be less than significant as a result of the Reservoir Restriction Alternative.**

25.2.4.2 Operations

Maintenance activities during operations could expose people or structures to adverse effects related to the rupture of a known earthquake fault. While earthquake activity poses a risk if strong seismic ground shaking and associated ground failure, liquefaction, or landslides occurred while workers were on-site for maintenance activities, the action alternative is reducing the risk of these seismic side effects occurring, by lowering the maximum capacity of San Luis Reservoir. Additionally, regular maintenance occurs at the facilities under existing conditions; therefore, operation and maintenance under the Reservoir

Restriction Alternative would reduce the future risks than compared to current existing conditions. **This impact would be beneficial**.

Operation of a San Luis Reservoir could result in long term impacts to geology, soils, or mineral resources. Operation of the Reservoir Restriction Alternative would result in the maximum elevation within San Luis Reservoir reducing by 55 feet. Consequently, additional soil surrounding the edge of the reservoir would become exposed, which could increase erosion of the exposed soils. However, implementation of this alternative would include revegetation of the reservoir rim which in the long-term would prevent any increases in erosion. **There would be no impact to geology, soils, or mineral resources**

Seismic related ground failure could impact operation of the San Luis Reservoir. The Reservoir Restriction Alternative would be designed to reduce the risks associated with the potential seismic related ground shaking and ground failure generated by nearby faults without structure failure. **This impact would beneficial**.

25.2.5 Environmental Consequences/Environmental Impacts of Alternative 3 - Crest Raise Alternative

25.2.5.1 Construction

Construction activities could expose people or structures to adverse effects related to the rupture of a known earthquake fault. Several faults run through the San Luis Reservoir area in the vicinity of potential construction activities. As described above, there is no historic earthquake activity at the faults directly in the vicinity of the reservoir. Records show deformation at these faults between 15,000 and 130,000 years ago. More recent earthquake activity is recorded at the Calaveras and San Andreas faults, located 23 and 28 miles from the reservoir, respectively. Earthquake activity at these faults could cause ground movement at San Luis Reservoir. Blasting activities previously occurred at Basalt Hill for construction of B.F. Sisk Dam and no known adverse effects related to the ruptures of a known or previously unknown earthquake fault were observed. Given this previous activity on site, under Crest Raise Alternative, construction activities at Basalt Hill, including excavation and blasting, would not result in the rupture of any known active faults.

Construction activities would not directly influence earthquake activity; however, in the case of an earthquake or strong ground movement during construction, workers would be exposed to the risk of loss, injury, or death. Construction activities would follow the safety requirements of the Federal Occupational Safety and Health Administration (OSHA) to reduce the potential for harm to construction workers or equipment. As noted in Chapter 2, Project Description, construction activities, impacting dam strength like embankment and foundation excavation, would be scheduled during periods of the year when reservoir storage levels are lower to limit in the event of a seismic event during construction the potential for dam overtopping and failure that could expose construction workers to injury or death and to equipment loss. Construction of the Crest Raise Alternative is estimated to take 8 to 10 years. With the addition of the shear key option, construction is expected to last approximately 10 to 12 years. As was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend this construction schedule to 20 years. **Impacts would be short-term and less than significant.**

Construction activities on unstable soils could result in the risk of loss, injury, or death as a result of liquefaction or landslides. The area where construction would take place at San Luis Reservoir is not in a high liquefaction hazard area; however, ground failure can occur during earthquake activity. As described above, in the case of an earthquake or strong ground movement during construction, workers would be exposed to the risk of loss, injury, or death. To lessen these potential impacts, construction activities would be governed by the emergency response plans described above to reduce this risk. Once blasting and extraction activities are completed, the site would be contoured in way to limit erosion and landslide potential.

San Luis Reservoir is located within a low to medium landslide hazard area, as delineated in county maps. The risk of loss, injury, and death from landslides during construction would be similar to the risks described for liquefaction. Pre-construction design would include the detailed survey and mapping of any locations in the construction footprint with the potential for landslide and the development of construction plans to avoid or mitigate that risk. In addition, compliance with safety measures and Federal and State safety regulations would reduce potential risks to workers from landslides. **Overall, impacts related to unstable soils as a result of liquefaction or landslides would be less than significant.**

Construction activities could take place on expansive soils but would not create a substantial risk to life or property. As described above in Section 25.1.3.3.2, there are some soils surrounding San Luis Reservoir that have expansive qualities. Expansion of soils is an important consideration when there is a possibility for changes in moisture content of soils. Construction activities that would result in moisture changes in soils would be evaluated during engineering design to accommodate potential soil expansion. **Impacts related to expansive soils as a result of change in moisture content would be less than significant.**

Construction activities could result in the loss of availability of a known mineral resource of regional or local importance. There is one abandoned oil well and three inactive mines in the vicinity of San Luis Reservoir. In addition, there is one active mine east of Los Banos Reservoir. Blasting activities at Basalt Hill would generate materials for the rock blanket used as a top layer of the new embankment, resulting in a net loss of mineral resources. Basalt Hill is located on federally owned land and was previously used to generate materials for the development of B.F. Sisk Dam. In addition, there is no known demand for these materials besides for use in support of construction at B.F. Sisk Dam. **Given, federal ownership of Basalt Hill and the previous blasting actions that occurred there, impacts to the availability mineral resources would be less than significant.**

25.2.5.2 Operations

Maintenance activities during operations could expose people or structures to adverse effects related to the rupture of a known earthquake fault. While earthquake activity poses a risk if strong seismic ground shaking and associated ground failure, liquefaction, or landslides occurred while workers were on-site for operations, the Crest Raise Alternative is not constructing structures for human habitation. Additionally, the Crest Raise Alternative would remedy the current seismic instability of B.F. Sisk Dam, reducing the risks to public safety. **The Crest Raise Alternative would reduce the risk of dam failure during a seismic event and enhance public and operational safety, therefore the impacts would be beneficial**.

Operation could result in long term impacts to geology, soils, or mineral resources. Operation of San Luis Reservoir, after implementation of the Crest Raise Alternative, would maintain current storage capacity at the reservoir. These operations would not affect the availability of a known mineral resource of value to the region or State, or cause the loss of a locally important resource recovery site. **There would be no long-term impact to geology, soils, or mineral resources of regional or local importance.**

Seismic related ground failure could impact operation of San Luis Reservoir. The Crest Raise Alternative would be designed to reduce the risks associated with the potential seismic related ground shaking and ground failure generated by nearby faults without structure failure. **The impact would be beneficial.**

25.3 Comparative Analysis of Alternatives

Table 25-4 lists the effects of each of the action alternatives and compares them to the existing conditions and No Action/No Project Alternative. The impacts listed in Table 25-4 are National Environmental Policy Act (NEPA) impacts as well as CEQA impacts, but they are judged for significance only under CEQA.

Table 25-4. Comparative Analysis of Alternatives

Potential Impact	Alternative	Significance Pursuant to CEQA	Proposed Mitigation	Significance After Mitigation Pursuant to CEQA
Construction activities could expose people or structures to adverse effects related to the rupture of a known earthquake fault.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities on unstable soils could result in the risk of loss, injury, or death as a result of liquefaction or landslides.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could take place on expansive soils creating a substantial risk to life or property.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Construction activities could result in the loss of availability of a known mineral resource of regional or local importance.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	LTS	None	LTS
	Alternative 3 - Crest Raise	LTS	None	LTS
Maintenance activities during operations could expose people or structures to adverse effects related to the rupture of a known earthquake fault.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	B	None	B
	Alternative 3 - Crest Raise	B	None	B
Operations could result in long term impacts to geology, soils, or mineral resources.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	NI	None	NI
	Alternative 3 - Crest Raise	NI	None	NI
Seismic related ground failure could impact operation of alternative facilities.	Alternative 1 - No Action/No Project	NI	--	--
	Alternative 2 - Reservoir Restriction	B	None	B
	Alternative 3 - Crest Raise	B	None	B

Key:
B= beneficial
LTS = less than significant
NI = no impact
None = no mitigation required
-- = not required per CEQA Guidelines

25.4 Mitigation Measures

No significant geology, seismicity, or soils impacts were identified for the action alternatives and no mitigation measures have been developed.

25.5 Significant Unavoidable Impacts

None of the action alternatives would result in a significant unavoidable impacts to geology, seismicity, or soils.

Chapter 26
Other Required Disclosures

Other required disclosures of environmental documents include irreversible and irretrievable commitment of resources; the relationship between short-term uses and long-term productivity; growth inducing impacts; summary of environmental impacts by alternative; significant and unavoidable impacts; and the environmentally superior alternative.

26.1 Irreversible and Irretrievable Commitment of Resources

According to the National Environmental Policy Act (NEPA), an environmental impact statement (EIS) must contain a discussion of irreversible and irretrievable commitment of resources that would result from the Proposed Action if it was implemented (40 Code of Federal Regulations [CFR] Section 1502.16). The irreversible commitment of resources generally refers to the use or destruction of a resource that cannot be replaced or restored over a long period of time. The irretrievable commitment of resources refers to the loss of production or use of natural resources and represents lost opportunities for the period when the resource cannot be used. The California Environmental Quality Act (CEQA) also requires a discussion of any significant effect on the environment that would be irreversible if the project were implemented or would result in an irretrievable commitment of resources (CEQA Guidelines Sections 15126[c] and 15127). Consistent with these requirements the evaluation of irreversible and irretrievable commitment of resources required by the alternatives was detailed in Chapters 4 through 25.

26.2 Growth Inducing Impacts

CEQA Guidelines Section 15126.2(d) requires an environmental document to:

> “Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth….”

NEPA requires that an EIS analyze direct and indirect impacts of growth-inducing effects. Growth-inducing effects under NEPA are a subset of indirect effects, which are defined as effects that “are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8[b]).

Direct growth-inducing impacts generally stem from the construction of new housing, businesses, or infrastructure. Indirect growth inducement could result if a project establishes substantial new permanent employment opportunities or if it would remove obstacles hindering population growth, such as the expansion or the provision of urban services and infrastructure in an undeveloped area. Under CEQA, growth inducement may not necessarily be considered detrimental, beneficial, or of insignificant consequence. Induced growth is considered a significant impact only if it directly (or indirectly) affects the ability of agencies to provide needed public services, or if it can be demonstrated that the potential growth significantly affects the environment.

The action alternatives considered in this EIS/Environmental Impact Report (EIR) would not result in the construction of new housing either directly or indirectly. The action alternatives would ensure dam stability in the event of an earthquake reducing safety concerns downstream of the dam. In addition, the action alternatives would maintain adequate water supply deliveries but would not provide additional water in excess of existing Central Valley Project and State Water Project contracts. The action alternatives would not provide new, sewer, electricity, or natural gas infrastructure or facilities and would not require or create any new public services such as schools, public services, or public roads that could support increased growth in the study area.

The Reservoir Restriction Alternative and Crest Raise Alternative would require construction workers to perform the necessary construction work. Any employment required would be temporary and would be needed only during a construction period of 1.5 years for the Reservoir Restriction Alternative and 8 to 12 years for the Crest Raise Alternative. As was described in Section 2.2.3.4 of the Project Description, funding constraints could potentially extend the construction of the Crest Raise Alternative to 20 years. Some construction workers would likely commute to the sites from the surrounding local communities. Some non-local workers may relocate permanently to the area due to the relatively long construction period. Chapter 24, Population and Housing, analyzed all potential impacts from non-local workers as being less than significant as communities in the region have sufficient housing supply to accommodate the estimated number of non-local workers. Thus, there would be no need for the construction of new housing. Implementation of the action alternatives would not generate any permanent employment opportunities that would attract a substantial number of people to the region.

The proposed action would not induce development growth or remove a barrier for growth because it would not increase water supply that could be used to approve development projects by local agencies. The action alternatives would not result in new housing, utilities, services, or permanent employment that could induce growth in the region, nor would the project result in any impacts that would require the provision of new housing, utilities, services, or permanent employment. Therefore, the action alternatives would not induce growth.

26.3 Preferred Alternative/Least Environmentally Damaging Practicable Alternative/Environmentally Superior Alternative

For the purpose of CEQA and in light of the November 15, 2017 decision from the First Appellate District Court of Appeal of the State of California, *Washoe Meadows Community v. Department of Parks and Recreation*, the United States Department of the Interior, Bureau of Reclamation (Reclamation) and California Department of Water Resources (DWR) have identified the Crest Raise Alternative as the preferred alternative. The lead agencies identification of a preferred alternative does not foreclose any alternatives or mitigation measures, consistent with the California Supreme Court's decision in *Save Tara v. City of West Hollywood*. All of the alternatives have been analyzed at a comparable level in this Draft EIS/EIR.

Reclamation and DWR are seeking input on the alternatives and their environmental effects during the public review of this Draft EIS/EIR. Reclamation and DWR will consider feedback received during the public review on the Draft EIS/EIR and the environmental impacts associated with each alternative when developing the Final EIS/EIR and selecting an alternative for implementation. Any alternative could be selected by the lead agencies following the conclusion of environmental review.

Reclamation and DWR have identified the Crest Raise Alternative as the preferred alternative because it was the only alternative identified with the ability to achieve all of the project objectives while balancing adverse environmental effects. As discussed in Chapter 2, the Reservoir Restriction Alternative would be unable to meet the one of the three objectives of the Proposed Action by substantially adversely impacting water supply deliveries to CVP and SWP contractors.

Reclamation and DWR are working closely with Federal, State, and regional agencies to meet regulatory requirements and avoid and minimize impacts and, where necessary, reach agreement on mitigation measures for impacts that cannot be avoided. One important process that integrates many of the applicable regulatory requirements is the Section 404(b)(1) process, as managed by the United States Army Corps of Engineers (USACE) with oversight from the United States Environmental Protection Agency. The 404(b)(1) process considers if the range of potential alternatives evaluated in the EIS/EIR is an appropriate range of “reasonable” and “practicable” alternatives using the best available information. USACE then determines the Least Environmentally Damaging Practicable Alternative (LEDPA) to meet requirements of NEPA, Sections 401 and 404 of the Clean Water Act, and Section 14 of the Rivers and Harbor Act, with consideration of compliance with the Federal Endangered Species Act and the National Historic Preservation Act. USACE’s 404(b)(1) LEDPA determination is expected to be attached to the Final EIS/EIR.

The Federal NEPA Council on Environmental Quality (CEQ) regulations require identification of an environmentally preferable alternative, and the State CEQA Guidelines (Section 15126.6[e]) require identification of an environmentally superior alternative. However, the CEQ Guidelines and CEQA Guidelines do not require adoption of the environmentally preferable/superior alternative as the preferred alternative for implementation. The selection of the preferred alternative is independent of the identification of the environmentally preferable/superior alternative although the identification of both will be based on the information presented in this EIS/EIR.

Section 1505.2(b) of the CEQ Regulations requires the NEPA lead agency to identify the environmentally preferable alternative in a Record of Decision. The CEQ Regulations define the environmentally preferable alternative as “…the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources.” Similar to the environmentally preferable alternative under NEPA, the CEQA Guidelines, Sections 15120 and 15126.6(e)(2), require identification of an environmentally superior alternative.

This EIS/EIR provides a substantive portion of the environmental information necessary for Reclamation and DWR to determine the environmentally preferable alternative. However, the public and other agencies reviewing a Draft EIS/EIR can assist the lead agencies to develop and determine environmentally preferable alternatives by providing their views in comments on the Draft EIS/EIR. At this phase in the process, Reclamation and DWR have identified the Crest Raise Alternative as the environmentally superior alternative because it balances the ability to achieve the project objectives with environmental effects. Reclamation and DWR will consider feedback during the public review phase of the Draft EIS/EIR on the environmental benefits and impacts of each alternative when developing the Final EIS/EIR and Record of Decision.

26.4 Controversies and Issues Raised by Agencies and the Public

CEQA requires disclosure of the controversial project issues raised by agencies and the public. Table 26-1 presents a summary of the project issues identified during the scoping period. The scoping report (Reclamation and DWR 2009) provide further information on issues identified by agencies and the public during the public scoping process.

Table 26-1. Summary of Controversies and Issues Raised by Agencies and the Public

Issue	Summary of Issue	Timeline for Addressing or Document/Section Addressing Issue
Impacts to Water Quality	Water quality impacts during and after project construction.	Chapter 4 Water Quality
Impacts from Flooding	Impacts from flooding due to dam failure following an earthquake.	Chapter 9 Flood Protection
Impacts to Recreation	Impacts to regional recreation from recreation site closures during construction of a project.	Chapter 19 Recreation
Impacts to Wildlife	Impacts of the action alternatives on project area wildlife from construction and operation of the project alternatives.	Chapter 14 Fisheries Resources and Chapter 15 Terrestrial Resources
Impacts to Water Supply	Impacts of to water supply from changes in San Luis Reservoir operations as a result of the project alternatives.	Chapter 5 Surface Water Supply

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Chapter 27
Cumulative Effects

This chapter describes the cumulative effects analysis completed in this Environmental Impact Statement/Environmental Impact Report (EIS/EIR). Included here are descriptions of the regulatory requirements, methodology, and cumulative projects considered. Resource specific cumulative effects analysis is completed in each resource chapter.

Cumulative effects are those environmental effects that on their own, may not be considered adverse, but when combined with similar effects over time, result in substantial adverse effects. Cumulative effects are an important part of the environmental analysis because they allow decision makers to look not only at the impacts of an individual proposed project, but the overall impacts to a specific resource, ecosystem, or human community over time from many different projects. This section describes the cumulative effects analysis for the three action alternatives proposed in this EIS/EIR including the regulatory requirements, the methodology, the projects considered in the analysis, and the potential cumulative effects for each environmental resource.

27.1 Regulatory Requirements

This section provides an overview of the regulatory setting associated with cumulative effects.

27.1.1 Regulatory Setting

Both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) require consideration of cumulative effects in an EIS/EIR.

27.1.1.1 National Environmental Policy Act

Cumulative effects are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 Code of Federal Regulations [CFR] Section 1508.7).”

NEPA regulations require an analysis of direct, indirect, and cumulative effects and define “effects” as “ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative (40 CFR Section 1508.8).” In addition, the NEPA regulations state that when determining the scope of an EIS, both connected and cumulative actions must be discussed in the same document as the proposed action (40 CFR Section 1508.25[a][1] and [2]).

27.1.1.2 California Environmental Quality Act

Cumulative effects are defined in the CEQA Guidelines as:

> “Two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.”

1. The individual effects may be changes resulting from a single project or a number of separate projects.

2. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time (CEQA Guidelines Section 15355).”

According to the CEQA Guidelines, a Lead Agency must discuss the cumulative impacts of a project when the cumulative effect is significant and the project's incremental contribution to the cumulative effect would be “cumulatively considerable,” that is, when the incremental effects of a project would be significant when viewed in connection with the effects of past, present, and probable future projects (CEQA Guidelines Section 15065[a][3]; Section 15130[a]).

If the combined cumulative impact associated with the project's incremental effect and the effects of other projects would not be significant, an EIR should briefly indicate why the cumulative impact is not significant (CEQA Guidelines Section 15130[a][2]).

Additionally, an EIR can determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable and therefore not significant. A project's contribution can also be less than cumulatively considerable if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact. The Lead Agency must identify facts supporting this conclusion (CEQA Guidelines Section 15130[a][3]).

27.2 Methodology for Assessing Cumulative Effects

This section provides an overview of the methodology used to analyze cumulative effects.

27.2.1 Area of Analysis

Table 27-1 describes the specific cumulative effects area of analysis for each resource area.

Table 27-1. Cumulative Effects Area of Analysis

Chapter	Resource	Area of Analysis
4	Water Quality	San Luis Reservoir, Sacramento-San Joaquin River Delta (Delta), Central Valley Project (CVP) San Felipe Division facilities, California Aqueduct, Delta-Mendota Canal, south-of-Delta CVP and State Water Project (SWP) contractors
5	Surface Water Supply	Same as Water Quality
6	Groundwater Resources	San Joaquin Valley Groundwater Basin, Santa Clara Valley Groundwater Basin, Gilroy-Hollister Valley Groundwater Basin, Ames Valley Groundwater Basin, Copper Mountain Valley Groundwater Basin, Warren Valley Groundwater Basin, Coachella Valley Groundwater Basin, Northwest Metropolitan Area Groundwater Basins, San Fernando Valley Groundwater Basin, San Gabriel Valley Groundwater Basin, Coastal Plain of Los Angeles, Coastal Plains of Orange County, and Upper Santa Ana Valley Groundwater Basin
7	Air Quality	Merced County and the San Joaquin Valley Air Basin
8	Greenhouse Gases	Regional and Global
9	Flood Control	Merced County
10	Visual Resources	San Luis Reservoir and O'Neill Forebay
11	Noise and Vibration	San Luis Reservoir, Merced County
12	Traffic and Transportation	Roadways in Merced counties as well as local roads in the cities of Gustine and Los Banos
13	Hazards and Hazardous Materials	San Luis Reservoir and the State Recreation Area
14	Fisheries Resources	San Luis Reservoir and the associated State Recreation Area, CVP and SWP facilities, Sacramento/San Joaquin River Delta
15	Terrestrial Resources	San Luis Reservoir, Merced County
16	Regional Economics	Merced County
17	Land Use	San Luis Reservoir including the SRA, O'Neill Forebay, Merced County
18	Agricultural Resources	San Luis Reservoir, Merced County, south-of-Delta CVP and SWP contractors
19	Recreation	San Luis Reservoir and the SRA, and Pacheco State Park (SP) in Merced County, Anderson Reservoir and Anderson Lake County Park (Anderson Park) in Santa Clara County

Chapter	Resource	Area of Analysis
20	Environmental Justice	Communities close to San Luis Reservoir and the SRA including Volta, Trent, Los Banos, Ingomar, Gustine, and unincorporated Santa Nella
21	Indian Trust Assets	Merced County
22	Public Utilities, Services, and Power	Merced County
23	Cultural Resources	San Luis Reservoir, Merced County
24	Population and Housing	The Cities of Los Banos, Newman, Gilroy, and Gustine, and unincorporated Santa Nella
25	Geology, Seismicity, and Soils	Merced County

Key:
CVP = Central Valley Project
SBA = South Bay Aqueduct
SRA = State Recreation Area

27.2.2 Timeframe for Cumulative Effects Analysis

The timeline for the cumulative effects analysis with the exception of greenhouse gasses and climate change and traffic and transportation, is 10 years for all short-term construction-related impacts. These impacts would be temporary and would only occur during construction. The timeframe for long-term impacts, with the exception of traffic and transportation, is 20 years, which represents the planning horizon addressed in this EIS/EIR. The timeframe for the traffic and transportation cumulative effects analysis is 25 years for all long-term impacts. Twenty-five years was chosen as the timeframe for long-term cumulative effects analysis as this is the planning horizon used in the Merced County Association of Government's Regional Transportation Plan (2014).

27.2.3 Identifying Past, Present, and Future Actions and Projects Contributing to Cumulative Effects

CEQA Section 15130(b)(1) identifies two methods that may be used to analyze cumulative impacts:

1. "A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency," and/or

2. "A summary of projections contained in an adopted local, regional, or statewide plan or related planning document, that describes or evaluates conditions contributing to the cumulative effect. Such plans may include: a general plan, regional transportation plan, or plans for the reduction of greenhouse gas emissions. A summary of projections may also be contained in an adopted or certified prior environmental document for such a plan. Such projections may be supplemented with additional information such as a regional modeling program. Any such document shall be referenced and made available to the public at a location specified by the Lead Agency."

This EIS/EIR analyzes cumulative impacts using both CEQA methods identified above. These methods are sufficient to satisfy NEPA and CEQA requirements for identifying past, present, and future actions and projects that may contribute to cumulative effects. Most EIS/EIR resources use one method or the other, but several resource areas use a combination of both methods.

A variety of Federal, State, county, and local government sources were reviewed to identify and collect information on past, present, and reasonably foreseeable actions in the project area that could contribute to cumulative effects. These include:

- City and county general plans;
- Future population, housing, traffic, and other projections found in existing city and county general plans;
- Published reports, documents, and plans;
- Biological Management Plans (Biological Opinions, Habitat Conservation Plans, etc.);
- Environmental documents (such as EIS/EIRs).
- Scoping comments; and
- Consultation with Federal, State, and local agencies.

Sections 27.2.5 and 27.2.6 below describe the project and projections considered for this cumulative effects analysis.

27.2.4 Mitigation

The EIS/EIR must identify potential mitigation measures if a project would result in cumulatively considerable effects.

27.2.4.1 National Environmental Policy Act

According to NEPA, a discussion on mitigation for adverse environmental effects is required in an EIS (40 Section Part 1502.16[h], 40 CFR Section 1502.14[f]); however, a final set of mitigation measures that are selected for implementation are adopted in a Record of Decision (ROD). If mitigation measures presented in the EIS are not adopted, the reasons why must be explained in the ROD (40 CFR Section 1505.2[c]). The cumulative effects analysis will identify potential feasible mitigation for significant cumulative effects; the ROD will present the final mitigation measures adopted as part of the project that will be completed with the respective alternative selected for implementation.

27.2.4.2 California Environmental Quality Act

Mitigation requirements of CEQA differ from those of NEPA. An EIR must examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects (CEQA Guidelines Section 15130). If there are feasible mitigation measures or alternatives that would avoid or substantially lessen the significant impacts of a project, as identified in the final EIR, such measures or alterations must in required in, or incorporated into, the project in order for it to be approved (CEQA Guidelines Section 15091). Therefore, CEQA requires each public agency to mitigate or avoid the significant effects of projects that it carries out or approves whenever it is feasible to do so (Public Resource Code § 21002.1[b]). The cumulative effects analysis will identify all feasible mitigation measures for effects of the project determined to be "cumulatively considerable" and thus significant. The approval of the EIR and subsequent CEQA findings will contain the feasible mitigation measures adopted as part of the project.

27.2.5 Cumulative Projects Considered for All Resources

This section and Table 27-2 describes the past, present, and reasonably foreseeable future cumulative actions and projects considered in this cumulative effects analysis.

Table 27-2. Project Documents Considered in Environmental Justice Cumulative Analysis

Author/Developer	Document Title	Coverage Area	Date Published	Timeframe Covered
California Department of Water Resources, United States Department of the Interior, Bureau of Reclamation	*Bay Delta Conservation Plan/ California Water Fix Final Environmental Impact Report/ Environmental Impact Statement*	The Bay Delta Conservation Plan/California Water Fix project would update the State Water Project by adding new points of diversion in the north Delta and by providing for large-scale species conservation.	2016	50 years
California High Speed Rail Authority	*California High-Speed Train Project EIR/EIS: Merced to Fresno*	The Merced to Fresno High-Speed Train project would connect a Merced station to a Fresno Station. The approximately 35-mile-long corridor between Merced and Fresno is an essential part of the statewide High-Speed Train system.	2012	20 years
United States Department of the Interior, Bureau of Reclamation	*Central Valley Project Municipal & Industrial Water Shortage Policy Environmental Impact Statement*	This project is intended to provide detailed, clear, and objective guidelines for the distribution of Central Valley Project water supplies during water shortage conditions.	2015	20 years

Author/Developer	Document Title	Coverage Area	Date Published	Timeframe Covered
United States Department of the Interior, Bureau of Reclamation and California Department of Parks and Recreation	*San Luis Reservoir State Recreation Area, Resource Management Plan/ General Plan, Environmental Impact Statement/Report - Park Plan*	Improvements to 27,000 acres of Federally owned and State run property, including the water surfaces of the San Luis Reservoir, O'Neill Forebay, Los Banos Reservoir, and adjacent recreation lands.	2013	25 years
Western Area Power Administration, United States Department of Energy, and the San Luis & Delta-Mendota Water Authority	*San Luis Transmission Project Final EIS/EIR*	Western Area Power Administration (Western) would construct, own, maintain, and operate new transmission lines, which would be located mostly adjacent to existing lines in Alameda, San Joaquin, Stanislaus, and Merced Counties in California. Additional components of the San Luis Transmission Project would include new 230-kV line terminal bays at Western's San Luis and Dos Amigos Substations, as well as a new 230/70-kV transformer bank and interconnection facilities at the San Luis Substation.	2016	2017 - 2021
United States Department of the Interior, Bureau of Reclamation	*San Luis Solar Project Final Environmental Assessment and Plan of Development*	30-year Land Use Authorization to access, install, operate, maintain and remove a 26 megawatt solar photovoltaic energy generating project in and adjacent to the State Recreation Area.	2018	30 years

Source: Department of Water Resources (DWR) and United States Department of the Interior, Bureau of Reclamation (Reclamation) 2016; California High Speed Rail Authority (CHSRA) 2012; Reclamation 2015; Reclamation and California Department of Parks and Recreation (CDPR) 2013; Western Area Power Administration and San Luis & Delta-Mendota Water Authority 2016; Reclamation 2018

27.2.5.1 Bay-Delta Conservation Plan/California Water Fix

The *Bay Delta Conservation Plan* (BDCP)/California Water Fix is being prepared by the United States Department of the Interior, Bureau of Reclamation (Reclamation) and Department of Water Resources (DWR), along with Kern County Water Agency, Metropolitan Water District of Southern California, San Luis and Delta-Mendota Water Authority, Santa Clara Valley Water District (SCVWD), State and Federal Water Contractors Agency, Westlands Water District, and Zone 7 Water Agency (referred to as Potential Authorized Entities).

The BDCP/California WaterFix planning process began in 2006 when updates to the State Water Project (SWP) and coordinated operations of the Central Valley Project (CVP) were initially proposed as the BDCP. The BDCP envisioned updating the SWP by adding new points of diversion in the north Delta and by providing for large-scale species conservation through a 50- year habitat conservation plan (HCP)/natural communities conservation plan (NCCP). The HCP/NCCP was intended to comply with Section 10 of the federal Endangered Species Act and to achieve compliance with the California Endangered Species Act through the California Natural Community Conservation Planning Act. A Draft EIS/EIR was released in December 2013.

Following release of the Draft EIS/EIR, Reclamation and DWR issued a Supplemental Draft EIS/Partially Recirculated Draft EIR that included for consideration three additional alternatives that would update the SWP without the large-scale conservation efforts in an HCP/NCCP. The lead agencies proposed that one of these non-HCP alternatives, known as California WaterFix Alternative 4A, be identified as the preferred alternative in replacement of the BDCP alternative (DWR and Reclamation 2015). The preferred WaterFix alternative (4A) consists of three new diversion points in the north Delta, tunnel conveyance and ancillary facilities, operational elements, restoration measures, and an adaptive management program (DWR and Reclamation 2015). The Supplemental Draft EIS/Partially Recirculated Draft EIR also included updates to the BDCP alternative as well as other revisions and updates to the 2013 Draft EIR/EIS analyses. In addition, the state proposed as a separate program, California EcoRestore, to provide restoration efforts for species conservation independent of the SWP facility upgrades.

The Final EIS/EIR for the BDCP/California WaterFix that identified the California WaterFix for implementation was released in December 2016. Biological Opinions for the California WaterFix were released in June 2017.

27.2.5.2 California High Speed Rail Project

The California High Speed Rail Authority (CHSRA) and United States Department of Transportation Federal Railroad Administration completed a programmatic EIS/EIR for the San Francisco to Central Valley portion of an approximately 800 mile long high speed rail network connecting San Francisco to San Diego. The track alignments considered in the EIS/EIR included one configuration traversing Pacheco Pass adjacent to State Route (SR) 120 and San Luis Reservoir. The railway is being designed to support train speeds in excess of 125 miles per hour and would construct both at grade and tunnel sections through Pacheco Pass (CHSRA 2012).

The Final Partially Revised Programmatic EIS/EIR was released by the CHSRA April 6, 2012. The EIS/EIR identified the Pacheco Pass Network Alternative as the preferred alternative for consideration in future project level engineering and environmental compliance (CHSRA 2012).

The San Jose to Merced project section is part of the first phase of the California High-Speed Rail System that will provide a critical rail link between the Silicon Valley and the Central Valley. The approximately 84-mile project section would travel between stations in San Jose and Gilroy and (after passing through the Central Valley Wye) north to Merced or south to Fresno (CHSRA 2017).

27.2.5.3 CVP Municipal & Industrial Water Shortage Policy

Allocation of CVP water supplies for any given water year is based upon forecasted reservoir inflows and Central Valley hydrologic conditions, amounts of storage in CVP reservoirs, regulatory requirements, and management of Section 3406(b)(2) resources and refuge water supplies in accordance with implementation of the Central Valley Project Improvement Act. In some cases, Municipal & Industrial (M&I) water shortage allocations may differ between CVP divisions due to regional CVP water supply availability, system capacity, or other operational constraints.

The purposes of the M&I Water Shortage Policy (WSP) are to:

- Define water shortage terms and conditions applicable to all CVP M&I contractors.
- Establish a water supply level that (a) with M&I contractors’ drought water conservation measures and other water supplies will sustain urban areas during droughts, and (b) during severe or continuing droughts will, as far as possible, protect public health and safety.
- Provide information to help M&I contractors develop drought contingency plans.

The M&I WSP and implementation guidelines are intended to provide detailed, clear, and objective guidelines for the distribution of CVP water supplies during water shortage conditions, thereby allowing CVP water users to know when, and by how much, water deliveries may be reduced in drought and other low water supply conditions (Reclamation 2015). This increased level of predictability is needed by water managers and the entities that receive CVP water to better plan for and manage available CVP water supplies, and to better integrate the use of CVP water with other available non-CVP water supplies.

While the specific future policy and shortage allocation process is currently under evaluation, it is likely that both agricultural and M&I water service contractors will received reduced allocations during shortage conditions. Reclamation will periodically reassess both the availability of CVP water supply and CVP water demand.

27.2.5.4 San Luis Reservoir State Recreation Area Resource Management Plan/General Plan

The California Department of Parks and Recreation (CDPR), in partnership with Reclamation, manages the majority of the San Luis Reservoir State Recreation Area (SRA). The CDPR planning process is integrated with

Reclamation's Resource Management Planning Process. The CDPR, in partnership with Reclamation, has developed and adopted the *San Luis Reservoir State Recreation Area Resource Management Plan (RMP)/General Plan (GP)* (Reclamation and CDPR 2013), in order to direct the future development, operations and maintenance of the SRA. The plan was officially adopted in 2013 and has a life expectancy of 25 years. CDPR and Reclamation continue to collaborate on the area's RMP/GP to guide future growth.

The plan area consists of 27,000 acres owned by Reclamation and includes the water surfaces of San Luis Reservoir, O'Neil Forebay, Los Banos Reservoir, and adjacent recreation lands in the vicinity of Los Banos, California. The project area was built as part of the water storage and delivery system of reservoirs, aqueducts, power plants, and pumping stations operated under the SWP and CVP. Lands managed by CDPR for recreation are part of the State Park system and comprise the SRA.

The plan's primary objective is to identify general areas in which future development may occur for recreation management. The plan includes an overview of existing conditions, including a summary of opportunities and constraints, a plan for future use and management of the project area, and the associated environmental analysis pursuant to NEPA and CEQA (Reclamation and CDPR 2013).

27.2.5.5 San Luis Transmission Project

The San Luis Transmission Project will develop approximately 95 miles of new transmission lines connecting the Tracy Substation and the Dos Amigos Substation with segments crossing O'Neill Forebay and connecting to the San Luis Substation. Additional components of the San Luis Transmission Project will include two new 500-kV substations, substation improvements, communication facilities, improvements to existing access roads, and new permanent access roads (Western Area Power Administration and San Luis & Delta-Mendota Water Authority 2016). The Final EIS/EIR for the San Luis Transmission Project was released in March 2016 with construction scheduled for 2018.

27.2.5.6 San Luis Solar Project

The San Luis Solar Project will allow a 30-year Land Use Authorization to access, install, operate, maintain, and remove a 26-megawatt alternating current solar facility. The project will be constructed on three sites along O'Neill Forebay and adjacent to the San Luis Reservoir SRA, to the northwest of the SR 152/SR 33 interchange. The three sites will cover a total of 159 acres and consist of solar photovoltaic panels, racks to hold the panels, and electrical infrastructure (Reclamation 2018). The Final Environmental Assessment and Plan of Development for the San Luis Solar Project was released in May 2018, with construction scheduled for 2018.

27.2.6 Cumulative Projections Considered for All Resources

This section describes the specific projections that have been used for the cumulative effects analysis.

27.2.6.1 Merced County General Plan – Background Report

The Background Report for the *2030 Merced County General Plan* was released in December 2013. This document presents population and employment projections through 2030. The projections have been developed by the California Department of Finance (DOF).

Table 27-3 shows both past and projected population estimates from the General Plan's projections from 2013. The current California DOF (2017) population projection for Merced County in 2030 has been revised downward, to 326,574, but the use of a higher population projection provides a more conservative cumulative impact analysis. Additionally the table also displays average annual growth rates for each time period. As indicated in Table 27-3, the county's population had an average annual growth rate of 3.1 percent from 2000 to 2005 and 2.7 percent from 2005 to 2010 and a projected growth rate of 2.6 percent from 2010 to 2030 (Merced County 2013). Utilizing these population projections, the Background Report identifies an estimated population increase from 2010 to 2030 of approximately 141,000 people that will require housing within the county (Merced County 2013).

Table 27-3. Past and Projected Population Estimates Merced County and California (2000-2030)

Year	Merced County	
	Population	Average Annual Growth Rate
2000	210,544	--
2003	225,115	2.3 percent
2005	243,700	4.1 percent
2010	276,200	2.7 percent
2020	340,800	2.3 percent
2030	417,200	2.2 percent

Source: Merced County 2013

Employment growth projections presented in the Background Report identified approximately 27,600 jobs that would be added in Merced County between 2005 and 2030. Table 27-4 shows these employment projections for both unincorporated and incorporated areas within the county from 2005 to 2030.

Table 27-4. Past and Projected Employment Estimates Merced County (1990-2030)

Year	Observed/ Projected	Total Jobs	Average Annual Growth Rate
1990	Observed	77,300	--
2004	Observed	86,500	0.9 percent
2005	Projected	87,400	1.0 percent
2030	Projected	115,000	2.1 percent

27.2.6.2 Total Estimated and Projected Population for California and Counties

Table 27-5 presents projections through 2040 for the State of California and the counties that could be affected by the proposed alternatives. Each of these communities has predicted an increase in population by 2040.

Table 27-5. Population Projections 2010-2040

	2010	2020	2030	2040
California	37,333,583	40,719,999	44,019,846	46,884,801
Alameda	1,515,338	1,708,594	1,878,556	2,032,262
Contra Costa	1,051,525	1,184,094	1,314,573	1,426,050
Fresno	932,628	1,033,068	1,145,646	1,256,572
Imperial	175,107	196,540	220,459	243,975
Kern	841,887	929,787	1,067,631	1,213,558
Kings	152,175	154,403	170,105	187,048
Los Angeles	9,837,011	10,451,759	10,885,337	11,161,569
Madera	150,193	162,814	186,761	212,229
Merced	256,803	286,397	326,574	369,193
Orange	3,014,962	3,260,659	3,434,157	3,558,718
Riverside	2,196,137	2,506,739	2,863,260	3,165,363
San Benito	55,401	60,170	66,796	73,535
San Bernardino	2,044,228	2,235,282	2,483,568	2,735,646
San Diego	3,100,529	3,406,126	3,638,609	3,830,210
San Joaquin	687,827	783,572	895,240	996,379
San Luis Obispo	269,013	286,416	302,323	310,367
Santa Barbara	423,552	461,916	492,495	516,163
Santa Clara	1,790,301	2,018,257	2,230,564	2,443,718
Stanislaus	515,888	572,155	638,995	699,177
Tulare	442,551	488,293	541,140	594,348
Ventura	824,467	871,960	922,001	961,828

Source: California DOF 2017

27.2.6.3 Population and Housing

Table 27-6 presents population projections through 2030 for each of the communities that could be affected by the proposed alternatives. Each of these communities has predicted an increase in population by 2030.

Table 27-6. Population Projections 2016-2030

Community	2016[1]	2030	2030 Population Projection Source
Los Banos	36,847	67,100	Merced County 2013
Gilroy	51,649	57,000	LAFCO Santa Clara County 2015
Newman	10,667	16,525	Stanislaus County 2016
Gustine	5,658	9,000	Merced County 2013
Santa Nella	1,965	N/A	N/A

Note:
[1] United States Census Bureau 2016.
Key:
LAFCO = Local Area Formation Committee
N/A = Not Available

According to the most recent data from Merced County Association of Governments (MCAG), the total housing need to accommodate future growth in Merced County from 2014 through 2023 is estimated to be 15,850 units, with 2,473 needed in Los Banos and 320 needed in Gustine (MCAG 2015)[1]. According to the Association of Bay Area Governments (ABAG), Santa Clara County is expected to require a total of 58,836 new housing units to accommodate future growth, including 1,088 in Gilroy, from 2014 through 2022 (ABAG 2013). Stanislaus County is expected to require 21,330 new housing units, with 778 housing units in Newman for 2014 through 2023 (Stanislaus Council of Governments [StanCOG] 2014).

All of the cities have recognized the potential for future increases in population and the corresponding need for new housing. In response, they have enacted goals and policies in the Housing Elements of their General Plans to accommodate this growth.

27.3 Cumulative Effects Analysis

27.3.1 Water Quality

27.3.1.1 Alternative 2 – Reservoir Restriction Alternative

The Reservoir Restriction Alternative could change Delta salinity and bromide concentrations resulting in water quality impacts. Implementation of the BDCP/California WaterFix/California EcoRestore could result in changed Delta Region operations and habitat health with the implementation of conservation and restoration measures designed to improve the health of the Delta ecosystem alongside improving water supply and water quality conditions. Future improved conditions in the Delta Region could result in increased south-of Delta exports.

[1] Data regarding population and housing projections beyond 2023 are not available for Merced County and Stanislaus County.

Modeling indicates that operation of the Reservoir Restriction Alternative would result in slight changes to Delta water quality resulting from changes in Delta outflows compared to the No Action Alternative. As was noted Chapter 4, Water Quality, potential changes in salinity in comparison to the No Action/No Project Alternative were determined to be immeasurable. Additionally, any increases in south-of-Delta export as a result of the California WaterFix would only follow improvements in the Delta ecosystem's health and improved water quality conditions in the Delta Region as a result of both the California WaterFix and California EcoRestore's restoration actions and would be limited by the reduced storage capacity in San Luis Reservoir. **Therefore, cumulative impacts of the Reservoir Restriction Alternative in combination with other projects in the Delta Region, would not result in significant cumulative impacts on Delta salinity and bromide concentrations.**

The Reservoir Restriction Alternative could change south-of-Delta CVP and SWP exports and Delta outflow. As was noted above, implementation of the BDCP/California WaterFix/California EcoRestore could result in changed Delta Region operations and habitat health.

Operation of the Reservoir Restriction Alternative would result in a decrease in the average south-of-Delta exports when compared to the No Action/No Project Alternative in most years because less water would be needed to fill a reduced capacity San Luis Reservoir. This would result in an increase in Delta outflow which along with the California WaterFix and California EcoRestore's restoration actions, would improve the Delta ecosystem's health and water quality conditions. **Therefore, cumulative impacts of the Reservoir Restriction Alternative in combination with other projects in the Delta Region, would not result in significant cumulative impacts on water quality.**

Construction activities and operations could generate water quality impacts which could violate water quality standards. Construction of trails, campgrounds, and wells identified in the *San Luis Reservoir SRA RMP/GP* could take place at the same time as the proposed project and would involve earth moving and construction near the shore of the reservoir. Additionally, construction activities associated with the California High Speed Rail Project could involve earth moving and construction projects upstream of the reservoir. The selected configuration of the railway will traverse Pacheco Pass adjacent to SR 152 and San Luis Reservoir. The California High Speed Rail Project includes water quality mitigation strategies include implementation of Stormwater Pollution Prevention Plans (SWPPPs) and Best Management Practices (BMPs) to minimize impacts to stormwater and maintain water quality, implementation of spill prevention and emergency response plans, and incorporation of biofiltration swales (CHSRA 2012).

Construction activities under the Reservoir Restriction Alternative would involve installation of a temporary access road and vegetation placement around the entire reservoir rim. The Reservoir Restriction Alternative could result in increased algae growth, as noted in Chapter 4, Water Quality, negatively impacting the quality of water in the reservoir. However, the construction projects associated with the *San Luis Reservoir SRA RMP/GP* and California High Speed Rail Project would not change the water storage capacity in San Luis Reservoir and, therefore, would not result in increased algae growth. Additionally, these cumulative projects and the Reservoir Restriction Alternative would require implementation of BMPs and SWPPPs which would prevent water quality degradation in San Luis Reservoir. Although a significant impact was identified for the Reservoir Restriction Alternative, the California High Speed Rail Project and the *San Luis Reservoir SRA RMP/GP* construction actions would not have a significant impact on water quality. **Therefore, cumulative impacts of the Reservoir Restriction Alternative in combination with other projects in the San Luis Reservoir Region, would not result in significant cumulative impacts on water quality.**

27.3.1.2 Alternative 3 – Crest Raise Alternative

The Crest Raise Alternative could change Delta salinity and bromide concentrations resulting in water quality impacts. As described in Chapter 4, Water Quality, the Crest Raise Alternative would raise the dam crest an additional 12 feet to a new crest elevation of 566 feet. The additional embankment height would maintain the current water surface elevation level of 544 feet and would not add or subtract any additional storage capacity. The Crest Raise Alternative would not change south-of-Delta exports and Delta outflow as San Luis Reservoir storage would remain the same. **Since there would be no operational impacts as a result of the Crest Raise Alternative, there would be no contribution to any cumulative effects.**

The Crest Raise Alternative could change south-of-Delta CVP and SWP exports and Delta outflow. As described in Chapter 4, Water Quality, the Crest Raise Alternative would not change south-of-Delta exports and Delta outflow as San Luis Reservoir storage would remain the same. **Since there would be no operational impacts as a result of the Crest Raise Alternative, there would be no contribution to any cumulative effects.**

Construction work around San Luis Reservoir could increase run-off and could introduce pollutants into nearby water bodies including the reservoir. Construction of trails, campgrounds, and wells identified in the *San Luis State Recreation Area General Plan* would take place at the same time as the proposed project and would involve earth moving and construction near the shore of the reservoir. Additionally, construction activities associated with the California High Speed Rail Project could involve earth moving and construction projects upstream of the reservoir. The selected configuration of the railway will traverse Pacheco Pass adjacent to SR 152 and San Luis Reservoir. The California High Speed Rail Project includes water quality mitigation strategies include implementation of SWPPPs and BMPs to minimize impacts to stormwater and maintain water quality, implementation of spill prevention and emergency response plans, and incorporation of biofiltration swales (CHSRA 2012). Other construction is projected to occur in Merced County as a result of projected population growth; however, construction is not expected to be in the vicinity of San Luis Reservoir.

Construction of the Crest Raise Alternative would involve earth moving activities near the shore of the reservoir that could introduce pollutants into the water and compromise water quality of the reservoir. However, the Crest Raise Alternative would require preparation of a SWPPP, BMPs, monitoring and other environmental commitments and construction controls to protect water quality, as outlined in Chapter 2, Project Description. These commitments reduce the effect of the alternative options to a less than significant level. The construction projects associated with the *San Luis State Recreation Area General Plan* and California High Speed Rail Project require implementation of BMPs and SWPPPs, which would prevent water quality degradation in San Luis Reservoir.

As noted in Chapter 4, Water Quality, with implementation of the shear key option, the Crest Raise Alternative would have a short term significant impact on water quality in San Luis Reservoir. However, this short-term impact would allow the continued storage and delivery of water. **Therefore, cumulative impacts of the Crest Raise Alternative in combination with other projects in the San Luis Reservoir Region, would not result in significant cumulative impacts on water quality.**

27.3.2 Surface Water Supply

27.3.2.1 Alternative 2 - Reservoir Restriction Alternative

Construction of the Reservoir Restriction Alternative could result in temporary interruptions in CVP and SWP water supply. As described in Chapter 5, Surface Water Supply, the construction under the Reservoir Restriction Alternative would not result in any interruptions to water supply deliveries. **Since there would be no construction impacts as a result of the Reservoir Restriction Alternative, there would be no contribution to cumulative effects.**

The Reservoir Restriction Alternative could change CVP and SWP deliveries to south-of-Delta contractors and change storage in San Luis Reservoir. Implementation of the proposed alternatives for the BDCP/California WaterFix and CVP M&I WSP could result in short-term and long-term changes in water supply availability. For example, potential changes in CVP and SWP Delta export requirements as a component of the BDCP could affect water supply availability in the area of analysis. Provisions in the CVP M&I WSP could change the allocation of exported CVP water between M&I and agricultural water users during periods of shortage potentially affecting water supply availability for these users.

While cities and counties work to guide growth to appropriate areas and aim to preserve agricultural lands through land use policies, future growth and development in counties and cities as driven by expected population growth throughout California, and specifically in the area of analysis, would likely increase water demand. County general plan provisions, numerous State and local policies, and conservation efforts spearheaded by local water suppliers seek to reduce per capita water consumption and the environmental review completed alongside regular general plan updates identifies water conservation mitigation for significant impacts, as required. These conservation efforts help to reduce the cumulative contribution to increased water use in the area of analysis generated by population growth.

The population growth projections presented in Table 27-5 along with the cumulative projects identified above would both contribute to increased pressure on the water supply system both locally and regionally to meet demands in the future. As noted in Chapter 5, Surface Water Supply, CVP and SWP water supply deliveries have decreased over time with implementation of Central Valley Project Improvement Act and the 2008 and 2009 United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) Biological Opinions for the Long-Term Operations of the SWP and CVP. The cumulative projects and projected growth statewide and in the counties identified above are expected to increase demand on these declining water supply deliveries and will contribute to significant cumulative water supply impacts in the future.

As noted in Chapter 5, Surface Water Supply, the Reservoir Restriction Alternative would significantly impact water supply deliveries to south-of-Delta CVP and SWP contractors. **Given the significant cumulative water supply impacts discussed above, the significant reductions in south-of-Delta deliveries under the Reservoir Restriction Alternative would be cumulatively considerable.**

27.3.2.2 Alternative 3 - Crest Raise Alternative

Construction of the Crest Raise Alternative could result in temporary interruptions in CVP and SWP water supply. As previously discussed in Section 27.3.2.1, the cumulative projects and projected growth statewide and in the counties identified above are expected to increase demand on these declining water supply deliveries and will contribute to significant cumulative water supply impacts in the future. As noted in Chapter 5, Surface Water Supply, with implementation of the shear key option, the Crest Raise Alternative would have a short term significant impact on water supply deliveries to south-of-Delta CVP and SWP contractors. However, this short-term impact would allow the continued storage and delivery of water to help meet the future increased demand. **Given that the reductions in south-of-Delta deliveries would be temporary under the Crest Raise Alternative, which would allow the**

continued full storage of water in San Luis Reservoir, the Crest Raise Alternative would not be cumulatively considerable.

The Crest Raise Alternative could change CVP and SWP deliveries to south-of-Delta contractors and change storage in San Luis Reservoir. As described in Chapter 5, Surface Water Supply, the Crest Raise Alternative would raise the dam crest an additional 12 feet to a new crest elevation of 566 feet. The additional embankment height would maintain the current water surface elevation level of 544 feet and would not add or subtract any additional storage capacity. The Crest Raise Alternative would not change CVP or SWP operations and would not change storage in San Luis Reservoir. **Since there would be no operational impacts as a result of the Crest Raise Alternative, there would be no contribution to cumulative effects.**

27.3.3 Groundwater Resources

27.3.3.1 Alternative 2 - Reservoir Restriction Alternative

Several related and reasonably foreseeable projects and actions may result in groundwater impacts in the Project area. Most of the cumulative projects and programs are intended to have beneficial impacts on groundwater conditions in the Project area.

Under the Project alternatives, groundwater levels are not expected to be substantially degraded. The Sustainable Groundwater Management Act (SGMA) legislation requires that all groundwater basins categorized as medium- and high-priority form a Groundwater Sustainability Agency (GSA) and be managed under a Groundwater Sustainability Plans (GSP) by January 31, 2020. A GSA is a local entity tasked with developing the GSP and associated rules and regulations. The GSP will include provisions to avoid chronic lowering of groundwater levels, along with avoiding significant and unreasonable degradation of water quality and land subsidence. When the GSP is in place and the basins are managed according to that GSP, the groundwater basin will be operated sustainably for the long term and not be subject to additional degradation of conditions. The subsidence that has recently occurred in the Project area is likely to continue in the short-term. However, given the implementation of a GSP, the rate of subsidence is expected to slow and/or stop. Any long-term lowering of water levels in the basin is also expected to slow and/or stop after January 2020, when the GSP is required to be implemented. The GSP will also require the long-term sustainable management of water quality in the basin. As discussed in Chapter 6, Groundwater Resources, it is assumed the project alternative would not cause any long-term substantial impacts on groundwater resources in accordance with SGMA. **Therefore, the Reservoir Restriction Alternative would not have cumulatively considerable incremental contributions to a significant cumulative impact to groundwater.**

27.3.3.2 Alternative 3 - Crest Raise Alternative

Under the Crest Raise Alternative, there would be short-term less than significant impacts to groundwater resources within the Project area. Implementation of SGMA legislation is expected to reduce overdraft conditions, slow and/or slow subsidence and improve groundwater quality within the Project area. Under the Crest Raise Alternative, groundwater quality is not expected to be substantially degraded. The water quality programs listed above are also intended to have beneficial impacts to surface and/or groundwater conditions. Groundwater levels and quality are also not expected to be substantially impacted by the Crest Raise Alternative. **Therefore, the Crest Raise Alternative would not have cumulatively considerable incremental contributions to a significant cumulative impact to groundwater.**

27.3.4 Air Quality

27.3.4.1 Alternative 2 - Reservoir Restriction Alternative

Revegetation activities associated with the Reservoir Restriction Alternative could cause temporary and short-term construction-related emissions of criteria pollutants or precursors that would exceed the San Joaquin Valley Air Pollution Control District's (SJVAPCD's) significance thresholds. The population in Merced County is expected to increase in the future. Increases in population and housing could increase traffic, utility demands, and construction projects, which would all result in increased air pollution. Additionally, air pollutant emissions associated with past and present development and activities have contributed to local and regional air pollution. Potential projects that could contribute to cumulative effects when considered with this alternative include the California High Speed Rail Project, the *San Luis Reservoir SRA RMP/GP*, the San Luis Transmission Project, and the San Luis Solar Project, because short-term construction activities associated with these projects would occur in Merced County near San Luis Reservoir.

Air pollution, by definition, is a cumulative impact because no single project determines the California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS) attainment status of a region. As a result, this alternative, when considered with past, present, and future development, would result in a significant cumulative impact because the region is designated nonattainment for several criteria air pollutants (SJVAPCD 2015).

The significance thresholds developed by the SJVAPCD serve to evaluate if a proposed project could either 1) cause or contribute to a new violation of a CAAQS or NAAQS in the study area or 2) increase the frequency or severity of any existing violation of any standard in the area. Therefore, if an alternative would produce air quality impacts that are individually significant, then the alternative would also be cumulatively considerable. However, multiple projects that do not exceed the significance thresholds could be cumulatively considerable if they occur simultaneously in the same area. If the combined impacts of these projects could cause or worsen a concentration standard (NAAQS or CAAQS), then the projects would have a cumulatively significant impact. This approach is consistent with the CEQA Guidance documents developed by the SJVAPCD (2015).

As was noted in Chapter 7, Air Quality, construction of this project would exceed the SJVAPCD's significance threshold and implementation of Mitigation Measures AQ-1, AQ-2, and AQ-3 would reduce criteria pollutant emissions. However, construction activities could occur simultaneously with construction activities associated with the cumulative projects, which would occur in the same vicinity. Therefore, combined emissions from the two projects could cause the NAAQS or CAAQS to be exceeded. **Therefore, the Reservoir Restriction Alternative's incremental contribution to the significant cumulative effect would be cumulatively considerable.**

Construction activities associated with the Reservoir Restriction Alternative could cause temporary and short-term construction-related emissions of toxic air contaminants (TACs) that would exceed the SJVAPCD's significance thresholds. As described previously, both the expected population growth in the region combined with past and present development projects contribute to local and regional air pollution. Impacts from TACs are largely localized impacts. Because of this, significant cumulative TAC effects associated with this alternative would be driven by the projection method of assessing cumulative impacts.

The SJVAPCD's significance thresholds for TACs are highly conservative and protective of health impacts on sensitive receptors. As a result, page 110 of the SJVAPCD's *Guidance for Assessing and Mitigating Air Quality Impacts* (GAMAQI) states that if project-specific TAC emissions would have a less than significant impact, then the project would not be expected to result in a cumulatively considerable net increase in health impacts. The proposed construction of the project would have a less than significant impact on sensitive receptors and mitigation would not be required. **Therefore, the Reservoir Restriction Alternative's incremental contribution to the cumulative effect would not be cumulatively considerable.**

27.3.4.2 Alternative 3 - Crest Raise Alternative

Construction activities associated with the Crest Raise Alternative could cause temporary and short-term construction-related emissions of criteria pollutants or precursors that would exceed the SJVAPCD's significance thresholds. As was noted above, the population in Merced County is expected to increase in the future, which alongside the potential cumulative projects could contribute to cumulative construction generated air quality effects. Air pollution, by definition, is a cumulative impact because no single project determines the CAAQS or NAAQS attainment status of a region. As a result, this alternative, when considered with past, present, and future development, would result in a significant cumulative impact because the region is designated nonattainment for several criteria air pollutants (SJVAPCD 2015).

As was previously described multiple projects that do not exceed the significance thresholds could be cumulatively considerable if they occur simultaneously in the same area. If the combined impacts of these projects could cause or worsen a concentration standard (NAAQS or CAAQS), then the projects would have a cumulatively significant impact (SJVAPCD 2015).

Construction of this project would not individually exceed the SJVAPCD's significance thresholds and mitigation would not be required. However, construction activities could occur simultaneously with construction activities associated with the cumulative projects, which would occur in the same vicinity. Therefore, combined emissions from the two projects could cause the NAAQS or CAAQS to be exceeded. **Therefore, the Crest Raise Alternative's incremental contribution to the significant cumulative effect would be cumulatively considerable.**

Operational activities associated with the Crest Raise Alternative could cause long-term emissions of criteria pollutants or precursors that would exceed the SJVAPCD's significance thresholds. As previously discussed, operational activities at San Luis Reservoir are not changing; therefore, no new emissions would occur from implementation of this alternative. Because there would be no operational impacts, there would be no contribution to cumulative impacts. **Therefore, the Crest Raise Alternative's incremental contribution to the significant cumulative effect would not be cumulatively considerable.**

Construction activities associated with the Crest Raise Alternative could cause temporary and short-term construction-related emissions of TACs that would exceed the SJVAPCD's significance thresholds. As described previously, both the expected population growth in the region combined with past and present development projects contribute to local and regional air pollution. Impacts from TACs are largely localized impacts. Because of this, significant cumulative TAC effects associated with this alternative would be driven by the projection method of assessing cumulative impacts.

The SJVAPCD GAMAQI states that if project-specific TAC emissions would have a less than significant impact, then the project would not be expected to result in a cumulatively considerable net increase in health impacts. The proposed construction of the project would have a less than significant impact on sensitive receptors and mitigation would not be required. **Therefore, the Crest Raise Alternative's incremental contribution to the cumulative effect would not be cumulatively considerable.**

27.3.5 Greenhouse Gas Emissions

27.3.5.1 Alternative 2 - Reservoir Restriction Alternative

As discussed in Chapter 8, Greenhouse Gas Emissions, the Reservoir Restriction Alternative would have no operations-related impacts to greenhouse gas (GHG) emissions and would not over the long-term contribute to any cumulative effects. The Reservoir Restriction Alternative would, however, have some minor construction related effects associated with revegetation of the new exposed area of shoreline in the zone between the existing maximum surface elevation and the alternative's lowered maximum surface elevation.

Revegetation activities associated with the Reservoir Restriction Alternative could generate GHG emissions, either directly or indirectly, that could have a significant impact on the environment. The population in Merced County is expected to increase in the future. Increases in population and housing could increase traffic, utility demands, and construction projects, which would all result in increased GHG emissions. Additionally, GHG emissions associated with past and present development and activities have contributed to global climate change. Potential projects that could contribute to cumulative effects when considered with this alternative include the California High Speed Rail Project, the *San Luis Reservoir SRA RMP/GP*, the San Luis Transmission Project, and the San Luis Solar Project, because short-term construction activities and long-term operational activities associated with these projects could potentially occur in Merced County.

In its *Guidance for Assessing and Mitigating Air Quality Impacts*, the SJVAPCD states that no single project could generate enough GHG emissions to noticeably change the global climate temperature; therefore, climate change is a result of the combination of past, present, and future projects (SJVAPCD 2015). Thus, this alternative would create a significant cumulative effect on climate change by adding additional GHG emissions to the atmosphere.

The California Air Pollution Control Officers Association (CAPCOA) document *CEQA & Climate Change* (2008) provides guidance to Lead Agencies for evaluating and addressing GHG emissions under CEQA. The CAPCOA document recognizes that a non-zero significance threshold could be construed as setting a de minimis threshold for cumulative impacts. In other words, a non-zero threshold would provide a point at which a project's contribution would not contribute considerably to climate change. Therefore, if an alternative would produce GHG emission impacts that are individually significant, then the alternative would also be cumulatively considerable. As was indicated in Chapter 8, Greenhouse Gas Emissions, construction and operation of this alternative would not exceed the quantitative GHG emissions threshold. **Therefore, the Reservoir Restriction Alternative's incremental contribution to the significant cumulative effect would not be cumulatively considerable.**

Revegetation activities associated with the Reservoir Restriction Alternative could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. As described previously, both the expected population growth in the region combined with past and present development projects contribute to global climate change. Potential projects that could contribute to cumulative effects when considered with this alternative include the California High Speed Rail Project, the *San Luis Reservoir SRA RMP/GP*, the San Luis Transmission Project, and the San Luis Solar Project, because long-term operational activities associated with these projects could occur in Merced County.

Because no single project can noticeably change the global climate temperature, this alternative, when considered in relationship to all past, present, and future development, would result in a significant cumulative impact. As described previously, the significance criterion used to assess an alternative's individual significance is sufficient to determine if a project would conflict with an applicable plan, policy, or regulation adopted for reducing GHG emissions for which significance thresholds have been set by DWR. Therefore, if an alternative would produce GHG emission impacts that are individually significant, then the alternative would also be cumulatively considerable. As was indicated in Chapter 8, Greenhouse Gas Emissions, construction and operation of this alternative would not individually exceed the quantitative GHG emissions threshold. **Therefore, the Reservoir Restriction Alternative's incremental contribution to the significant cumulative effect would not be cumulatively considerable.**

27.3.5.2 Alternative 3 - Crest Raise Alternative

Construction activities associated with the Crest Raise Alternative could generate GHG emissions, either directly or indirectly, that could have a significant impact on the environment. The population in Merced County is expected to increase in the future. Increases in population and housing could increase traffic, utility demands, and construction projects, which would all result in increased GHG emissions. Additionally, GHG emissions associated with past and present development and activities have contributed to global climate change. Potential projects that could contribute to cumulative effects when considered with this alternative include the California High Speed Rail Project, the *San Luis Reservoir SRA RMP/GP*, the San Luis Transmission Project, and the San Luis Solar Project, because short-term construction activities and long-term operational activities associated with these projects could potentially occur in Merced County.

As previously discussed, if an alternative would produce GHG emission impacts that are individually significant, then the alternative would also be cumulatively considerable. As was indicated in Chapter 8, Greenhouse Gas Emissions, construction of this alternative would not exceed the quantitative GHG emissions threshold with implementation of Mitigation Measure GHG-1.

Therefore, the Crest Raise Alternative's incremental contribution to the significant cumulative effect would be cumulatively considerable pre-mitigation, but would not be cumulatively considerable with mitigation.

Construction activities associated with the Crest Raise Alternative could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. As described previously, both the expected population growth in the region combined with past and present development projects contribute to global climate change. Potential projects that could contribute to cumulative effects when considered with this alternative include the California High Speed Rail Project, the *San Luis Reservoir SRA RMP/GP*, the San Luis Transmission Project, and the San Luis Solar Project, because long-term operational activities associated with these projects could occur in Merced County.

As previously discussed, if an alternative would produce GHG emission impacts that are individually significant, then the alternative would also be cumulatively considerable. As was indicated in Chapter 8, Greenhouse Gas Emissions, construction of this alternative would not individually exceed the quantitative GHG emissions threshold with implementation of Mitigation Measure GHG-1. **Therefore, the Crest Raise Alternative's incremental contribution to the significant cumulative effect would be cumulatively considerable pre-mitigation, but would not be cumulatively considerable with mitigation.**

27.3.6 Flood Protection

27.3.6.1 Alternative 2 – Reservoir Restriction Alternative

Implementation of the Reservoir Restriction Alternative in combination with facilities and trail construction at San Luis Reservoir could result in the placement of structures in the 100-year flood hazard area that could impede or redirect flood flows. As described in Chapter 9, Flood Protection, areas around the shoreline of San Luis Reservoir are located in Federal Emergency Management Agency (FEMA) flood zone D, defined as areas of undetermined but possible flood hazard. There would be no construction of any new structures under the Reservoir Restriction Alternative and no placement of structures within the 100-year flood hazard area.

The new trails and facilities at San Luis Reservoir proposed in the *San Luis Reservoir SRA RMP/GP* would involve construction at the reservoir. The new facilities proposed in the management plan would not be large, and none of the new facilities would be in the 100-year floodplain. The San Luis Transmission Project would construct new transmission lines near San Luis Reservoir to connect the San Luis Substation to a new transmission line that would be developed between the Tracy Substation and the Dos Amigos Substation in the potential inundation area of San Luis Reservoir. The San Luis Solar Project would develop a new 159-acre solar facility adjacent to SR 152 crossing O'Neill Forebay.

The San Luis Transmission Project and the San Luis Solar Project would place new infrastructure in the potential inundation area of San Luis Reservoir. In the event of dam failure these new facilities could impede or redirect flood flows. The Reservoir Restriction Alternative would not however place new infrastructure in the 100-year floodplain or in the downstream inundation area of San Luis Reservoir. **The Reservoir Restriction Alternative would not contribute to any significant cumulative impacts on flood flows.**

Implementation of the Reservoir Restriction Alternative in combination with facilities and trail construction at San Luis Reservoir could result in the unaddressed exposure of people or structures to an unacceptable risk of loss, injury or death involving flooding, including flooding because of increases in the potential for the failure of a levee or dam. Potential for flooding exists around San Luis Reservoir. Long-term operations of water supply facilities under the Reservoir Restriction Alternative would change reducing the maximum surface elevation 55 feet from the current maximum elevation of 544 feet to a new maximum elevation of 489 feet, and permanently reducing the maximum capacity of the reservoir compared to existing conditions. The reduction in surface elevation could reduce dam failure consequences during a seismic event. Construction of trails and facilities at San Luis Reservoir proposed in the *San Luis Reservoir SRA RMP/GP* would include site-specific geotechnical investigations for siting and design of permanent structures. This would minimize any potential impacts from earthquakes and dam failure at the reservoir. The construction of the San Luis Transmission Project and the San Luis Solar Project would place new infrastructure downstream of San Luis Reservoir. In the event of dam failure these new facilities could be exposed to risk of loss. However, as described in Chapter 9, Flood Protection, the Reservoir Restriction Alternative would address flood hazard risks to people or structures. **Therefore, the Reservoir Restriction Alternative would not contribute to any significant cumulative impacts on flood risk and would provide a beneficial change in the cumulative risk of flooding in the study area.**

Implementation of the Reservoir Restriction Alternative in combination with facilities and trail construction at San Luis Reservoir could alter the drainage pattern and/or create runoff water that would exceed the capacity of existing or planned stormwater drainage systems. There would be construction associated with the Reservoir Restriction Alternative including installation of a temporary access road and vegetation placement around the rim of the entire reservoir. However, with implementation of the SWPPP impacts to the drainage pattern and the creation of runoff water would be less than significant.

As described in the environmental analysis for the *San Luis Reservoir SRA RMP/GP* (Reclamation and CDPR 2013), earth moving and construction during facilities and trail creation projects would alter the local drainage pattern around San Luis Reservoir. When specific construction and maintenance activities are undertaken, site-specific analysis would be conducted and detailed assessment of each project's activities would take place. The environmental analysis presented in the *San Luis Reservoir SRA RMP/GP* indicates that implementation of mitigation measures designed to reduce and control stormwater runoff in the case that more detailed environmental analysis determines significant stormwater-related impacts. Similarly, construction and operation of the San Luis Transmission Project and the San Luis Solar Project would disturb earth near B.F. Sisk Dam and would introduce new impervious surface. The development and implementation of a SWPPP would ensure that stormwater during construction is captured and runoff volume is reduced and the incorporation of methods to minimize flood damage into the design of all new structures would reduce potential effects to drainage patters associated with all of these projects. **The Reservoir Restriction Alternative in combination with other cumulative projects would not result in a significant cumulative impact related to drainage and runoff.**

27.3.6.2 Alternative 3 – Crest Raise Alternative

Implementation of the Crest Raise Alternative in combination with facilities and trail construction at San Luis Reservoir could result in the placement of structures in the 100-year flood hazard area that could impede or redirect flood flows. As described in Chapter 9, Flood Protection, areas around the shoreline of San Luis Reservoir are located in FEMA flood zone D, defined as areas of undetermined but possible flood hazard. Construction activities would occur at the dam which is within the inundation area of San Luis Reservoir.

The new trails and facilities at San Luis Reservoir proposed in the *San Luis Reservoir SRA RMP/GP* would involve construction at the reservoir that could be near construction at B.F. Sisk Dam under the Crest Raise Alternative. The new facilities proposed in the management plan would not be large, and none of the new facilities would be in the 100-year floodplain. The San Luis Transmission Project would construct new transmission lines near San Luis Reservoir. The San Luis Solar Project would develop a new 159-acre solar facility adjacent to SR 152 crossing O'Neill Forebay.

The San Luis Transmission Project and the San Luis Solar Project would not place new infrastructure within the 100-year floodplain. In the event of dam failure these new facilities would not impede or redirect flood flows. The Crest Raise Alternative would not however place new infrastructure in the 100-year floodplain or in the downstream inundation area of San Luis Reservoir. **The Crest Raise Alternative would not contribute to any significant cumulative impacts on flood flows.**

Implementation of the Crest Raise Alternative in combination with facilities and trail construction at San Luis Reservoir could result in the increased exposure of people or structures to an unacceptable risk of loss, injury or death involving flooding, including flooding because of increases in the potential for the failure of a levee or dam. Potential for flooding exists around San Luis Reservoir. Long-term operations of water supply facilities under the Crest Raise Alternative would not change the maximum allowable water storage volume in the reservoir compared to existing conditions. As was described in Chapter 9, Flood Protection, implementation of the Crest Raise Alternative would reduce the potential for seismic induced dam failure from overtopping generated by embankment sloughing and/or seiche generated wave action and the associated flood risk.

Construction of trails and facilities at San Luis Reservoir proposed in the *San Luis Reservoir SRA RMP/GP* would include site-specific geotechnical investigations for siting and design of permanent structures. This would minimize any potential impacts from earthquakes and dam failure at the reservoir. The construction of the San Luis Transmission Project and the San Luis Solar Project would place new infrastructure downstream of San Luis Reservoir. In the event of dam failure these new facilities could be exposed to an unacceptable risk of loss. However, as described in Chapter 9, Flood Protection, the Crest Raise Alternative would reduce dam failure and flood hazard risks to people or structures. **Therefore, the Crest Raise Alternative would not contribute to any significant cumulative impacts on flood risk and would provide a beneficial change in the cumulative risk of flooding in the study area.**

Implementation of Crest Raise Alternative in combination with facilities and trail construction at San Luis Reservoir could alter the drainage pattern and/or create runoff water that would exceed the capacity of existing or planned stormwater drainage systems. Construction of the crest raise would result in less than significant impacts to the drainage pattern and the creation of runoff water.

As described in the environmental analysis for the *San Luis Reservoir SRA RMP/GP* (Reclamation and CDPR 2013), earth moving and construction during facilities and trail creation projects would alter the local drainage pattern around San Luis Reservoir. When specific construction and maintenance activities are undertaken, site-specific analysis would be conducted and detailed assessment of each project's activities would take place. The environmental analysis presented in the *San Luis Reservoir SRA RMP/GP* indicates that implementation of mitigation measures designed to reduce and control stormwater runoff in the case that more detailed environmental analysis determines significant stormwater-related impacts. Similarly, construction and operation of the San Luis Transmission Project and the San Luis Solar Project would disturb earth near B.F. Sisk Dam and would introduce new impervious surface. The development and implementation of a SWPPP would ensure that stormwater during construction is captured and runoff volume is reduced and the incorporation of methods to minimize flood damage into the design of all new structures would reduce potential effects to drainage patters associated with all of these projects.

Changes to the land from permanent filling and grading would alter local drainage patterns, however, methods to minimize flood damage or pollution from stormwater would be implemented as a part of the SWPPP that will be completed to control and reduce runoff during construction and prior to the reestablishment of ground cover in disturbed areas. Projects developed as part of the *San Luis Reservoir SRA RMP/GP* and the San Luis Transmission Project and the San Luis Solar Project would implement SWPPPs to control and reduce runoff. **Overall, the Crest Raise Alternative in combination with other cumulative projects would not result in a cumulative significant impact related to drainage and runoff.**

27.3.7 Visual Resources

27.3.7.1 Alternative 2 – Reservoir Restriction Alternative

Implementation of the Reservoir Restriction Alternative in combination with other cumulative actions could have short-term adverse effects on Class A and Class B visual resources, scenic resources within a designated State scenic highway, existing visual character of the area, and may create light glare in the reservoir region. As described in Chapter 10, Visual Resources, the Reservoir Restriction Alternative construction actions are limited to revegetation actions. Construction equipment is limited to hydroseeding trucks and boats, which are common to the visual landscape. In addition, the green hydroseed mixture, although contrasting to the seasonally brown vegetation, will be covered over as seeds begin to germinate within approximately 8 to 10 days of application. Therefore, no views from scenic vistas, nor the overall visual character in the study area will be affected by construction actions.

As the construction of the Reservoir Restriction Alternative would not impact visual resources, **the Reservoir Restriction Alternative's incremental contribution to any significant cumulative impact on visual quality in the area of analysis would not be cumulatively considerable.**

Under the Reservoir Restriction Alternative, operational changes at the San Luis Reservoir could affect visual resources. Following implementation of the Reservoir Restriction Alternative, a maximum elevation of 489 feet (a reduction of 55-feet from existing conditions) within San Luis Reservoir would likely not affect the visual character of the area, as revegetation actions would be taken to prevent a bathtub ring effect around the reservoir. In combination with the other cumulative projects in the area of analysis, scenic values in the foreground for recreation users at San Luis Reservoir and in the background from vistas along public roadways (including SR 152), at the Romero Outlook Visitors Center, and open space areas, such as the Cottonwood Creek Wildlife Area and portions of Pacheco State Park would return to their current quality level. **Therefore, the Reservoir Restriction Alternative in combination with the other cumulative projects would not result in a significant cumulative impact on visual quality in the area of analysis.**

27.3.7.2 Alternative 3 – Crest Raise Alternative

Implementation of the Crest Raise Alternative in combination with other cumulative actions could have short-term adverse effects on Class A and Class B visual resources, scenic resources within a designated State scenic highway, existing visual character of the area, and may create light glare in the reservoir region. As described in Chapter 10, Visual Resources, the Crest Raise Alternative would create two construction and stockpile areas north and south of Gianelli Intake Facility. Blasting activities, to generate materials for construction, would occur at Basalt Use Area. These construction actions could affect views from scenic vistas and overall visual character in the study area.

The *San Luis Reservoir SRA Regional Management Plan/General Plan* and the California High Speed Rail Project have been identified as cumulative plans that could contribute to visual resource effects during the construction of the Crest Raise Alternative. The proposed improvements at San Luis Reservoir SRA, the California High Speed Rail Project, the San Luis Transmission Project, and the San Luis Solar Project could result in cumulative effects associated with visual resources.

The *San Luis Reservoir SRA Regional Management Plan/General Plan* includes a Park Plan, which outlines various alternatives for future park expansion and new facility development including new trails. It is typical for park expansion projects to be phased; thus, associated construction actions could take place prior to or congruently with Crest Raise Alternative construction actions.

A multi-modal trail system is proposed to connect both use areas to the Pacheco State Park. The Dinosaur Point Use Area trail would also connect to the San Luis Wildlife Area (Reclamation and CDPR 2013). An additional trail is proposed to connect the Basalt and Los Banos Creek use areas. Construction of these trails would be expected to require small scale construction equipment and hand labor and would not be anticipated to generate substantial visual impacts.

The California High Speed Rail Project would develop a new railway traversing the Pacheco Pass adjacent to the San Luis Reservoir and SR 152. The railway would support train speeds in excess of 125 miles per hour and would likely have sections visible to both San Luis Reservoir and SR 152. The project construction schedule for this section of railway is currently unknown but, if funding is secured in the near future, development of the high-speed railway could take place prior to or congruently with the Crest Raise Alternative construction actions.

Development of the California High Speed Rail Project would establish new railway and railway tunnels across Pacheco Pass parallel to SR 152 near San Luis Reservoir. Construction of this railway would likely require large scale equipment that would be visible from San Luis Reservoir, public roadways (including SR 152), the Romero Outlook Visitors Center, and open space areas, such as the Cottonwood Creek Wildlife Area and portions of Pacheco State Park, would generate a temporary degradation of the areas visual character and the quality of scenic vistas.

The San Luis Transmission Project and the San Luis Solar Project would both construct new facilities downstream of B.F. Sisk Dam. The San Luis Transmission Project would develop new transmission lines connecting the Tracy Substation to the Dos Amigos Substation with a side connection the San Luis Substation at B.F. Sisk Dam. This project would develop new transmission towers in the near the construction staging area for the Crest Raise Alternative. The San Luis Solar Project would develop a new 159-acre solar power generation facility in the area between the O'Neill Forebay and SR 152. Construction of these projects would likely require large scale equipment that would be visible from public roadways (including SR 152), the Romero Outlook Visitors Center, and open space areas, such as the Cottonwood Creek Wildlife Area and portions of Pacheco State Park, would generate a temporary degradation of the areas visual character and the quality of scenic vistas.

If construction of these projects was completed concurrently with the Crest Raise, the Basalt Use Area would be closed for the full construction schedule and Dinosaur Point would be opened but restricted to areas away from B.F. Sisk Dam, limiting impacts to prolonged visual resource impacts to foreground views from the reservoir. Effects on background views of the dam face from more distant locations like public roadways (including SR 152), the Romero Outlook Visitors Center, and open space areas, such as the Cottonwood Creek Wildlife Area and portions of Pacheco State Park in the short-term given the introduction of construction equipment, construction traffic and construction lighting would be limited by those viewing points' distance from the construction areas and the short viewing period for motorists passing by on neighboring roadways. **Therefore, the Crest Raise Alternative's incremental contribution to any significant cumulative impact on visual quality in the area of analysis would not be cumulatively considerable.**

Under the Crest Raise Alternative, structural changes to B.F. Sisk Dam as well as operational changes at the San Luis Reservoir could affect visual resources. In the long-term, following completion of the Crest Raise Alternative, the new material added to the B.F. Sisk Dam embankment and downstream toe would be anticipated to fade over time as new embankment materials are reduced in tone through weathering driven primarily by sun exposure and return to a color and texture similar to the existing materials and as a result would not result in permanent reductions in scenic quality from viewing locations in and around San Luis Reservoir. **Therefore, the Crest Raise Alternative's incremental**

contribution to any significant cumulative impact on visual quality in the area of analysis would not be cumulatively considerable.

27.3.8 Noise

27.3.8.1 Alternative 2 – Reservoir Restriction Alternative

Construction actions associated with the Reservoir Restriction Alternative are limited to revegetation around the reservoir rim. Noise generated from revegetation construction actions are not anticipated to generate noise levels exceeding existing conditions. In addition, operation of the Reservoir Restriction Alternative will not contribute to increases in the existing noise setting. **Therefore, the Reservoir Restriction Alternative's incremental contribution to the significant cumulative effect would not be cumulatively considerable.**

27.3.8.2 Alternative 3 – Crest Raise Alternative

Construction activities associated with the Crest Raise Alternative could expose sensitive receptors to noise levels in excess of standards established in the local general plan or noise ordinance. All construction activities associated the Crest Raise Alternative would occur within Merced County. While the Merced County Code (Section 10.60.030) sets specific sound level limitations for the county, the noise ordinance specifically exempts construction activities between 7 a.m. and 6 p.m. Operation of construction equipment between 6 p.m. and 7 a.m. is prohibited unless it does not result in noise levels exceeding the background level by 10 A-weighted dB (dBA) between 6 p.m. and 10 p.m. and by 5 dBA between 10 p.m. and 7 a.m. Construction activities, including blasting and excavation, would exceed Merced County limits of a 10 dBA increase. A smaller crew of 10 to 20 people would be active at the construction area performing equipment maintenance, repair activities, crushing operations at Basalt Hill, and borrow operations at Borrow Area 6 from 6:00 p.m. to 6:00 a.m. These nighttime construction actions are not anticipated to exceed the Merced County limits.

Construction projects expected to occur in the county as a result of projected population growth could result in significant cumulative noise levels. Construction of the California High Speed Rail Project, the San Luis Transmission Project and the San Luis Solar Project could potentially occur at the same time as construction activities near San Luis Reservoir for the Crest Raise Alternative and would involve a substantial amount of construction equipment and vehicle traffic that could contribute to noise impacts. The proposed alignment of the California High Speed Rail Project the San Luis Transmission Project, and the San Luis Solar Project would all be along SR 152. The cumulative noise effect would be significant given the California High Speed Rail Project alignment's crossing of SR 152 via aerial structure and beneath Dinosaur Point Road via tunnel (CHSRA 2016) and the San Luis

Transmission Project and San Luis Solar Project location along SR 152 adjacent to O'Neill Forebay, all important construction traffic routes for the Crest Raise Alternative. Implementation of Mitigation Measure NOISE-1 and NOISE-2 would reduce impacts from the Crest Raise Alternative, but it would not be sufficiently to reduce the alternative's construction impacts to a less than significant level. **Therefore, with the implementation of Mitigation Measure NOISE-1 and NOISE-2, the Crest Raise Alternative's incremental contribution to the significant cumulative noise effect would remain cumulatively considerable.**

Construction activities associated with the Crest Raise Alternative could expose sensitive receptors to excessive groundborne vibration or groundborne noise. Construction projects expected to occur in the county as a result of projected population growth could result in significant negative impacts. Construction of the California High Speed Rail Project, the San Luis Transmission Project, and the San Luis Solar Project could potentially occur at the same time as construction activities near San Luis Reservoir for the Crest Raise Alternative. Construction and operation of these cumulative projects result in significant cumulative vibration effects. The Crest Raise Alternative's effect on vibration and ground borne would, as was noted in Chapter 11, Noise and Vibration, be less than significant but given the close proximity of alternative's construction area to the cumulative project's construction areas the Crest Raise Alternative could contribute to a significant cumulative vibration and ground borne noise impact. This significant cumulative effect would be included the borrow area east of B.F. Sisk Dam where excavation and transport of borrow materials for placement on the dam could occur adjacent to construction actions for the San Luis Transmission Project and the San Luis Solar Project and the SR 152 construction areas near Cottonwood Bay adjacent to the California High Speed Rail Project alignment. **The Crest Raise Alternative's incremental contribution to the significant cumulative noise effect would be cumulatively considerable.**

Construction activities associated with and operation of the Crest Raise Alternative could result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. Construction and operation of the California High Speed Rail Project, the San Luis Transmission Project, and the San Luis Solar Project could potentially occur at the same time as construction and operation of the extended reservoir. Construction impacts on ambient noise levels generated by both the Crest Raise Alternative and the cumulative projects would be short-term and would not result in permanent increases in ambient noise levels. The long term operation of the California High Speed Rail Project would not produce substantial permanent ambient noise level effects as the passing trains would be intermittent. Operation of the San Luis Transmission Project, the San Luis Point Improvement Project, and the San Luis Solar Project would not produce permanent ambient noise level effects. Therefore, there would be no significant cumulative impacts. The Crest Raise Alternative would not result in any long-term noise impacts, due to the operation and maintenance of the new facilities built under this Alternative. **Therefore, the Crest Raise Alternative would not contribute to any cumulative long-term noise effect.**

Construction activities associated with and operation of the Crest Raise Alternative could cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. Noise from construction equipment and construction traffic would occur throughout the construction phase of this alternative. Noise levels at the sensitive receptor, San Luis Creek Use Area and subdivisions off SR 152, would exceed the significance criteria, which would contribute to a substantial temporary increase in ambient noise levels in the project vicinity.

Construction projects expected to occur in the county as a result of projected population growth could result in significant negative impacts. Construction of the California High Speed Rail Project, the San Luis Transmission Project, the San Luis Point Improvement Project, and the San Luis Solar Project could occur at the same time as construction activities near San Luis Reservoir for the Crest Raise Alternative and would involve a substantial amount of construction equipment and vehicle traffic that would cause an increase in ambient noise levels in the project vicinity. The Crest Raise Alternative's incremental contribution to cumulative ambient noise levels would be significant. The long term operation of the California High Speed Rail Project would produce substantial periodic ambient noise level effects with regular passing trains. Operation of the San Luis Transmission Project, the San Luis Point Improvement Project, and the San Luis Solar Project would not produce permanent ambient noise level effects. Operation of the Crest Raise Alternative would not change operations at San Luis Reservoir in a way that would introduce a new noise source. Therefore, cumulative periodic ambient noise level increases would not be a significant cumulative impact.

Implementation of Mitigation Measure NOISE-1 and NOISE-2 would reduce construction impacts from the Crest Raise Alternative, but it would not be sufficient to reduce the alternative's construction impacts to a less than significant level. **Therefore, the Crest Raise Alternative's incremental contribution to the significant cumulative increase in temporary ambient noise levels during construction would be cumulatively considerable pre-mitigation and remain cumulatively considerable post mitigation. Operation of the Crest Raise Alternative would not contribute to any cumulative temporary or periodic ambient noise effect.**

Operational sources located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would not expose people residing or working in the project area to excessive noise levels. Operation of the California High Speed Rail Project, the San Luis Transmission Project, the San Luis Solar Project, the San Luis Point Improvement Project, and the reservoir under the Crest Raise Alternative would occur within the San Luis Reservoir Seaplane Base Airport Land Use Plan. The seaplane base allows water landings of planes on the reservoir. Because of the high sound levels associated with construction equipment, construction workers would be wearing hearing protection in compliance with California Occupational Safety and Health Administration (OSHA) regulations, and no workers would be exposed to excessive noise levels associated with either project. Additionally, neither of the proposed projects would cause new residents or offsite workers to be located within the airport land use plan. **Therefore, the Crest Raise Alternative would not contribute to any cumulative effect.**

27.3.9 Traffic and Transportation

27.3.9.1 Alternatives 2 and 3 – Reservoir Restriction and Crest Raise Alternatives

27.3.9.1.1 Construction Impacts

Construction activities for the Reservoir Restriction or Crest Raise Alternative in combination with construction activities considered for cumulative impacts could result in degradation of roadway Level of Service (LOS) in the area of analysis. Construction of projects considered for cumulative impacts in Merced County including the California High Speed Rail Project, the *San Luis Reservoir SRA RMP/GP*, and development projects related to projected growth in the County could create additional construction traffic in the area of analysis during the same time period.

The proposed California High Speed Rail alignment runs a few miles north of San Luis Reservoir. Construction details of the High Speed Rail segment closer to the reservoir, including time and duration of construction, are currently unavailable. If the construction of this High Speed Rail’s segment would occur during the same time as construction of Alternative 3, it could result in cumulative traffic impacts to the area of analysis. However, without construction details of the California High Speed Rail segment, cumulative impacts associated with the California High Speed Rail project cannot be determined at this point.

The *San Luis Reservoir SRA RMP/GP* describes that traffic on SR 152 currently exceeds capacity during the peak hours and additional development in the region related to the projects proposed at the SRA and development projects related to projected growth in the County would further add to this significant cumulative condition.

The *San Luis Reservoir SRA RMP/GP* notes that as specific projects at the SRA are developed, site-specific environmental analyses would be conducted and mitigation measures would be implemented to reduce impacts to visitor access or circulation on local roads.

As shown in Chapter 12, Traffic and Transportation, construction-related truck and personnel trips associated with the Reservoir Restriction and Crest Raise Alternatives by them self would not result in a degradation of roadway LOS values during the construction period. **However, the alternatives' incremental contribution to significant cumulative impacts on traffic flow in the area of analysis could be cumulatively considerable if construction of the Reservoir Restriction or Crest Raise Alternatives, and the California High Speed Rail's segment located closest to the reservoir would occur at the same time.**

Construction activities for the Reservoir Restriction or Crest Raise Alternative in combination with construction activities considered for cumulative impacts could result in temporary traffic safety effects. The presence of additional heavy construction equipment and slower moving traffic on regional and local roads around San Luis Reservoir and B.F. Sisk Dam related to the California High Speed Rail project, the *San Luis Reservoir SRA RMP/GP* and development projects related to projected growth in Merced County would increase risks related to traffic safety. One of the alternatives considered in the *San Luis Reservoir SRA RMP/GP* include signage improvements to address existing turning conflicts. Additionally, agencies with jurisdiction over nearby signage and roadways are expected to continue to incorporate roadway improvements over time (Reclamation and CDPR 2013); these would have a beneficial effect on the cumulative condition in the area of analysis, but would not reduce the magnitude of other cumulative construction activities' effect on traffic safety to a less than significant cumulative level.

Construction of the Reservoir Restriction or Crest Raise Alternative could cause a significant impact on traffic safety, but could be reduced to less than significant level with implementation of Mitigation Measure TR-1 discussed in Chapter 12, Traffic and Transportation.

Construction activities for the Reservoir Restriction or Crest Raise Alternative in combination with construction activities considered for cumulative impacts could result in reductions of capacity, availability, or performance of public transit and non-motorized transportation, or conflict with any programs regarding public transit, bicycle, or pedestrian facilities. Since the San Luis Reservoir Region has very low pedestrian, bicycle, and transit activities, cumulative construction activities associated with the Reservoir Restriction or Crest Raise Alternative would also not cause any interruptions to public transit or non-motorized traffic. **Therefore, there would be no cumulative effects.**

27.3.9.1.2 Operations

Operations and maintenance activities of the Reservoir Restriction or Crest Raise Alternative in combination with projects considered for cumulative impacts could result in negative cumulative effects to roadway LOS, traffic safety, and the operations and performance of public transit and non-motorized *transportation.* As mentioned earlier, the Reservoir Restriction or Crest Raise Alternative would not have any additional operation and maintenance (O&M) personnel after construction. **Therefore, there would be no cumulative effects.**

27.3.10 Hazards and Hazardous Materials

27.3.10.1 Alternative 2 – Reservoir Restriction Alternative

Construction and operation of the Reservoir Restriction Alternative could increase the risk of exposure from hazardous materials to the public and construction workers. Construction of the alternative could also conflict with seaplane maneuvers on San Luis Reservoir and operations at the San Luis Reservoir Seaplane Base, increase the risk of wildfire within the vicinity of the project area, and temporarily interfere with an emergency response plan or emergency evacuation plan. Implementation of the Reservoir Restriction Alternative could, as noted in Chapter 13, Hazards and Hazardous Materials, result in impacts to hazards and hazardous materials.

The *San Luis Reservoir SRA RMP/GP* has been identified as a cumulative plan and the San Luis Solar Project and the San Luis Transmission Project have been identified as cumulative projects that could contribute to hazards and hazardous materials effects during the construction of the Reservoir Restriction Alternative.

Construction of trails as a part of the *San Luis Reservoir SRA RMP/GP*, development of the San Luis Solar Project and the San Luis Transmission Project would be expected to require construction equipment which could require the use of motor oil, gasoline, diesel fuel, solvents and degreasers similar to those required for construction of the Reservoir Restriction Alternative. However, a SWPPP for the trail, solar and transmission projects would be required by the Regional Water Quality Control Board for approval of a General Construction Permit under the National Pollutant Discharge Elimination System (NPDES) Program. A SWPPP would also be required under the General Construction Permit for the Reservoir Restriction Alternative and would describe safety measures and BMPs to be implemented when transporting, storing or using hazardous materials.

SR 152 would be the main site access for trucks, light equipment and construction worker access to the Park Plan trail construction areas, San Luis Solar Project and the San Luis Transmission Project. If the Park Plan trails, the San Luis Solar Project or the San Luis Transmission Project are constructed at the same time as the Reservoir Restriction Alternative this construction traffic could conflict with emergency response and evacuation plans for the State Responsibility Area, a potentially significant cumulative effect. Construction of the trails, the San Luis Solar Project or the San Luis Transmission Project at a time different than the Reservoir Restriction Alternative would eliminate the potential for construction traffic conflict with emergency response and evacuation plans for the State Responsibility Area.

As noted in Chapter 13, Hazards and Hazardous Materials, the 2030 Merced County General Plan Background Report identified the San Luis Reservoir area as a region at moderate or high risk for wildfire. Sparks could be generated while using mechanical equipment during construction of the Park Plan trails, the San Luis Solar Project or the San Luis Transmission Project, which could cause a wildfire, a potentially significant cumulative effect.

The construction and operation of the Reservoir Restriction Alternative in combination with these cumulative actions could result in significant cumulative impacts on hazards and hazardous materials and this Alternative's contribution to these impacts would be cumulatively considerable. The implementation of mitigation measures to reduce the severity of the alternative's potential for significant impacts from encountering contaminated soil, increasing wildfire risk and conflicting with emergency response would be reduced to a less than significant. **Therefore, with implementation of Mitigation Measures HAZ-2, HAZ-3, HAZ-4, and TR-1, the Reservoir Restriction Alternative's incremental contribution to significant cumulative effects in the Merced County - San Luis Reservoir Region on hazards and hazardous materials would be a less than significant impact and would not be cumulatively considerable.**

27.3.10.2 Alternative 3 – Crest Raise Alternative

The increased risk of exposure to the public and workers from hazards and hazardous materials under construction and operation of the Crest Raise Alternative are similar to those described under the Reservoir Restriction Alternative above. The two cumulative projects that could contribute to hazards and hazardous materials effects during the construction of the Crest Raise Alternative are the same as those identified under the Reservoir Restriction Alternative. **The construction and operation of the Crest Raise Alternative in combination with these cumulative actions could result in significant cumulative impacts on hazards and hazardous materials and this Alternative's contribution to these impacts would be cumulatively considerable**. The implementation of mitigation measures to reduce the severity of the alternative's potential for significant impacts from encountering contaminated soil, increasing wildfire risk and conflicting with emergency response would be reduced to a less than significant. **Therefore, with implementation of Mitigation Measures HAZ-1, HAZ-2, HAZ-3, HAZ-4, and TR-1, the Crest Raise Alternative's incremental contribution to significant cumulative effects in the Merced County - San Luis Reservoir Region on hazards and hazardous materials would be a less than significant impact and would not be cumulatively considerable.**

27.3.11 Fisheries Resources

27.3.11.1 Alternative 2 - Reservoir Restriction Alternative

Construction activities could destroy or adversely affect aquatic habitats for special-status fish species. Construction and operation of the Reservoir Restriction Alternative could result in temporary impacts on aquatic habitats for fish species. However, the San Luis Reservoir is an artificial environment and does not support a naturally evolved aquatic community. Although a few native species may be present and any given time, the vast majority of fish species in the reservoir have either been directly introduced or transported into the reservoir via the California Aqueduct and Delta-Mendota Canal.

Other projects that could contribute to cumulative impacts on aquatic habitat conditions include State Water Project Supply Allocation Settlement Agreement, Los Vaqueros Reservoir Expansion Project, and the San Joaquin River Restoration Program. These effects on aquatic habitat conditions would be localized to the action areas for each of those projects and would not be anticipated to affect habitat conditions in San Luis Reservoir. **Therefore, the Reservoir Restriction Alternative's incremental contribution to cumulative effects on aquatic habitats for special-status fish species would not be cumulatively considerable.**

27.3.11.2 Alternative 3 - Crest Raise Alternative

Construction activities could destroy or adversely affect aquatic habitats for special-status fish species. Construction of the Crest Raise Alternative could result in temporary impacts on aquatic habitats for fish species from clearing, grading, staging of equipment, and other ground-disturbing activities. In addition, implementation of the optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasonal drawdown cycles, during the period that the berm foundation would be excavated with effects similar to those described above for the Reservoir Restriction Alternative. However, these impacts would be temporary and within the wide range of seasonal lake level fluctuations currently experienced at San Luis Reservoir.

Other projects that could contribute to cumulative impacts on aquatic habitat conditions include State Water Project Supply Allocation Settlement Agreement, Los Vaqueros Reservoir Expansion Project, and the San Joaquin River Restoration Program. These effects on aquatic habitat conditions would be localized to the action areas for each of those projects and would not be anticipated to affect habitat conditions in San Luis Reservoir. **Therefore, the Crest Raise Alternative's incremental contribution to cumulative effects on aquatic habitats for special-status fish species would not be cumulatively considerable.**

Operation of the Crest Raise Alternative could result in impacts to aquatic habitats for special-status fish species. Other projects that could contribute to cumulative impacts on aquatic habitat conditions include State Water Project Supply Allocation Settlement Agreement, Los Vaqueros Reservoir Expansion Project, and the San Joaquin River Restoration Program. These projects, if implemented, would influence operations in the Delta at the same time as the Crest Raise Alternative. However, the Crest Raise Alternative should result in no changes to Delta operations of the CVP and SWP. Implementation of optional shear key action would require limits on the maximum surface elevation in San Luis Reservoir for two seasons, during the period that the berm foundation would be excavated, with potential Delta effects during this period similar to those described above for the Reservoir Restriction Alternative. **Therefore, the Crest Raise Alternative's incremental contribution to significant cumulative effects on special-status fish species with and without the optional shear key component would not be cumulatively considerable.**

27.3.12 Terrestrial Resources

27.3.12.1 Alternative 2 - Reservoir Restriction Alternative

Construction of the Reservoir Restriction Alternative could destroy or adversely affect terrestrial resources. Construction activities for the Reservoir Restriction Alternative could result in impacts on special-status wildlife or their habitat at the San Luis Reservoir. Alternatives described in the *San Luis Reservoir SRA RMP/GP*, the California High Speed Rail Project, the San Luis Transmission Project, and the San Luis Solar Project could also have impacts on special-status wildlife or habitat at the San Luis Reservoir, and could occur at the same time as the Reservoir Restriction Alternative. **Together, these projects and the Reservoir Restriction Alternative could result in significant cumulative effects on special-status wildlife with potential to occur at the San Luis Reservoir.**

However, the Reservoir Restriction Alternative would implement Mitigation Measure TERR-15 to complete worker awareness training and require a nighttime speed limit and litter removal. This mitigation would reduce impacts to previously unidentified special-status wildlife to a less than significant level. **With implementation of Mitigation Measure TERR-15, the Reservoir Restriction Alternative's incremental contribution to significant cumulative effects on special-status wildlife would not be cumulatively considerable.**

Operation of the Reservoir Restriction Alternative could destroy or adversely affect terrestrial resources. Operation of the Reservoir Restriction would result in an increase in the acreage of habitat available to terrestrial species, having a beneficial impact on terrestrial resources. **Therefore, operation of the Reservoir Restriction Alternative would not contribute to any cumulative impacts on terrestrial resources.**

27.3.12.2 Alternative 3 - Crest Raise Alternative

Construction activities could destroy or adversely affect sensitive habitats including wetland and riparian vegetation communities. Construction activities for the Crest Raise Alternative could result in impacts on wetland riparian vegetation communities at the San Luis Reservoir. Alternatives described in the *San Luis Reservoir SRA RMP/GP*, the California High Speed Rail Project, the San Luis Transmission Project, and the San Luis Solar Project could also have impacts on wetland and riparian vegetation communities at the San Luis Reservoir, and could occur at the same time as the crest raise. **Together, these projects and the Crest Raise Alternative could result in significant cumulative effects associated with loss or adverse modification of wetland and riparian habitats.**

However, the Crest Raise Alternative would implement Mitigation Measure TERR-16 which requires the avoidance of wetlands whenever practicable, the use of fencing used to delineate waters of the United States and waters of the State within and adjacent to construction areas that cannot be directly filled, and to identify these areas as sensitive habitat prior to the start of construction to prevent unintended trampling of wetland vegetation by construction personnel and equipment. Mitigation Measure TERR-16 further requires that areas disturbed by construction would be replanted with native plants to minimize erosion. This mitigation would reduce impacts to previously unidentified sensitive habitats to a less than significant level. **With implementation of Mitigation Measure TERR-16, the Crest Raise Alternative's incremental contribution to significant cumulative effects on wetland and riparian habitats would not be cumulatively considerable.**

Construction activities could kill, harm, or disturb terrestrial wildlife, including special-status species, or their habitats. Construction activities for the Crest Raise Alternative could result in impacts on special-status wildlife or their habitat at the San Luis Reservoir. Alternatives described in the *San Luis Reservoir SRA RMP/GP*, the California High Speed Rail Project, the San Luis Transmission Project, and the San Luis Solar Project could also have impacts on special-status wildlife or habitat at the San Luis Reservoir, and could occur at the same time as the Crest Raise Alternative. **Together, these projects and the Crest Raise Alternative could result in significant cumulative effects on special-status wildlife with potential to occur at the San Luis Reservoir.**

However, the Crest Raise Alternative would implement Mitigation Measures TERR-1 through TERR-5 and TERR-11 through TERR-15 to complete special habitat and species surveys, implement avoidance requirements, train workers, and require species specific compensatory mitigation requirements to address unavoidable impacts to habitats. This mitigation would reduce impacts to previously unidentified special-status wildlife to a less than significant level. **With implementation of Mitigation Measures TERR-1 through TERR-5 and TERR-11 through TERR-15, the Crest Raise Alternative's incremental**

contribution to significant cumulative effects on special-status wildlife would not be cumulatively considerable.

Construction activities could disturb nesting migratory birds, including raptors. Construction activities for the Crest Raise Alternative could result in impacts on migratory birds if construction occurs during nesting season and/or results in destruction of nesting habitat for migratory birds. Alternatives described in the *San Luis Reservoir SRA RMP/GP*, the California High Speed Rail Project, the San Luis Transmission Project, and the San Luis Solar Project could also have impacts on migratory birds or habitat at the San Luis Reservoir, and could occur at the same time as the crest raise. **Together, these projects and the Crest Raise Alternative could result in significant cumulative effects on migratory birds at the San Luis Reservoir.**

However, the Crest Raise Alternative would implement Mitigation Measures TERR-6 through TERR-10 to avoid or reduce effects to migratory birds. **Therefore, with implementation of Mitigation Measures TERR-6 through TERR-10, the Crest Raise Alternative's incremental contribution to significant cumulative effects on migratory birds would not be cumulatively considerable.**

Construction activities could destroy or adversely affect special-status plant species. Construction activities for the Crest Raise Alternative could result in impacts on special-status plants at the San Luis Reservoir. Alternatives described in the *San Luis Reservoir SRA RMP/GP*, the California High Speed Rail Project, the San Luis Transmission Project, and the San Luis Solar Project could also have impacts on special-status plants at the San Luis Reservoir, and could occur at the same time as the Crest Raise Alternative. **Together, these projects and the Crest Raise Alternative could result in significant cumulative effects on special-status plants at the San Luis Reservoir.**

However, the Crest Raise Alternative would implement Mitigation Measure TERR-1, which outlines requirements for special habitat and species surveys, avoidance requirements, and compensatory mitigation requirements to address unavoidable impacts to habitats. This mitigation would reduce impacts to previously unidentified special-status plant species to a less than significant level. **Therefore, with implementation of Mitigation Measure TERR-1, the Crest Raise Alternative's incremental contribution to significant cumulative effects on special-status plants would not be cumulatively considerable.**

Construction activities could result in conflicts with local policies or ordinances protecting biological resources. The Merced County General Plan includes, as described in Chapter 15, Terrestrial Resources, includes objectives and policies to preserve and protect biologic resources in the County. These include provisions to preserve existing and increase the overall acreage of protected lands in the County, and the designation of buffers around and protection of wetlands**. Together these projects and the Crest Raise Alternative could generate significant impacts on terrestrial wildlife and vegetation.** Mitigation Measures TERR-1 through 16 are required to reduce these potential impacts to terrestrial wildlife and vegetation including wetlands during construction near the San Luis Reservoir shoreline to a less than significant level. **Therefore, with implementation of Mitigation Measures TERR-1 through 16 the Crest Raise Alternative's incremental contribution to significant cumulative effects on local policies or ordinances protecting biological resources would not be cumulatively considerable.**

27.3.13 Regional Economics

27.3.13.1 Alternative 2 - Reservoir Restriction Alternative

The Reservoir Restriction Alternative, in combination with the CVP M&I WSP, could have cumulative effects on CVP contractors water supply. The CVP M&I WSP would increase CVP water supplies to CVP M&I contractors during drought years to avoid adverse public health and safety impacts. This would also avoid economic losses avoided with water shortages. The WSP could reduce some deliveries to CVP agricultural users during drought years. The Reservoir Restriction Alternative would also decrease water supplies to CVP agricultural users. This reduction in agricultural water supplies would contribute to adverse regional economic effects under the cumulative condition.

Projected population growth in CVP and SWP service areas, combined with the Reservoir Restriction Alternative, could result in regional economic effects. The population in CVP and SWP service areas (Fresno, Kern, Kings, Los Angeles, Merced, Orange, San Benito, San Diego, San Joaquin, Santa Clara and Stanislaus counties) is projected to increase from 21,185,412 in 2010 to 24,499,654 in 2030. This population growth would both contribute to increased pressure on the water supply system both locally and regionally to meet demands in the future. The Reservoir Restriction Alternative would also decrease water supplies to CVP and SWP water users. This reduction in water supplies from the Reservoir Restriction Alternative and projected growth statewide in the counties identified above are expected to increase demand on these declining water supply deliveries and will contribute to adverse regional economic cumulative effects in the future. A portion of the regional economic effects associated with construction expenditures for the Reservoir Restriction Alternative would occur in Merced County. There would also be jobs generated in Merced County. These effects would also benefit the Merced County economy and occur during the 1.5 to 2 year construction period. Construction of Reservoir Restriction Alternative would have a positive cumulative economic effect.

The Reservoir Restriction Alternative, in combination with the California High Speed Rail Project, could have regional economic effects. Construction traffic for the California High Speed Rail Project could deter some visitors to the reservoir, which would decrease visitor spending in Merced County. This would be an adverse cumulative economic effect. Construction activities under the San Luis Transmission Project would also cause temporary closures of the San Luis Reservoir SRA. The Reservoir Restriction Alternative would also decrease visitor spending by reducing water based recreation opportunities. This reduction in visitor spending would contribute to adverse cumulative regional economic effects.

The Reservoir Restriction Alternative, combined with the San Luis Reservoir SRA RMP/GP, San Luis Transmission Project, and San Luis Solar Project, could affect recreational expenditures at the San Luis Reservoir SRA and, in turn, affect the Merced County regional economy. One purpose of the *San Luis Reservoir SRA RMP/GP* is to improve recreational facilities and opportunities to accommodate increased visitor use. The plan outlines alternatives that improve access and facilities, which would attract more visitors to the San Luis Reservoir SRA. Increased number of visitors at the San Luis Reservoir SRA would result in additional spending in Merced County, which would have positive regional economic effects. Operation of the Reservoir Restriction Alternative would reduce water based recreation opportunities, which would be in conflict with the objectives of the *San Luis Reservoir SRA RMP/GP*. It would decrease visitors to Merced County and adversely affect the regional economy. This would be an adverse cumulative economic effect of the Reservoir Restriction Alternative.

27.3.13.2 Alternative 3 - Crest Raise Alternative

The Crest Raise Alternative, in combination with the Bay-Delta Conservation Plan and CVP M&I WSP, could have cumulative effects on CVP and SWP water contractors water supply. The BDCP would increase water exports to south-of-Delta contractors. This would increase water supply reliability for south-of delta water contractors and reduce economic effects associated with potential water shortages. The CVP M&I WSP would increase CVP water supplies to CVP M&I contractors during drought years to avoid adverse public health and safety impacts. This would also avoid economic losses avoided with water shortages. The WSP could reduce some deliveries to CVP agricultural users during drought years. Though the Crest Raise Alternative would not change water supply to the CVP and SWP contractors it would increase water supply reliability by reducing the likelihood of dam failure during a seismic event. Cumulatively, the projects would have a beneficial economic effect for CVP and SWP contractors.

The Crest Raise Alternative, in combination with the California High Speed Rail Project, could have regional economic effects. A portion of the California High Speed Rail Project track alignment traverses Pacheco Pass adjacent to SR 120 and San Luis Reservoir. Construction expenditures for these projects would result in economic output, labor income, and employment in Santa Clara and Merced counties as construction workers spend money in the counties and some construction materials may be purchased. This would be a positive economic effect. This would be a positive cumulative economic effect.

Construction traffic for the California High Speed Rail Project could deter some visitors to the reservoir, which would decrease visitor spending in Merced County. This would be an adverse cumulative economic effect. This reduction in visitor spending would contribute to adverse cumulative regional economic effects.

Projected population and employment growth in Merced County, combined with the Crest Raise Alternative, could result in regional economic effects. The population in Merced County is projected to increase from 256,803 in 2010 to 326,574 in 2030. Jobs are project to increase by approximately 42,000 from 2010 to 2030. Increases in population and jobs would increase economic activity in the county as more housing would be developed and commercial development would likely increase. These would be beneficial economic effects in the county. A portion of the regional economic effects associated with construction expenditures for the Crest Raise Alternative would occur in Merced County. There would also be jobs generated in Merced County. These effects would also benefit the Merced County economy and occur during the construction period. Construction of Crest Raise Alternative would have a positive cumulative economic effect. O&M expenditures would be long-term, but have relatively minor beneficial regional cumulative economic effects.

The Crest Raise Alternative, combined with the San Luis Reservoir SRA RMP/GP, San Luis Transmission Project, and San Luis Solar Project, could affect recreational expenditures at the San Luis Reservoir SRA and, in turn, affect the Merced County regional economy. One purpose of the *San Luis Reservoir SRA RMP/GP* is to improve recreational facilities and opportunities to accommodate increased visitor use. The plan outlines alternatives that improve access and develop. One specific development proposed includes new trails connecting to both the Basalt and Medeiros use areas. Improved facilities would attract more visitors to the San Luis Reservoir SRA. Increased number of visitors at the San Luis Reservoir SRA would result in additional spending in Merced County, which would have positive regional economic effects. Construction of the Crest Raise Alternative would temporarily close the Basalt and Medeiros use areas, which would be in conflict with the objectives of the *San Luis Reservoir SRA RMP/GP*. It would decrease visitors to Merced County and adversely affect the regional economy. This would be an adverse cumulative economic effect of the Crest Raise Alternative.

The Crest Raise Alternative, the San Luis Transmission Project, and the San Luis Solar Project, would all result in closures of recreational facilities during construction. This would reduce the number of visitors to San Luis Reservoir and reduce spending in Merced County. The reduced visitor spending would occur during the construction period. This would be an adverse cumulative effect to the regional economy of Merced County.

27.3.14 Land Use

27.3.14.1 Alternative 2 - Reservoir Restriction Alternative

As discussed in Chapter 17, Land Use, the Reservoir Restriction Alternative would have no construction requirements, and would therefore have no construction-related impacts to land use. However, the alternative could result in reductions in CVP and SWP water supply deliveries, which could affect land use. Although agricultural practices may change, permanent changes to land use designations are not anticipated under the Reservoir Restriction Alternative. Of the cumulative projects considered, the proposed actions of the *BDCP*/California WaterFix, California High Speed Rail Project, CVP M&I WSP, *San Luis Reservoir State Recreation Area RMP/GP*, and the San Luis Transmission Project could result in short-term and long-term changes in land use. For example, potential land acquisitions could change land use designations. Construction and implementation of conservation measures included in the BDCP/California WaterFix could result in incompatibilities with local land use regulations, depending on the final locations. Also, construction and operation of some components of the San Luis Transmission Project would not be compatible with the current use or the proposed or active conservation easement agreements. The land use effects of these projects would be analyzed in appropriate environmental impact documents and significant impacts would be mitigated where necessary.

Future growth and development in Merced County would undergo environmental review with mitigation for significant impacts, as required. The Reservoir Restriction Alternative would not result in cumulative effects relative to projects identified in the region or future potential growth and development in counties in the area of analysis. **Because there would be no impacts to land use as a result of the Reservoir Restriction Alternative, there would be no contribution to cumulative effects.**

27.3.14.2 Alternative 3 - Crest Raise Alternative

As described in Chapter 17, Land Use, construction of the Crest Raise Alternative would generate no short-term or long-term impacts on land use in the area of analysis. Operation of the alternative would be consistent with current water supply operation in San Luis Reservoir. Of the cumulative projects considered, the proposed actions of the *BDCP*/California WaterFix, California High Speed Rail Project, CVP M&I WSP, *San Luis Reservoir State Recreation Area RMP/GP*, and the San Luis Transmission Project could result in short-term and long-term changes in land use. For example, potential land acquisitions could change land use designations. Construction and implementation of conservation measures included in the BDCP/California WaterFix could result in incompatibilities with local land use regulations, depending on the final locations. Also, construction and operation of some components of the San Luis Transmission Project would not be compatible with the current use or the proposed or active conservation easement agreements.

The effects to land use from these projects would be analyzed in appropriate environmental impact documents and significant impacts would be mitigated where necessary.

Future growth and development in counties and cities in the area of analysis would undergo environmental review with mitigation for significant impacts, as required. The Crest Raise Alternative would not result in cumulative effects relative to projects identified in the region or future potential growth and development in counties in the area of analysis. **Because there would be no impacts to land use as a result of the Crest Raise Alternative, there would be no contribution to cumulative effects.**

27.3.15 Agricultural Resources

27.3.15.1 Alternative 2 - Reservoir Restriction Alternative

As discussed in Chapter 18, Agricultural Resources, the Reservoir Restriction Alternative would generate no short-term or long-term impacts on Important Farmland or existing agricultural land use zoning in the area of analysis. However, the alternative could have less than significant impacts to agricultural resources due to reductions in CVP and SWP water supply deliveries. Of the cumulative projects considered, the proposed actions of the BDCP /California WaterFix, California High Speed Rail Project, CVP M&I WSP, *San Luis Reservoir SRA RMP/GP*, and the San Luis Transmission Project could result in short-term and long-term changes in agricultural resources. For example, potential land acquisitions could convert Important Farmland to nonagricultural use. Also, construction of the San Luis Transmission Project could result in the severance of agricultural parcels that could indirectly contribute to agricultural land conversion from Important Farmland to nonagricultural use. The agricultural resource effects of these projects would be analyzed in appropriate environmental impact documents and significant impacts would be mitigated where necessary.

Future growth and development in Merced County would undergo environmental review with mitigation for significant impacts, as required. The Reservoir Restriction Alternative could have a less than significant impact to agricultural resources, by reducing CVP and SWP water supply deliveries and potentially resulting in changes to agricultural uses on currently irrigated agricultural lands (e.g., changes in crop types; converting to dryland farming, grazing, or agricultural processing; idling; or fallowing) or even the potential conversion of Important Farmland to nonagricultural use. Many of the proposed actions under the cumulative projects could potentially result in impacts to agricultural lands and possibly result in the conversion of Important Farmland to nonagricultural uses. **Therefore, the Reservoir Restriction Alternative's incremental contribution to cumulative impacts on agricultural resources in the area analysis could result in less than significant cumulative effects.**

27.3.15.2 Alternative 3 - Crest Raise Alternative

As described in Chapter 18, Agricultural Resources, construction of the Crest Raise Alternative would generate no short-term or long-term impacts on Important Farmland or existing agricultural land use zoning in the area of analysis. Operation of the alternative would be consistent with current water supply operation in San Luis reservoir and the surrounding area, resulting in no changes to CVP and SWP water deliveries to south-of-Delta contractors. Of the cumulative projects considered, the proposed actions of the BDCP/California WaterFix, California High Speed Rail Project, CVP M&I WSP, *San Luis Reservoir SRA RMP/GP*, and the San Luis Transmission Project could result in short-term and long-term changes in agricultural resources. For example, potential land acquisitions could convert Important Farmland to nonagricultural use. Also, construction of the San Luis Transmission Project could result in the severance of agricultural parcels that could indirectly contribute to agricultural land conversion from Important Farmland to nonagricultural use. The agricultural resource effects of these projects would be analyzed in appropriate environmental impact documents and significant impacts would be mitigated where necessary.

Future growth and development in counties and cities in the area of analysis would undergo environmental review with mitigation for significant impacts, as required. The Crest Raise Alternative would not result in cumulative effects relative to projects identified in the region or future potential growth and development in counties in the area of analysis. **Because there would be no impacts to Important Farmland and agricultural resources as a result of the Crest Raise Alternative, there would be no contribution to cumulative effects.**

27.3.16 Recreation

27.3.16.1 Alternative 2 - Reservoir Restriction Alternative

The Reservoir Restriction Alternative would require operational changes and would result in very limited impacts due to construction. Therefore, the Reservoir Restriction Alternative would not contribute to any of the construction-related cumulative impacts of the projects listed above in Section 27.2.5. No cumulative activities or projects have been identified that, in combination with the limited project construction, would affect recreational resources.

Lower reservoir levels due to the Reservoir Restriction Alternative could impact future improvements to recreational areas at the reservoir. The *San Luis Reservoir SRA RMP/GP* includes improvements to boating and fishing facilities at the reservoir and San Luis Creek. The plan includes the development of a Marina at Dinosaur Point to relieve the demand at the San Luis Creek. The plan includes new boarding floats and ADA-accessible fishing pier located at San Luis Creek. Lower reservoir levels would not affect these additions as they would be located at the San Luis Creek and not along the San Luis Reservoir. Additional changes to the area are described below in Section 27.3.16.2. Lower reservoir levels could present challenges in the construction of the Marina and may limit the amount of available boating space at the reservoir. **The incremental contribution of the Reservoir Restriction Alternative to this significant cumulative effect on the recreational use of the water would be cumulatively considerable if recreation facility expansions outlined in the *San Luis Reservoir SRA RMP/GP* are unable to be completed as planned due to lower reservoir levels. No feasible mitigation has been identified that could reduce the severity of this impact; therefore, it remains significant, and the contribution of the Reservoir Restriction Alternative remains cumulatively considerable.**

27.3.16.2 Alternative 3 - Crest Raise Alternative

The *San Luis Reservoir SRA RMP/GP* and the San Luis Transmission Project has been identified as a cumulative project that could contribute to recreation effects of the Crest Raise Alternative. The proposed recreation facility expansions in the *San Luis Reservoir SRA RMP/GP* at the five use areas described in the Park Plan are presented below in Table 27-7. Together with the proposed project construction under the Crest Raise Alternative, proposed improvements at San Luis Reservoir SRA and the San Luis Transmission Project could result in significant cumulative effects associated with recreation resources. No other cumulative projects or plans were identified that could contribute to recreation effects during construction of the Crest Raise Alternative.

The *San Luis Reservoir SRA RMP/GP* includes a Park Plan, which outlines various alternatives for future park expansion. Funding for such improvements is not secured, thus a project construction timeline is not available. It is typical for park expansion projects to be phased; however, associated construction actions could take place prior to or concurrently with B.F. Sisk Dam SOD Project construction actions.

The San Luis Transmission Project would construct new transmission lines starting in 2018, before the Crest Raise Alternative Construction, near San Luis Reservoir to connect the San Luis Substation to a new transmission line that would be developed between the Tracy Substation and the Dos Amigos Substation. This new transmission line between Tracy and Dos Amigos would cross O’Neill Forebay and pass adjacent to the Medeiros Use Area. The San Luis Substation connection and the new transmission line segment near the Medeiros Use Area would generate short term, construction related impacts on recreation with the potential development of transmission line supports in the San Luis Reservoir SRA, which could require temporary closures during construction and could potentially, depending on placement, displace existing and planned camping sites. The San Luis Solar Project would develop a new 159-acre solar facility at the western corner of the Medeiros Use Area that would permanently convert land that is currently used informally for recreation and is adjacent to approximately 18 established campsites.

Table 27-7. Proposed Improvements at San Luis Reservoir SRA

Use Area	Camping			Boating/Water Sports	Day Use	Fishing	Picnicking	Trails	Other
	# of Sites	Group	RV						
Basalt	10	1	30					X	Reconfiguration of existing campsites to allow larger RV access and add full hookups. Upgraded campfire center or development of a new amphitheater.
Dinosaur Point	30			X	X			X	Potential new access road at Honker Bay off SR 152. Development of a new marina to relieve demand at San Luis Creek Use Area.
Los Banos Creek	40	1							Development of a motel and restaurant, along with concessions. New trail connecting to the Basalt Use Area.
Medeiros	250			X					Development of an additional 100 primitive and 100 tent camp sites, along with associated parking.
San Luis Creek	30	2		X		X	X		Additional concessions, interpretive programs, and group event shelter are proposed. An ADA accessible fishing pier. A new amphitheater in the northern beach area.
Total	360	4	30						

Source: Reclamation and CDPR 2013

The Park Plan proposes various trail improvements throughout the SRA, which could result in the temporary closure of additional trails during construction of the Crest Raise Alternative. The Park Plan proposes new trails connecting to the use areas, which could result in reduced recreational trail use during construction of the Crest Raise Alternative. A multi-modal trail system is proposed to connect both use areas to the Pacheco SP. The Dinosaur Point Use Area trail would also connect to the San Luis Wildlife Area (Reclamation and CDPR 2013). An additional trail is proposed to connect the Basalt and Los Banos Creek use areas. The trails would only result in reduced use during construction activities. After construction is complete, these trails could result in an increase of human traffic in the area.

If trail development is completed prior to construction of the Crest Raise Alternative, recreational use of the new trails would be restricted during the construction period, due to the closure of the Basalt and Medeiros use areas. Users of the new trails during construction of the Crest Raise Alternative would be unable to connect with San Luis Reservoir, which could cause a reduction of recreational trail use. However, the closures due to construction would be temporary and the proposed improvements could increase recreational opportunities in the long-term. **The incremental contribution of the Crest Raise Alternative to this significant cumulative effect on recreational trails in the area of analysis due to the temporary closure of recreational trails would not be cumulatively considerable.**

Construction of the Crest Raise Alternative in combination with other cumulative projects could impact recreation opportunity in the area of analysis. The Park Plan proposes various park improvements at all five of the use areas within the SRA, which could result in the temporary closure of multiple recreation facilities during construction of the Crest Raise Alternative. The San Luis Transmission Project proposes the development of transmission line support structures that could displace existing campsites at the Medeiros Use Area and the San Luis Solar Project proposes the permanent conversion of approximately 159 acres of land currently used for informal recreation in the Medeiros Use Area prior to construction of the Crest Raise Alternative. If recreation facility expansions within the SRA identified in Table 27-5 are completed during construction of the Crest Raise Alternative, additional recreation facilities in the SRA could be temporarily closed to the public during the construction period. In addition, if recreation facilities in the Medeiros Use Area are removed by the San Luis Transmission Project and the San Luis Solar Project prior to construction of the crest raise, fewer facilities would be available to offset visitors unable to use the Basalt Use Area. This would be a significant cumulative impact. **The incremental contribution of the Crest Raise Alternative to this significant cumulative effect on recreation opportunities in the area of analysis due to the temporary closure of recreation facilities would be cumulatively considerable if any of the other cumulative projects are completed at the same time. No feasible mitigation has been identified that could reduce the severity of this impact; therefore, it remains cumulatively significant, and the contribution of the Crest Raise Alternative remains cumulatively considerable. The incremental contribution of the Crest Raise Alternative to this significant cumulative effect on trail access in the area of analysis would not be cumulatively considerable.**

The Park Plan proposes various park improvements at all five of the use areas within the SRA, which could displace visitors and substantially contribute to overcrowded conditions at other local and regional recreation sites during construction of the Crest Raise Alternative. As identified in Table 27-5, the Park Plan proposes various park expansions that would require construction at all five of the use areas within the SRA.

If the planned recreation facility expansions described in the Park Plan are completed during construction of the Crest Raise Alternative, additional recreation facilities in the SRA could be temporarily closed. Simultaneous closures at multiple use areas could displace visitors to other areas within the San Luis Reservoir SRA or at other local and regional recreation sites. This would be a significant cumulative impact because the displacement could contribute to overcrowding at these other recreation sites. **The incremental contribution of the Crest Raise Alternative to this significant cumulative effect on recreation user displacement and overcrowding in the area of analysis due to the temporary closure of recreation facilities would be cumulatively considerable if recreation facility expansions outlined in the Park Plan are completed at the same time. No feasible mitigation has been identified that could reduce the severity of this impact; therefore, it remains cumulatively significant, and the contribution of the Crest Raise Alternative remains cumulatively considerable.**

The Park Plan proposes various park improvements at all five of the use areas within the SRA, which could contribute to recreation access during operation of the Crest Raise Alternative. As identified in Table 27-5, the Park Plan proposes various park expansions that would require construction at all five of the use areas within the SRA.

As noted in Chapter 19, Recreation, the Crest Raise Alternative would not result in any operational changes in the reservoir and thus would not contribute to the cumulative impacts to recreation of other projects. **The incremental contribution of the Crest Raise Alternative to this significant cumulative effect on trail access in the area of analysis would not be cumulatively considerable.**

27.3.17 Environmental Justice

27.3.17.1 Alternative 2 - Reservoir Restriction Alternative

Expose a minority and or low-income population to adverse or disproportionately high effects or hazards from project construction in combination with other cumulative projects. Construction actions are limited to revegetation of the reservoir rim between the maximum pool elevation and the proposed maximum restricted reservoir water surface planned with the Reservoir Restriction Alternative. The temporary construction activities could cause impacts to air quality and noise. However, the air quality impact thresholds identified in Chapter 7 are regional, across the entire San Joaquin Valley Air Basin, and not specific to Merced. Therefore, adverse and disproportionately high air quality impacts would not occur to the minority populations surrounding the Project area due to construction. In addition, as described in Chapter 11, there are very small and localized noise impacts, which would result in a less than significant impact. Therefore, adverse and disproportionately high noise impacts would not occur to the minority populations surrounding the Project area due to construction. **Because there would be no environmental justice related impacts as a result of the Reservoir Restriction Alternative, there would be no contribution to cumulative effects.**

27.3.17.2 Alternative 3 - Crest Raise Alternative

Expose a minority and or low-income population to adverse or disproportionately high effects or hazards from project construction in combination with other cumulative projects. Construction of the Crest Raise Alternative has the potential to adversely affect minority populations within the San Luis Reservoir region.

The *San Luis Reservoir SRA RMP/GP*, the San Luis Solar Project and the San Luis Transmission Project, and the California High-Speed Train Project have been identified as cumulative projects with the potential to contribute to construction related effects to minority and/or low-income populations surrounding the reservoir.

The *San Luis Reservoir SRA RMP/GP* has been identified as a cumulative project with the potential to contribute to construction related effects to minority and/or low-income populations surrounding the reservoir. The plan includes a Park Plan, identifying construction related park improvements over a twenty five year period, starting at the time of adoption. This plan has yet to be adopted; however, if adopted prior to the completion of the Crest Raise Alternative, it is assumed that some of the proposed park improvements could be concurrently constructed during the construction period.

The San Luis Solar Project has been identified as a cumulative project with the potential to contribute to construction related effects to minority and/or low-populations surrounding the reservoir. The project proposes a 30-year land use authorization to access, install, operate, maintain and remove a 26-megawatt alternating current solar photovoltaic energy generating project in and adjacent to the San Luis SRA. Project construction could be congruent with construction of the Crest Raise Alternative.

The San Luis Transmission Project has been identified as a cumulative project with the potential to contribute to construction related effects to minority and/or low-income populations surrounding the reservoir. The project proposes the construction, maintenance, and operation of new transmission lines, which would be located adjacent to existing lines in Alameda, San Joaquin, Stanislaus, and Merced Counties. Additional components of the project include a new 230-kV line terminal bays at the Western Area Power Administration’s San Luis and Dos Amigos Substation, as well as a new 230/700-kV transformer bank and interconnection facilities at the San Luis Substation, and auxiliary facilities. The project would be constructed and operated between 2017 and 2021. If construction of the Crest Raise Alternative begins prior to 2021 it is assumed that some of the projects components could be concurrently constructed during the construction period of the alternative.

The California High-Speed Train Project has been identified as a cumulative project with the potential to contribute to construction related effects to minority and/or low-income populations surrounding the reservoir. The project proposes the construction, maintenance and operation of a new high-speed trail which would pass through the Merced train station. The purpose of the project is to provide the public with electric-powered high-speed rail service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the south San Joaquin Valley, and to connect the northern and southern portions of the system.

Multiple, simultaneous construction projects at the San Luis Reservoir SRA, could increase the likelihood of minority and/or low-income populations being adversely affected by air quality related construction effects. If construction of the Crest Raise Alternative and implementation of other construction projects at the San Luis Reservoir SRA occurred at the same time, the Crest Raise Alternative could contribute to adverse cumulative effect on minority and/or low-income populations as was noted above the alternative's effects would not however be disproportionate given the similar demographic characteristics of all of the communities in the study area and the similar effects each community would experience. **The Crest Raise Alternative's incremental contribution to this effect would not be cumulatively considerable.**

27.3.18 Public Utilities, Services, and Power

27.3.18.1 Alternative 2 - Reservoir Restriction Alternative

27.3.18.1.1 Construction

Construction activities for the Reservoir Restriction Alternative, in combination with projects and projections considered for cumulative effects, could result in adverse impacts associated with the provision of governmental services or facilities including fire and police protection, and schools.

Short-term construction activities could increase risks to workers and the public. Construction of the Reservoir Restriction Alternative as was noted in Chapter 22, Public Utilities, Services, and Power, would have a less than significant impact on governmental services, including fire and police protection.

Construction of projects considered for cumulative impact in Merced County including the California High Speed Rail project, the San Luis Transmission Project, and the San Luis Solar Project and development projects related to projected growth in the county could create construction-related risks during the same time period. Construction around San Luis Reservoir would be temporary and the implementation of emergency response or remediation and containment plans, as well as compliance with OSHA standards, would ensure that risks are properly managed and emergency situations are efficiently handled if they do occur. The majority of future construction work associated with projects considered for cumulative impacts would be completed by residents within the region. Thus, there would not be large population growth related to construction activities.

The impact analysis of general plan alternatives at the reservoir describes that future increases in population could lead to increases in demand for recreation at the reservoir. Thus, increased demand for emergency services would occur under each alternative considered for future development and expansion at the reservoir. The *San Luis Reservoir SRA RMP/GP* proposes specific mitigation measures to reduce impacts to the provision of public services. **As noted above, impacts associated with the Reservoir Restriction Alternative would be short-term and less than significant and the alternative's incremental contribution to any significant cumulative impacts on fire or police protection or schools would not be cumulatively considerable.**

Construction activities associated with the Reservoir Restriction Alternative, in combination with projects and projections considered for cumulative effects could result in the need for new water, wastewater, or stormwater facilities. Construction of the Reservoir Restriction Alternative, as was noted in Chapter 22, Public Utilities, Services, and Power, would not require any new water, wastewater, or stormwater facilities. No additional stormwater or wastewater facilities are proposed under this alternative and no cumulative impacts to these utilities is expected as a result of implementation. **Because there would be no impacts as a result of the Reservoir Restriction Alternative, there would be no contribution to cumulative effects.**

Construction activities would generate solid waste, the disposal of which could, in combination with projects and projections considered for cumulative effects, exceed the capacity of landfills designated to accommodate the project's solid waste disposal needs. Disposal of construction debris from the Reservoir Restriction Alternative would generate a less than significant impact on remaining capacity at the landfill proposed for use. Over time, construction debris from the California High Speed Rail, the San Luis Solar Project, and San Luis Transmission Project construction as well as from future growth and development throughout Merced County could however cause the landfill to reach capacity more quickly than originally planned when the facility was developed.

There are two regional landfills in the area, both of which contain adequate space for the small amount of material expected to be disposed of as a result of this project. The Billy Wright landfill, which would be utilized by this project, is expected to reach capacity in 2054 under normal operations (CalRecycle 2017a). The Reservoir Restriction Alternative construction waste from hydroseed packaging would comprise less than 1 percent of the remaining capacity at this landfill. Another landfill in the county, the Highway 59 Landfill, is projected to cease operations in 2030 (CalRecycle 2017b), and will not be used by this project. The Reservoir Restriction Alternative's incremental contribution to the regional landfills' remaining capacity would be minimal. **The Reservoir Restriction Alternative's contribution to the cumulative effect from future construction projects and population growth on regional landfill capacity would not be cumulatively considerable.**

Construction activities involved in the Reservoir Restriction Alternative, in combination with projects and projections considered for cumulative effects could result in adverse impacts associated with the use and/or depletion of local or regional energy supplies. As described in Chapter 22, Public Utilities, Services, and Power, construction-related energy use would not result in adverse impacts to energy supplies at the reservoir or in the larger Merced area because of the use of generators. Use of power supplies at the reservoir during construction would not change existing operations at the reservoir. Other construction at the reservoir and in the county would also utilize local energy resources. However, the energy demand associated with the cumulative projects, including the Reservoir Restriction Alternative, could be met by regional supplies, especially in the case of the Reservoir Restriction Alternative construction efforts using generators as necessary. **Therefore, the Reservoir Restriction Alternative would not contribute to any significant cumulative impact on regional energy supplies.**

27.3.18.1.2 Operations

Long-term operations of the Reservoir Restriction Alternative, in combination with projects and projections considered for cumulative effects, could result in the need for additional capacity of energy supplies or the depletion of local or regional energy supplies. As described in Chapter 22, Public Utilities, Services, and Power, operation of the Reservoir Restriction Alternative would have less than a significant impact to public utilities. Operation of the Reservoir Restriction Alternative would reduce electricity use at the Pacheco Pumping Plant or at the Gianelli Pumping-Generating Plant. **Therefore, the Reservoir Restriction Alternative would not contribute to any significant cumulative impact on regional energy supplies.**

Operations of the Reservoir Restriction Alternative in combination with projects and projections considered for cumulative effects could result in increases in stormwater runoff and the need for new stormwater drainage facilities. As described in Chapter 22, Public Utilities, Services, and Power, operation of the Reservoir Restriction Alternative would have no impact on stormwater runoff and stormwater drainage facilities. **Because there would be no impacts to stormwater as a result of the Reservoir Restriction Alternative, there would be no contribution to cumulative effects.**

27.3.18.2 Alternative 3 - Crest Raise Alternative

27.3.18.2.1 Construction

Construction activities for the Crest Raise Alternative, in combination with projects and projections considered for cumulative effects, could result in adverse impacts associated with the provision of governmental services or facilities including fire and police protection, and schools.

Short-term construction activities could increase risks to workers and the public. Construction of the Crest Raise Alternative as was noted in Chapter 22, Public Utilities, Services, and Power, would have a less than significant impact on governmental services including fire and police protection, and schools.

Construction of projects considered for cumulative impact in Merced County including the California High Speed Rail project, the San Luis Transmission Project, and the San Luis Solar Project and development projects related to projected growth in the county could create construction-related risks during the same time period. Construction around San Luis Reservoir would be temporary and the implementation of emergency response or remediation and containment plans, as well as compliance with OSHA standards, would ensure that risks are properly managed and emergency situations are efficiently handled if they do occur. The majority of future construction work associated with projects considered for cumulative impacts would be completed by residents within the region. Thus, there would not be large population growth related to construction activities.

The impact analysis of general plan alternatives at the reservoir describes that future increases in population could lead to increases in demand for recreation at the reservoir. Thus, increased demand for emergency services would occur under each alternative considered for future development and expansion at the reservoir. The *San Luis Reservoir SRA RMP/GP* proposes specific mitigation measures to reduce impacts to the provision of public services. **As noted above, impacts associated with the Crest Raise Alternative would be short-term and less than significant and the alternative's incremental contribution to any significant cumulative impacts on fire or police protection or schools would not be cumulatively considerable.**

Construction activities associated with the Crest Raise Alternative, in combination with projects and projections considered for cumulative effects could result in the need for new water, wastewater, or stormwater facilities. Construction of the Crest Raise Alternative as was noted in Chapter 22, Public Utilities, Services, and Power, would have a less than significant impact on any changes in demand for new water, wastewater, or stormwater facilities.

Future growth and development in Merced County would likely require the construction and extension of water supply pipelines and wastewater and stormwater infrastructure close to where the growth and development takes place. This would be located in the vicinity of already developed urban areas in the county, not in close proximity to the reservoir.

The *San Luis Reservoir SRA RMP/GP* describes that, under all future development alternatives at the reservoir, maintenance and safety upgrades would be required. While increased visitation to the SRA under the alternatives in the *San Luis Reservoir SRA RMP/GP* would lead to an increased demand on water supply and wastewater facilities, the alternatives include varying amounts of utility upgrades in order to handle increased demands.

Utility upgrades at the reservoir proposed under the *San Luis Reservoir SRA RMP/GP* would be focused on providing water and wastewater services to visitors, and would expand on existing facilities in order to increase visitor capacity. Two of the development alternatives in the proposed *San Luis Reservoir SRA RMP/GP* include construction of new visitor and recreational facilities and could have impacts on public utilities during construction (Reclamation and CDPR 2013). These impacts, which include disruption to utility service during construction, would be minor after mitigation.

It is unlikely that the construction of new visitor facilities would occur at the same time as the construction associated with the alternatives discussed in this document, so no cumulative impacts associated with construction would be expected. Additionally, the Crest Raise Alternative would not have a long term impact the visitor areas or infrastructure of the SRA.

The San Luis Transmission Project would develop approximately 95 miles of new transmission lines connecting the Tracy Substation and the Dos Amigos Substation with segments crossing O’Neill Forebay and connecting to the San Luis Substation. The San Luis Solar Project would develop a new 159 acre solar facility adjacent to the SR 152 crossing of O’Neill Forebay. These cumulative projects would introduce new impervious surfaces but would not generate new demands on water or wastewater systems. Construction of both of these projects would, similar to the Crest Raise Alternative be subject to a SWPPP that would require the implementation of BMPs to control stormwater runoff during construction.

No additional stormwater or wastewater facilities are proposed under this project, and no cumulative impacts to these utilities is expected as a result of implementation. **The Crest Raise Alternative in combination with the other cumulative projects and plans in the study area would not contribute to any significant cumulative impacts on demands on water, wastewater, or stormwater facilities.**

Construction activities would generate solid waste, the disposal of which could, in combination with projects and projections considered for cumulative effects, exceed the capacity of landfills designated to accommodate the project’s solid waste disposal needs. Disposal of construction debris from the Crest Raise

Alternative would generate a less than significant impact on remaining capacity at the landfill proposed for use. Over time, construction debris from the California High Speed Rail, the San Luis Solar Project, and San Luis Transmission Project construction as well as from future growth and development throughout Merced County could however cause the landfill to reach capacity more quickly than originally planned when the facility was developed. There are two regional landfills in the area, both of which contain adequate space for the small amount of material expected to be disposed of as a result of this project. The Billy Wright landfill, which would be the primary landfill utilized by this project, is expected to reach capacity in 2054 under normal operations (CalRecycle 2017a). Construction debris from the alternative would comprise less than 1 percent of the remaining capacity at this landfill. Another landfill in the county, the Highway 59 Landfill, is projected to cease operations in 2030 (CalRecycle 2017b), and will not be used by this project. The Crest Raise Alternative's incremental contribution to the regional landfills' remaining capacity would be minimal. **The Crest Raise Alternative's contribution to the cumulative effect from future construction projects and population growth on regional landfill capacity would not be cumulatively considerable.**

Construction activities involved in the Crest Raise Alternative, in combination with projects and projections considered for cumulative effects could result in adverse impacts associated with the use and/or depletion of local or regional energy supplies. As described in Chapter 22, Public Utilities, Services, and Power, temporary power facilities would be used during construction of the Crest Raise Alternative. Construction-related energy use would not result in adverse impacts to energy supplies at the reservoir or in the larger Merced area because of the use of generators or connections to existing power supplies at Gianelli Pumping-Generating Plant. Use of power supplies at the reservoir during construction would not change existing operations at the reservoir. Other construction at the reservoir and in the county would also utilize local energy resources. However, the energy demand associated with the cumulative projects, including the Crest Raise Alternative, could be met by regional supplies, especially in the case of the Crest Raise Alternative construction efforts using generators as necessary. **Therefore, the Crest Raise Alternative would not contribute to any significant cumulative impact on regional energy supplies.**

27.3.18.2.2 Operations

Long-term operations of the Crest Raise Alternative, in combination with projects and projections considered for cumulative effects, could result in the need for additional capacity of energy supplies or the depletion of local or regional energy supplies. As described in Chapter 22, Public Utilities, Services, and Power, there would be no change in operations under the Crest Raise Alternative. Operation of the Crest Raise Alternative would not change electricity use at the Pacheco Pumping Plant or at the Gianelli Pumping-

Generating Plant. **Because there would be no operational impacts associated with energy supplies as a result of the Crest Raise Alternative, there would be no contribution to cumulative effects.**

Operations of the Crest Raise Alternative in combination with projects and projections considered for cumulative effects could result in increases in stormwater runoff and the need for new stormwater drainage facilities. Construction of rail facilities as part of the California High Speed Rail project, the San Luis Transmission Project, and construction of new infrastructure at San Luis Reservoir as a part of the San Luis Solar project would have to comply with NPDES permit requirements and measures identified in a SWPPP. Additionally, stormwater related impacts from the Crest Raise Alternative would be localized around the reservoir; thus, stormwater impacts from the California High Speed Rail project would not cumulatively add to runoff effects at the reservoir. As described in the *San Luis Reservoir SRA RMP/GP*, implementation of the management and development alternatives at the reservoir would include utility upgrades. Thus, stormwater would continue to be managed onsite. Stormwater associated with the San Luis Solar project would also be managed onsite with permanent BMPs planned as part of the project design (Reclamation 2018). **Therefore, cumulative impacts to stormwater drainage facilities at San Luis Reservoir would be less than significant.**

27.3.19 Cultural Resources

27.3.19.1 Alternative 2 – Reservoir Restriction Alternative

The San Jose to Merced Section of the California High Speed Rail Project, *San Luis Reservoir SRA RMP/GP*, and the San Luis Transmission Line Project have been identified as cumulative actions that could result in significant impacts to cultural resources. Construction associated with the California High Speed Rail Project, San Luis Transmission Project, and San Luis Solar Project would not impact the shoreline or water level of the San Luis Reservoir. New visitor access and trails included in the *San Luis Reservoir SRA RMP/GP* could result in unauthorized collection and vandalism at cultural resources surrounding the San Luis Reservoir, however, mitigation measures included in the *San Luis Reservoir SRA RMP/GP* would reduce these impacts to less than significant levels.

Under the Reservoir Restriction Alternative, there would be no direct impacts to cultural resources and indirect impacts would be less than significant (see Chapter 23, Cultural Resources). Therefore, pursuant to CEQA, **the incremental contribution of the Reservoir Restriction Alternative to potentially significant cumulative effects on cultural resources within the project area would not be cumulatively considerable.**

27.3.19.2 Alternative 3 – Crest Raise Alternative

The San Jose to Merced Section of the California High Speed Rail Project, *San Luis Reservoir SRA RMP/GP*, and the San Luis Transmission Line Project have been identified as cumulative actions that could contribute to cultural resource impacts during construction of the Crest Raise Alternative. Ground disturbing activities associated with each of these projects could generate significant impacts to cultural resources. Ground disturbing activities within the Crest Raise Alternative APE, including the excavation of borrow areas, the use or modification of roads and staging areas, and the modification of the B.F. Sisk Dam, may alter or destroy cultural resources that are included in or may be eligible for inclusion in the National Register of Historic Places (NRHP) and/or the California Register of Historical Resources (CRHR).

Under the Crest Raise Alternative, direct impacts to cultural resources would be significant (see Chapter 23, Cultural Resources). The implementation of Mitigation Measure CR-1 would reduce these impacts to a less than significant level under CEQA. Therefore, pursuant to CEQA, **the incremental contribution of the Crest Raise Alternative to potentially significant cumulative effects on cultural resources within the project area would not be cumulatively considerable.**

27.3.20 Population and Housing

27.3.20.1 Alternative 2 – Reservoir Restriction Alternative

27.3.20.1.1 Construction

Construction of the Reservoir Restriction Alternative could have the potential to induce population growth in the area of analysis and could require new housing to accommodate this growth. The cities expected to accommodate non-local workers for the duration of construction of the Reservoir Restriction Alternative are Los Banos, Newman, Gilroy, and Gustine. As noted above, these cities have projected population growth through 2020 and have planned for this growth through their General Plans by encouraging new development, including new housing. As identified in Table 27-5, population increases in Merced and Santa Clara counties through 2020 are expected to be substantial in all of the nearby communities, ranging from 28 percent in Gilroy to almost 50 percent in Los Banos. This projected population increase, and the associated need for increased housing, is considered to be cumulatively significant. The Reservoir Restriction Alternative would have the potential to increase the population of any one of these four communities by a maximum of 5 people. These impacts would end after construction as the non-local workers would return to their places of origin. However, as the construction duration of this alternative is 1.5 years, a permanent impact is unlikely. No new housing is expected to be required to be constructed in order to accommodate the workers as sufficient available housing stock is expected to be available. **Therefore, the Reservoir Restriction Alternative's incremental contribution to the significant cumulative effect**

associated with population growth and housing would not be cumulatively considerable.

27.3.20.1.2 Operations

There would be no population and housing impacts from operation of this alternative; **therefore, there would be no cumulative effects.**

27.3.20.2 Alternative 3 – Crest Raise Alternative

27.3.20.2.1 Construction

Construction of the Crest Raise Alternative could have the potential to induce population growth in the area of analysis and could require new housing to accommodate this growth. The cities expected to accommodate non-local workers for the duration of construction of the Crest Raise Alternative are Los Banos, Newman, Gilroy, and Gustine. As noted above, these cities have projected population growth through 2020 and have planned for this growth through their General Plans by encouraging new development, including new housing. As identified in Table 27-5, population increases in Merced and Santa Clara counties through 2020 are expected to be substantial in all of the nearby communities, ranging from 28 percent in Gilroy to almost 50 percent in Los Banos. This projected population increase, and the associated need for increased housing, is considered to be cumulatively significant. The Crest Raise Alternative would have the potential to increase the population of any one of these four communities by a maximum of 19 people. These impacts would end after construction as the non-local workers would return to their places of origin; however given the 8 to 12-year construction schedule of this alternative this effect is consider permanent. The number of new people attributable to the Crest Raise Alternative is less than one percent of the population of any of the individual nearby communities, and only a fraction of one percent of the population of all four communities combined. Moreover, no new housing is expected to be required to be constructed in order to accommodate the workers as sufficient available housing stock is expected to be available. **Therefore, the Crest Raise Alternative's incremental contribution to the significant cumulative effect associated with population growth and housing would not be cumulatively considerable.**

27.3.20.2.2 Operations

There would be no population and housing impacts from operation of this alternative; **therefore, there would be no cumulative effects**.

27.3.21 Geology, Seismicity, and Soils

27.3.21.1 Alternative 2 – Reservoir Restriction Alternative

27.3.21.1.1 Construction

Construction activities during implementation of the Reservoir Restriction Alternative in combination with projects considered for cumulative impacts could expose people or structures to adverse effects related to the rupture of a known earthquake fault, seismically-induced ground shaking, and unstable soils. Construction will be limited to revegetation of the reservoir rim between the current maximum pool elevation and the proposed restricted reservoir water surface elevation for the implementation of the Reservoir Restriction Alternative. This construction action would not result in the exposure of workers to the risk of loss, injury, or death as a result of rupture of a known earthquake fault at or near the reservoir. **Therefore, construction of the Reservoir Restriction Alternative in combination with other cumulative projects would not result in a cumulative significant impact related to geology, seismicity, and soils.**

27.3.21.1.2 Operations

Operation and maintenance of the Reservoir Restriction Alternative in combination with other construction and maintenance activities at San Luis Reservoir could expose people or structures to adverse effects related to the rupture of a known earthquake fault, seismically-induced ground shaking, and unstable soils. Implementation of the Reservoir Restriction Alternative would reduce the risk if strong seismic ground shaking and associated ground failure, liquefaction, or landslides occurred while workers were on-site. In addition, the Reservoir Restriction Alternative does not propose any construction actions, nor constructing structures for human habitation and would not increase the frequency of maintenance workers being onsite when compared to existing support of the San Luis Reservoir.

Cumulative activities that could contribute to cumulative effects during operations of the Reservoir Restriction Alternative include other construction projects occurring around the reservoir included in the *San Luis Reservoir SRA RMP/GP*, the California High Speed Rail, the San Luis Transmission Project, and the San Luis Solar Project. These cumulative projects, similar to the Reservoir Restriction Alternative are not proposing permanent structures for human habitation. The California High Speed Rail Project would be designed to include safeguards to stop train traffic in the event of seismic activities to prevent any accidents caused by impacts to the tracks. The visitor facilities proposed under the *San Luis Reservoir SRA RMP/GP* would be subject to California building codes that require protection against seismic ground shaking. **Operation and maintenance of the Reservoir Restriction Alternative in combination with other projects would not result in a significant cumulative impact on geology, seismicity, and soils.**

27.3.21.2 Alternative 3 – Crest Raise Alternative

27.3.21.2.1 Construction

Construction activities during the implementation of the Crest Raise Alternative in combination with projects considered for cumulative impacts could expose people or structures to adverse effects related to the rupture of a known earthquake fault, seismically-induced ground shaking, and unstable soils. Construction of the Crest Raise Alternative would not expose workers to the risk of loss, injury, or death as a result of rupture of a known earthquake fault at or near the reservoir. Other cumulative projects that have been identified in the area of construction around San Luis Reservoir include those described in the *San Luis Reservoir SRA RMP/GP* the California High Speed Rail Project, the San Luis Transmission Project, and the San Luis Solar Project. Development and construction in Merced County related to projected population growth in the county would not likely occur in the vicinity of San Luis Reservoir and would not add to potential geology and soil effects related to the Crest Raise Alternative.

Future development proposed at San Luis Reservoir includes construction of trails, campgrounds, and other recreation resources. Earth moving activities involved in these potential future projects at the reservoir could expose workers to adverse effects related to earthquake activity and unstable soils. However, the environmental analysis for the *San Luis Reservoir SRA RMP/GP* identifies geology, seismicity, and soils as a resource area that would not experience significant effects and is not considered further. The actions identified in the plan would not permit development of structures in Alquist-Priolo fault zones and would not increase the risk related to seismic events. Further, geologic studies and site-specific geotechnical investigations for siting and design of permanent structures, campgrounds, roads, and trails would minimize damage from erosion, unstable soils, landslides, and earthquakes.

The California High Speed Rail would traverse Pacheco Pass adjacent to SR 152 and San Luis Reservoir. Although construction activities could expose workers to risks associated with seismic ground shaking and unstable soils, final design of the project would require site-specific geotechnical assessments to ensure soil stability as well as short-term and long-term safety of people and structures. The San Luis Transmission Project and the San Luis Solar Project are also considered in the cumulative analysis. The San Luis Transmission Project would develop approximately 95 miles of new transmission lines connecting the Tracy Substation and the Dos Amigos Substation with segments crossing O’Neill Forebay and connecting to the San Luis Substation. The San Luis Solar Project would develop a new 159-acre solar facility adjacent to the SR 152 crossing O’Neill Forebay.

Construction activities proposed for the Crest Raise Alternative would not directly influence earthquake activity, in addition in the event of an earthquake as noted in Chapter 25, Geology, Seismicity, and Soils, cconstruction activities would follow the safety requirements of OSHA to reduce the potential for harm to construction workers or equipment. Similarly construction of projects proposed in the *San Luis Reservoir SRA RMP/GP,* and construction activity propose under the California High Speed Rail Project, the San Luis Transmission Project, and the San Luis Solar Project would be subject to the same safety requirements. **Therefore, construction of the Crest Raise Alternative in combination with other cumulative projects would not result in a significant cumulative impact on geology, seismicity, and soils.**

27.3.21.2.2 Operations

Operation and maintenance of the Crest Raise Alternative in combination with other construction and maintenance activities at San Luis Reservoir could expose people or structures to adverse effects related to the rupture of a known earthquake fault, seismically-induced ground shaking, and unstable soils. Implementation of the Crest Raise Alternative would reduce the risk if strong seismic ground shaking and associated ground failure, liquefaction, or landslides occurred while workers were on-site. In addition, the Crest Raise Alternative is not constructing structures for human habitation and would not increase the frequency of maintenance workers being onsite when compared to existing support of B.F. Sisk Dam.

Cumulative activities that could contribute to cumulative effects during operations of the Crest Raise Alternative include other construction projects occurring around the reservoir included in the *San Luis Reservoir SRA RMP/GP*, the California High Speed Rail, the San Luis Transmission Project, and the San Luis Solar Project. These cumulative projects, similar to the Crest Raise Alternative are not however proposing permanent structures for human habitation. The California High Speed Rail Project would be designed to include safeguards to stop train traffic in the event of seismic activities to prevent any accidents caused by impacts to the tracks. The visitor facilities proposed under the *San Luis Reservoir SRA RMP/GP* would be subject to California building codes that require protection against seismic ground shaking. **Operation and maintenance of the Crest Raise Alternative in combination with other projects would not result in a significant cumulative impact on geology, seismicity, and soils.**

Chapter 28
Consultation, Coordination, and Compliance

This chapter documents the consultation and coordination efforts that have occurred during development of the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) Environmental Impact Statement/Environmental Impact Report (EIS/EIR). In addition, this chapter lists the needed permits, petitions, and compliance documents for the project actions.

28.1 Compliance with Related Laws, Rules, Regulations, and Executive Orders

Federal and State of California (State) laws, rules and regulations, Executive Orders (EOs), and compliance requirements for implementation of the alternatives are described in the following sections. Descriptions are organized by Federal, State, and local requirements.

28.1.1 Federal Requirements

Compliance with Federal laws, rules, and regulations for implementation of the alternatives is summarized below. A total of 30 Federal requirements are identified.

28.1.1.1 Bald and Golden Eagle Protection Act

Administered by the United States Fish and Wildlife Service (USFWS), the Bald and Golden Eagle Protection Act (BGEPA) provides for the protection of the bald eagle (*Haliaeetus leucocephalus*) and the golden eagle (*Aquila chrysaetos*) by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. The BGEPA prohibits unregulated take and makes it illegal to kill, wound, pursue, shoot, shoot at, poison, capture, trap, collect, molest, or disturb bald or golden eagles. Impacts to special-status species, including bald and golden eagles protected by the BGEPA, are analyzed in Chapter 15, Terrestrial Resources, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.1.2 Central Valley Project Municipal and Industrial Water Shortage Policy

The Central Valley Project (CVP) Municipal and Industrial (M&I) Water Shortage Policy (WSP) and implementation guidelines are intended to provide detailed, clear, and objective guidelines for the distribution of CVP water supplies during a Condition of Shortage, thereby allowing CVP water service contractors to know when, and by how much, water deliveries may be reduced in drought and other low water supply conditions. Impacts to CVP water supply deliveries are analyzed in Chapter 5, Surface Water Supply, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.3 Central Valley Project Improvement Act

On October 30, 1992, Public Law 102-575 was signed into law. This law included Title 34, the Central Valley Project Improvement Act (CVPIA), which amended previous authorizations of the CVP. The CVPIA mandated changes in management of the CVP, requiring fish and wildlife protection, restoration, and mitigation as project purposes equal to that of agricultural irrigation, municipal and industrial (M&I) supplies, and power generation.

The CVPIA also created the Refuge Water Supply Program (RWSP) to ensure all 19 CVPIA identified wetland habitat areas annually receive adequate water to maintain and improve the areas. The United States Department of the Interior, Bureau of Reclamation (Reclamation) is annually required to deliver 422,251 acre-feet (AF) of water supplies throughout the state for the RWSP, which is supplied primarily through the CVP (California Department of Fish and Wildlife [CDFW] 2017). Impacts to CVP water supply deliveries are analyzed in Chapter 5, Surface Water Supply, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.4 Clean Air Act

The United States Environmental Protection Agency (USEPA) is responsible for implementation of the Federal Clean Air Act (CAA). The CAA was enacted in 1955 and was amended in 1963, 1965, 1967, 1970, 1977, 1990, and 1997. Under authority of the CAA, USEPA established National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), inhalable particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}), fine particulate matter with an aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2).

CAA requires States to classify air basins (or portions thereof) as either “attainment” or “nonattainment” with respect to criteria air pollutants, based on whether the NAAQS have been achieved, and to prepare State Implementation Plans (SIPs) containing emission reduction strategies to maintain the NAAQS for those areas designated as attainment and to attain the NAAQS for those areas designated as nonattainment.

Chapter 7, Air Quality, analyzes the emissions of criteria pollutants and the impact on air basins, and these compliance requirements would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.1.4.1 General Conformity

Section 176 (c) of the CAA (42 United States Code [USC 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 SIP required under Section 110 (a) of the Federal CAA (42 USC 7410[a]) before the action is otherwise approved. In this context, conformity means that such Federal actions must be consistent with a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of those standards. Each Federal agency must determine that any action proposed that is subject to the regulations implementing the conformity requirements will, in fact, conform to the applicable SIP before the action is taken. This project is subject to the General Conformity Rule because it involves a Federal agency (Reclamation).

The general conformity regulations apply to a proposed Federal action in a nonattainment or maintenance area if the total of direct[1] and indirect[2] emissions of the relevant criteria pollutants and precursor pollutants caused by the proposed action equal or exceed certain *de minimis* amounts, thus requiring the Federal agency to make a determination of general conformity. A Federal agency can indirectly control emissions by placing conditions on Federal approval or Federal funding.

Table 28-1 presents the *de minimis* amounts for nonattainment areas. The *de minimis* threshold for all maintenance areas is 100 tons per year (tpy), except for Pb, which has a *de minimis* threshold of 25 tpy.

Table 28-1. General Conformity *De Minimis* Thresholds

Pollutant	Classification of Emissions Type	*De Minimis* Threshold (tpy)
O_3 (VOCs or NOx)	Serious NAA	50
O_3 (VOCs or NOx)	Severe NAA	25
O_3 (VOCs or NOx)	Extreme NAA	10
O_3 (VOCs or NOx)	Other NAA	100
CO	n/a	100
SO_2	n/a	100
NO_2	n/a	100
PM_{10}	Moderate NAA	100
PM_{10}	Serious NAA	70
$PM_{2.5}$	Direct emissions	100
$PM_{2.5}$	SO_2 precursor	100
$PM_{2.5}$	NOx precursor	100

[1] Direct emissions are those that are caused or initiated by the Federal action and occur at the same time and place as the Federal action.
[2] Indirect emissions are reasonably foreseeable emissions that are further removed from the Federal action in time and/or distance and can be practicably controlled by the Federal agency on a continuing basis (40 CFR 93.152).

Pollutant	Classification of Emissions Type	*De Minimis* Threshold (tpy)
$PM_{2.5}$	VOC or ammonia precursor[1]	100
Pb	n/a	25

Source: 40 CFR 93.153.

Notes:

[1] Pollutant not subject to *de minimis* threshold if the State does not determine it to be a significant precursor to $PM_{2.5}$ emissions.

Key:

CO = carbon monoxide; n/a = not applicable; NAA = nonattainment area; NO_2 = nitrogen dioxide; NOx = nitrogen oxides; O_3 = ozone; Pb = lead; PM_{10} = inhalable particulate matter; $PM_{2.5}$ = fine particulate matter; SO_2 = sulfur dioxide; tpy = tons per year; VOC = volatile organic compounds

If the regulating Federal agency determines that the general conformity regulations do not apply to the proposed action (meaning the project emissions do not exceed the *de minimis* thresholds in a nonattainment or maintenance area), no further analysis or documentation is required.

28.1.1.5 Clean Water Act

Growing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act (CWA).

The CWA implemented requirements to set water quality standards for all known contaminants in surface waters. Section 303(d) of the 1972 CWA requires States, territories and authorized tribes to develop a list of water quality-impaired segments of waterways. The 303(d) list includes water bodies that do not meet water quality standards for the specified beneficial uses of that waterway, even after point sources (e.g., wastewater treatment plant discharges) of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for water bodies on their 303(d) lists and implement a process, called Total Maximum Daily Loads (TMDLs), to meet water quality standards (USEPA 2017a).

TMDLs are intended to address all significant stressors that cause, or threaten to cause, water body beneficial use impairments, including point sources, nonpoint sources (e.g., runoff from fields, streets, range, or forest land), and naturally occurring sources (e.g., runoff from undisturbed lands). The TMDL process is a tool for implementing water quality standards and is based on the relationship between point source pollution and its deleterious effects on ambient in-stream conditions. The TMDL establishes the maximum allowable loadings of a pollutant that can be assimilated[3] by a water body while still meeting applicable water quality standards. The TMDL provides the basis for the establishment of water quality-based controls. These controls should provide the pollution reduction necessary for a water body to meet water quality standards. A TMDL

[3] As known as assimilative capacity: the ability of a body of water to cleanse itself; to receive waste waters or toxic substances without deleterious effects and without damage to aquatic life or humans who consume the water.

is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The TMDLs allocation calculation for each water body must include a margin of safety to ensure that the water body can be used for the beneficial uses the State has designated. Additionally, the calculation also must account for seasonal variation in water quality (USEPA 2017a). For example, pollutant loads might be greater during winter months with higher flows, however, the rivers may have more assimilative capacity for such pollutants.

TMDLs may be based on readily available information and studies. In some cases, complex studies or models are needed to understand how stressors are causing water body impairment. In many cases, simple analytical efforts provide an adequate basis for stressor assessment and implementation planning. TMDLs are developed to provide an analytical basis for planning and implementing pollution controls, land management practices, and restoration projects needed to protect water quality. States are required to include approved TMDLs and associated implementation measures in State water quality management plans. Within California, TMDLs implementation is regulated through regional Basin Plans.

Water quality of waters of the U.S. subjected to a discharge of dredged or fill material is regulated under Section 404 of the CWA. These actions must not violate Federal or State water quality standards. Specifically, in the State of California, the applicable Regional Water Quality Control Board (RWQCB) administers Section 401 and either issues or denies water quality certifications depending upon whether the proposed discharge or fill material complies with applicable State and Federal laws. The CWA also requires that a permit be obtained from the USEPA and the United States Army Corps of Engineers (USACE) when discharge of dredged or fill material into wetlands and waters of the U.S. occurs. Section 404 of the CWA requires the USEPA and USACE to issue individual and general permits for these activities.

In addition to complying with State and Federal water quality standards, all point sources that discharge into waters of the U.S. must obtain a National Pollutant Discharge Elimination System (NPDES) permit under provisions of Section 402 of the CWA. In California, the State Water Resources Control Board (SWRCB) and RWQCBs are responsible for the implementation of the NPDES permitting process at the State and regional levels, respectively. The NPDES permit process also provides a regulatory mechanism for the control of non-point source pollution created by runoff from construction and industrial activities, and general and urban land use, including runoff from streets. To prevent polluted stormwater runoff from being washed into municipal separate storm sewer systems (MS4s), certain operators are required to obtain NPDES permits. The 1990 Phase I regulation requires medium and large cities or certain counties with populations of 100,000 or more to obtain NPDES permit coverage for their stormwater discharges. The 1999 Phase II regulation requires small MS4s in U.S. Census Bureau defined urbanized areas to obtain NPDES permit coverage for their stormwater discharges. Phase II also includes non-traditional MS4s such as public universities, departments of transportation, hospitals and prisons. There are approximately 855 Phase 1 MS4s and 6,695 Phase II MS4s (USEPA 2018).

Projects involving construction activities (e.g., clearing, grading, or excavation) involving land disturbance greater than one acre must file a Notice of Intent (NOI) with the applicable RWQCB to indicate their intent to comply with the State General Permit for Stormwater Discharges Associated with Construction Activity (General Permit). The State General Permit specifies Best Management Practices (BMPs), to achieve compliance as well as numeric action levels (NALs) in order to achieve Federal standards to minimize sediment and pollutant loadings. The General Permit requires preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP) as well as a Rain Event Action Plan (REAP) prior to construction. The SWPPP and REAP are intended to help identify the sources of sediment and other pollutants, and assess the effectiveness of BMPs in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

Impacts to water quality under the CWA are analyzed in Chapter 4, Water Quality, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.6 Dam Safety Guidelines

The Federal government issued *Federal Guidelines for Dam Safety* in 1979 (reprinted April 2004) (Federal Emergency Management Agency [FEMA] 2004). The purpose of these guidelines is to enhance national dam safety and ensure protection of human life and property. Federal agencies are required to apply these guidelines in planning, design, construction, operation, and regulation to protect the structural integrity of dams and associated structures. Additional guidelines were developed in subsequent documents including dam safety risk management, emergency action planning, earthquake analysis and design of dams, hazard potential classification for dams, and selecting appropriate inflow design floods for dams. Impacts to dam safety are analyzed in Chapter 9, Flood Protection, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.7 Earthquake Hazard Reduction Act of 1977

The Earthquake Hazard Reduction Act of 1977 established a national goal of reducing the risks of life and property from future earthquakes in the United States (U.S.) through the establishment and maintenance of an earthquake program including prediction and hazard assessment research, seismic monitoring and information dissemination. The Act established the Earthquake Hazard Reduction Program to promote the adoption of earthquake hazard reduction measures by Federal, State, and local governments. Section 8 of the Act calls for the adoption of standards for assessing and enhancing the seismic safety of buildings constructed for or leased by the Federal Government (42 United States Code [USC] 7701 et. seq.). Impacts to seismic safety under the

Earthquake Hazard Reduction Act of 1977 are analyzed in Chapter 25, Geology, Seismicity, and Soils, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.8 Endangered Species Act

Under Federal Endangered Species Act (ESA), the Secretary of the Interior and the Secretary of Commerce have joint authority to list a species as threatened or endangered (United States Code [USC], Title 16, Section 1533[c]). All Federal agencies are required to determine how to use their existing authorities to further the purposes of the Act to aid in recovering listed species, and to address existing and potential conservation issues (USFWS 1998). ESA (United States Code [USC], Title 16, Section 1533[c]) prohibits the “take” of endangered or threatened fish and wildlife species, the take of endangered or threatened plants in areas under Federal jurisdiction or in violation of State law, or adverse modifications to their critical habitat. Under ESA, the definition of “take” is to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” USFWS and the National Marine Fisheries Service (NMFS) also interpret the definition of “harm” to include significant habitat modification that could result in the take of a species.

If an activity would result in the incidental take of a Federally-listed species, one of the following is required: an incidental take permit (ITP) under Section 10(a) of ESA or an incidental take statement issued pursuant to Federal interagency consultation under Section 7 of ESA. Such authorization typically requires various measures to avoid and minimize species take, and to protect the species and avoid jeopardy to the species’ continued existence.

Section 7(a)(2) states (16 USC 1536[3], [4]) that each Federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. In fulfilling these requirements, each agency is to use the best scientific and commercial data available and to initiate consultation (USFWS 1998), as is further described in regulations (50 CFR §402). Pursuant to the requirements of Section 7 of ESA, a Federal agency reviewing a proposed project which it may authorize, fund, or carry out must determine whether any Federally-listed threatened or endangered species, or species proposed for Federal listing, may be present in the project area and determine whether implementation of the proposed project is likely to affect the species. In addition, the Federal agency is required to determine whether a proposed project is likely to jeopardize the continued existence of a listed species or any species proposed to be listed under ESA or result in the destruction or adverse modification of critical habitat proposed or designated for such species (16 USC 1536[3], [4]). Impacts to Federally-listed threatened or endangered species under ESA are analyzed in Chapter 15, Terrestrial Resources, and would apply to all of the alternatives evaluated in this EIS/EIR.

NMFS administers ESA for marine and anadromous fish species, including California Central Valley steelhead (Oncorhynchus mykiss) distinct population segment (DPS), Sacramento River winter-run and Central Valley spring-run Chinook salmon (O. tshawytscha) evolutionarily significant unit (ESU), and southern DPS of North American green sturgeon (Acipenser medirostris). USFWS administers ESA for non-anadromous and non-marine fish species such as delta smelt (Hypomesus transpacificus), and longfin smelt (Spirinchus thaleichthys), which has been recently proposed for listing and warrants consideration for protection under the ESA. In 2012, the USFWS acknowledged that the San Francisco Bay-Delta DPS of the longfin smelt warrants listing but was precluded from listing at that time because of other higher priorities and consequently will be treated as a candidate species. Proponents of projects where a Federally-listed species is present that is likely to be affected by the existing or proposed project must consult with USFWS and/or NMFS. Authorization may involve a letter of concurrence that the project will not result in the potential take of a listed species, or may result in the issuance of a Biological Opinion (BO) that describes measures that must be undertaken to minimize the likelihood of an incidental take of a listed species. A project that is determined by NMFS or USFWS to jeopardize the continued existence of a listed species cannot be approved under a BO. Impacts to Federally-listed threatened or endangered marine and anadromous fish species under ESA are analyzed in Chapter 14, Fisheries Resources, and would apply to all of the alternatives evaluated in this EIS/EIR.

Where a Federal agency is not authorizing, funding, or carrying out a project, take that is incidental to the lawful operation of a project may be permitted pursuant to Section 10(a) of ESA through approval of a habitat conservation plan (HCP).

ESA requires the Federal government to designate "critical habitat" for any species it lists under the ESA. "Critical habitat" is defined as: 1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to the species conservation, and those features that may require special management considerations or protection; and 2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation. Impacts to critical habitat under ESA are analyzed in Chapter 14, Fisheries Resources, and Chapter 15, Terrestrial Resources, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.8.1 Biological Opinions

As described above, BOs are prepared through formal consultation under Section 7 of the ESA (described above) by either NMFS or USFWS in response to a Federal action affecting a listed species.

The Coordinated Long-Term Operation of the CVP and State Water Project (SWP) is currently subject to BOs issued by USFWS (2008) and NMFS (2009) pursuant to Section 7 of the ESA. The USFWS BO concluded that the operation of these water projects would result in jeopardy to delta smelt (Hypomesus transpacificus) and adverse modification of critical habitat, and included Reasonable and Prudent Alternatives to avoid jeopardy to this species. The NMFS BO concluded that the operations were likely to jeopardize the continued existence of several threatened and endangered species, including Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, and the Southern Distinct Population Segment of North American green sturgeon.

In 2011, the BOs were remanded by court order to the Federal fish and wildlife agencies for revision. This decision was appealed to the Ninth Circuit Court of Appeals and in 2014 the orders to rewrite the BOs were reversed. The Ninth Circuit decision affirmed the requirement that Reclamation complete an EIS on implementing the BOs by December 1, 2015. The Final EIS was published on November 23, 2015 and the Record of Decision was signed on January 11, 2016.

28.1.1.9 Executive Order 11990, Protection of Wetlands

Executive Order 11990 requires Federal agencies to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. This requirement extends to actions involved with construction activities which would affect wetlands. Federal agencies must provide opportunities for early public review of any plans or proposals for new construction in wetlands. Impacts to wetlands are analyzed in Chapter 15, Terrestrial Resources, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.1.10 Executive Order 11988, Floodplain Management

Executive Order 11988 addresses floodplain issues related to human safety, health, and welfare. It requires Federal agencies to avoid adverse impacts due to occupancy and modification of floodplains and support of development within floodplains (FEMA 2015). The Executive Order also encourages the restoration and preservation of the beneficial aspects of floodplains through the following actions:

- acquiring, managing, and disposing of Federal lands and facilities;
- providing Federally-undertaken, financed, or assisted construction and improvements; and
- conduct Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation and licensing activities.

Impacts to floodplains are analyzed in Chapter 9, Flood Protection, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.11 Executive Order 13783 – Promoting Energy Independence and Economic Growth

Section 3 of Executive Order 13783 rescinds certain energy and climate-related presidential and regulatory actions. Actions that were revoked include Executive Order 13653, Preparing the United States for the Impacts of Climate Change, and Council on Environmental Quality (CEQ) guidance entitled "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews."

28.1.1.12 Farmland Policy Act of 1981

The Farmland Policy Act of 1981 was established to minimize the impacts Federal programs have on the irreversible conversion of farmland to nonagricultural uses. It ensures that Federal programs are administered to be compatible with State, local, and private programs and policies to protect farmland. Under the Farmland Policy Act, farmland consists of Prime Farmland, Unique Farmland, and Land of Statewide or Local Importance. It can be forest land, pastureland, cropland, or other land, excluding water or urban built-up land (Natural Resources Conservation Service [NRCS] No Date). The Farmland Protection Policy Act established the Farmland Protection Program and the Land Evaluation and Site Assessment (LESA) system. The NRCS uses the LESA system to establish a farmland conversion impact rating. Impacts to farmland protected by the Farmland Policy Act are analyzed in Chapter 18, Agricultural Resources, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.13 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) provides the basic authority for USFWS involvement in evaluating impacts on fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It also requires Federal agencies that construct, license or permit water resource development projects, to consult with the USFWS, NMFS, and State fish and wildlife agencies regarding the impacts on fish and wildlife resources and measures to mitigate these impacts before project implementation. Under the FWCA, the USFWS coordinates with other agencies (e.g., NMFS and CDFW) to ensure that the recommendations in the FWCA report reflect a more inclusive report that includes an evaluation of impacts on fish and wildlife from the project, recommended mitigation measures, and other recommendations to address these impacts (Reclamation 2015). Impacts to fish and wildlife were analyzed consistent with the FWCA in Chapter 14, Fisheries Resources, and Chapter 15, Terrestrial Resources, and would apply to all of the alternatives evaluated in this EIS/EIR. Coordination and consultation with the USFWS, NMFS, and State fish and wildlife agencies is discussed below in Section 28.3, Agency Coordination.

28.1.1.14 Magnuson-Stevens Fishery Conservation and Management Act

The Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (Magnuson-Stevens Act) (Public Law [P.L.] 94-256 or 10 USC 1801 et seq.) require heightened consideration of habitat for commercial fish species in resource management decisions. EFH is defined in the Magnuson-Stevens Act as “those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity.” NMFS interprets EFH to include aquatic areas and their associated physical, chemical, and biological properties used by fish that are necessary to support a sustainable fishery and the contribution of the managed species to a healthy ecosystem. The Magnuson-Stevens Act and its implementing regulations (50 CFR § 600.92[j]) require that before a Federal agency may authorize, fund, or carry out any action that may adversely affect EFH, it must consult with NMFS. The purpose of the consultation is to develop conservation recommendations that address reasonably foreseeable adverse effects on EFH. Freshwater EFH for Pacific salmonids includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically, accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers, and long-standing impassable natural barriers. Impacts to EFH under the Magnuson-Stevens Act are analyzed in Chapter 14, Fisheries Resources, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.15 Memorandum of April 29, 1994, “Government-to-Government Relations with Native American Tribal Governments”

President William J. Clinton’s 1994 memorandum, “Government-to-Government Relations with Native American Tribal Governments,” directed Reclamation to assess the effect of its programs on tribal trust resources and Federally-recognized tribal governments. Reclamation is tasked with actively engaging Federally-recognized tribal governments and consulting with such tribes on a government-to-government level (59 Federal Register [FR] 1994). Impacts to tribal trust resources and Federally-recognized tribal governments are analyzed in Chapter 21, Indian Trust Assets, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.16 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) makes it unlawful at any time, by any means, or in any manner to intentionally pursue, hunt, take, capture, or kill migratory birds anywhere in the U.S., except as permitted by regulations. The law also applies to the intentional disturbance and removal of nests occupied by migratory birds or their eggs during the breeding season. Impacts to special-status species, including migratory birds protected by the MBTA, are analyzed in Chapter 15, Terrestrial Resources, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.1.17 National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) to provide affordable flood insurance to property owners and encourage communities to comply with FEMA regulations including enforcement of floodplain management regulations (FEMA 2017a). FEMA issues Flood Insurance Rate Maps (FIRMs) for communities participating in NFIP. These maps delineate flood hazard zones in the community. Flood zones are defined as follows (FEMA 2017b):

- Undetermined Risk Areas: Zone D includes areas where flooding could happen although the flood risks are undetermined because no analysis has been conducted (FEMA 2011).
- Minimal Flood Hazard Areas: Zones C and X (unshaded) are defined as areas of minimal flood hazard above the 500-year flood level.
- Moderate Flood Hazard Areas: Zones B and X (shaded) are defined as areas of moderate flood hazard usually located between the limits of the 100-year and 500-year floodplain.
- Special Flood Hazard Areas (SFHA): is defined as areas with a one percent annual chance of flooding (100-year floodplain); these areas are designated on the FIRM as Zones A, AO, AH, A1-A-30, AE, A99, AR, AR/AE, AR/AO, AR/A1-A30, AR/A, V, VE or V1-V30.

Impacts to FEMA-defined flood zones under NFIP are analyzed in Chapter 9, Flood Protection, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.1.18 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) (54 United States Code [USC] 306108) requires Federal agencies to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. Historic properties are defined as significant cultural resources that are included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) (36 CFR Part 60). The Section 106 process, outlined at 36 CFR Part 800, involves consultation with the State Historic Preservation Officer (SHPO), Indian tribes, and other interested parties, discussed below in Section 28.3, Agency Coordination. The goal of consultation is “to identify historic properties potentially affected by the undertaking, assess its effects and seek ways to avoid, minimize or mitigate any adverse effects on historic properties” (36 CFR Part 800.1[a]). Although the NHPA and NEPA are independent statutes, the two review processes are often coordinated.

Reclamation uses the NHPA Section 106 process as the primary means for identifying cultural resources that may be impacted by proposed agency actions and for evaluating the potential impacts of those actions on cultural resources under NEPA.

Advisory Council on Historic Preservation (ACHP) regulations regarding the Protection of Historic Properties (36 CFR Part 800) establish procedures for compliance with Section 106 of the NHPA. The NHPA was formerly codified under 16 USC Section 470 et seq. but is currently codified under 54 USC Section 300101 et seq. Following ACHP guidelines, “Section 106” is referred to as that section of the original public law that enacted the NHPA as opposed to its legal citation. It is also a reference that has been in constant use for almost 50 years.

Impacts to historic properties under NHPA are analyzed in Chapter 23, Cultural Resource, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.1.19 Principles and Requirements for Federal Investments in Water Resources

Furthermore, Reclamation is subject to *Principles and Requirements for Federal Investments in Water Resources* (CEQ 2013). This document requires areas of risk and uncertainty to be identified, described, and considered when analyzing potential investments in water resources. It specifically requires climate change impacts to be accounted for and addressed. Appendix E, Climate Change Analysis, provides an assessment of the proposed alternatives under projected future climate conditions and discusses the environmental impacts of the project alternatives under projected future climate conditions.

28.1.1.20 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) of 1976, administered by the USEPA, governs the disposal of solid and hazardous waste. Under RCRA, the USEPA was given authority of “cradle-to-grave” control of hazardous waste and this is the current approach for hazardous waste management. Three programs were established under RCRA including the solid waste program, hazardous waste program, and underground storage tank (UST) program. Under the law, controls for the generation, transport, treatment, storage, and disposal of hazardous waste are strictly mandated. Only active and future facilities are controlled under RCRA (USEPA 2017c). There have been three amendments to RCRA, including the Hazardous and Solid Waste Amendments of 1984, the Federal Facility Compliance Act of 1992, and the Land Disposal Program Flexibility Act of 1996 (USEPA 2017c). Impacts related to the disposal of solid and hazardous waste under RCRA are analyzed in Chapter 13, Hazards and Hazardous Material, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.1.21 Safe Drinking Water Act

The Federal Safe Drinking Water Act (SDWA) was enacted in 1974 to protect the quality of drinking water in the U.S. This law focuses on all waters actually or potentially designated for drinking use, whether from above ground or underground sources. The SDWA authorized the USEPA to establish safe water quality criteria for specific contaminants and required all owners or operators of public water systems to comply with primary (health-related) standards. State governments assume this authority from the USEPA and also encourage attainment of secondary water quality standards. Contaminants of concern in a domestic water supply are those that either pose a health threat or in some way alter the aesthetic acceptability of the water. These types of contaminants are currently regulated by the USEPA through primary and secondary maximum contaminant levels (MCLs). As directed by the SDWA amendments of 1986, the USEPA has been expanding its list of primary MCLs. MCLs have been proposed or established for approximately 100 contaminants. Impacts to water quality under the SDWA are analyzed in Chapter 4, Water Quality, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.22 San Luis Act (Public Law 86-488)

In 1960 the San Luis Act (Public Law 86-488) authorized the construction and operation of the San Luis Unit, which is jointly operated by Reclamation and DWR. The principal purpose of the San Luis Unit is irrigation water supply for almost 1 million acres of prime farmland in central California. The San Luis Unit joint-use facilities include O'Neill Dam and Forebay, B.F. Sisk Dam, San Luis Reservoir, and San Luis Canal.

28.1.1.23 United States Department of the Interior Secretarial Order No. 3215

In 2000, the Department of the Interior (DOI) issued a Secretarial Order, Principles for the Discharge of the Secretary's Trust Responsibility, assigns responsibility for ensuring protection of ITAs to the heads of bureaus and offices (DOI 2000). Reclamation is required to "protect and preserve Indian trust assets from loss, damage, unlawful alienation, waste, and depletion" (DOI 2000). Impacts to Indian trust assets under the Secretarial Order are analyzed in Chapter 21, Indian Trust Assets, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.24 United States Department of the Interior Secretarial Order No. 3289, Amendment No. 1

In 2009, the DOI issued a Secretarial Order on climate change that expands DOI bureaus' responsibilities in addressing climate change (amended on February 22, 2010). The purpose of Secretarial Order No. 3289 is to provide guidance to bureaus and offices within the DOI on how to provide leadership by developing timely responses to emerging climate change issues. This Order replaces Secretarial Order No. 3226, signed on January 19, 2001, entitled "Evaluating Climate Change Impacts in Management Planning." It reaffirms efforts within DOI that are ongoing with respect to climate change. Among the requirements of the Order is one that requires each bureau and office of DOI to "consider and analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, and/or when making major decisions affecting DOI resources" (DOI 2010). Appendix E, Climate Change Analysis, provides an assessment of the proposed alternatives under projected future climate conditions and discusses the environmental impacts of the project alternatives under projected future climate conditions.

28.1.1.25 United States Department of the Interior Secretarial Order No. 3360

In 2017, the DOI issued a Secretarial Order that continues the implementation of Executive Order (EO) 13783 by rescinding documents inconsistent with EO 13783. The order rescinds Departmental Manual Part 523, Chapter 1: Climate Change Policy, and directs each bureau and office to review all existing regulations, orders, guidance documents, policies, instructions, notices, and implementing actions that are inconsistent with EO 13783 and initiate a process to suspend, revise, or rescind any such actions (DOI 2017).

28.1.1.26 United States Department of the Interior Climate Change Adaptation Plan

In 2014, DOI released its Climate Change Adaptation Plan, which focuses on the department's work to address climate change through implementation of EO 13653 (since rescinded) and its Climate Change Adaptation Policy (523 DM 1). The plan summarizes DOI's efforts to address climate-related risks and demonstrates its efforts to modernize programs to support climate resilience investment (DOI 2014). Appendix E, Climate Change Analysis, provides an assessment of the proposed alternatives under projected future climate conditions and discusses the environmental impacts of the project alternatives under projected future climate conditions.

28.1.1.27 United States Department of the Interior Plan for a Coordinated, Science-Based Response to Climate Change Impacts on Our Land, Water, and Wildlife Resources

DOI subsequently released *Interior's Plan for a Coordinated, Science-Based Response to Climate Change Impacts on Our Land, Water, and Wildlife Resources*. The plan provides a framework for DOI's conservation strategies related to climate change. DOI relies on three main resources – climate change impact science, data integration and dissemination, and enabling science-based adaptation strategies – to implement its vision. As part of its response to climate change, DOI established Climate Science Centers and Landscape Conservation Cooperatives to form the foundation of an integrated approach to climate change science and adaptation (DOI no date). Appendix E, Climate Change Analysis, provides an assessment of the proposed alternatives under projected future climate conditions and discusses the environmental impacts of the project alternatives under projected future climate conditions.

28.1.1.28 United States Department of the Interior, Bureau of Reclamation National Environmental Policy Act Handbook

The Reclamation *National Environmental Policy Act (NEPA) Handbook* (Reclamation 2012) recommends that climate change be considered, as applicable, in every NEPA analysis. The *NEPA Handbook* acknowledges that there are two interpretations of climate change in regards to Reclamation actions: 1) Reclamation's action is a potentially significant contributor to climate change and 2) climate change could affect a Reclamation proposed action. The *NEPA Handbook* recommends considering different aspects of climate change (e.g., relevance of climate change to the proposed action, timeframe for analysis, and relevant regional/local projections of climate change) to determine the extent to which it should be discussed under NEPA. Appendix E, Climate Change Analysis, provides an assessment of the proposed alternatives under projected future climate conditions and discusses the environmental impacts of the project alternatives under projected future climate conditions.

28.1.1.29 United States Department of the Interior, Bureau of Reclamation Safety of Dams Act

The Safety of Dams Act of 1978 as amended gives Reclamation authority to modify dams and other actions to reduce the risk related to dam failure (Reclamation 2017a). Reclamation's Safety of Dams Program ensures regular monitoring, examination and evaluation of dam performance to identify potential risks to the public, property or the environment. The evaluation considers loading conditions and the consequences of structural dam failure. Unreasonable risks require corrective actions to be developed and implemented. The Safety of Dams Process entails a four-phased approach including: comprehensive and periodic inspections and reviews every 8 and 4 years respectively; issues evaluation which may include additional studies; Corrective Action Study (CAS) as recommended by the issues evaluation; and design/modification as recommended in the CAS (Reclamation 2017b). The CAS for B.F. Sisk Dam is underway by Reclamation in collaboration with the California Department of Water Resources (DWR) (Reclamation 2017c). Impacts to dam safety under the Safety of Dams Act of 1978 are analyzed in Chapter 9, Flood Protection, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.30 United State Energy Acts

Power and energy production and distribution are regulated by the Federal government. The Federal Energy Regulatory Commission (FERC) regulates both Federal and non-Federal power projects.

The Energy Policy and Conservation Act of 1975 promotes energy conservation when feasibly obtainable. The Alternative Fuels Act of 1988 amends a portion of the Energy Policy and Conservation Act to pursue the use of alternative fuels including electricity.

Section 403(b) of the Power Plant and Industrial Fuel Use Act of 1978 (Public Law [P.L.] 95-629) and Executive Order 12185, Conservation of Petroleum and Natural Gas (December 17, 1979, 44 Federal Register [FR] §75093), encourage conservation of petroleum and natural gas.

The Secretary of Energy is required to enact programs to help improve energy efficiencies; increase the use of renewable energy; reduce environmental impacts and foster economic growth as part of the Energy Policy Act of 1992.

The Energy Policy Act of 2005 directs the Secretary of Energy to develop programs related to “energy efficiency research, development, demonstration and commercial application” (USLegal.Com 2016).

Impacts to energy under the U.S. Energy Acts are analyzed in Chapter 22, Public Utilities, Services, and Power, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.1.31 Water Project Recreation Act

The Federal Water Project Recreation Act requires Federal agencies with authority to approve water projects to include recreation development as a condition of approving permits. Recreation development must be considered along with any navigation, flood control, reclamation, hydroelectric, or multipurpose water resource project. The act states "consideration should be given to opportunities for outdoor recreation and fish and wildlife enhancement whenever any such project can reasonably serve either or both purposes consistently" (Reclamation 2015). Impacts to recreation under the Water Project Recreation Act are analyzed in Chapter 19, Recreation, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2 State Requirements

Compliance with State laws, rules, and regulations for implementation of the alternatives is summarized below. A total of 42 State requirements are identified.

28.1.2.1 20x2020 Water Conservation Plan

As part of an effort to improve the Delta, the 20x2020 Water Conservation Plan is a statewide initiative to maximize the state’s urban water efficiency and conservation opportunities. It aims to set in motion a range of activities designed to achieve the 20 percent per capita reduction in urban water demand by 2020. These activities include improving an understanding of the variation in water use across California, promoting legislative initiatives that incentivize water agencies to promote water conservation, and creating evaluation and enforcement mechanisms to assure regional and statewide goals are met (SWRCB 2010). Impacts to water supply deliveries are analyzed in Chapter 5, Surface Water Supply, and the plan would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.2 Alquist-Priolo Earthquake Fault Zoning Act

The 1972 Alquist-Priolo Earthquake Fault Zoning Act (PRC Section 2621 *et seq*.) requires local agencies to regulate development within earthquake fault zones to reduce the hazards associated with surface fault ruptures. It also regulates construction in earthquake fault zones. Impacts to seismic hazards under the Alquist-Priolo Earthquake Fault Zoning Act are analyzed in Chapter 25, Geology, Seismicity, and Soils, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.3 California Buildings Standards Code

28.1.2.3.1 Noise

The State of California has adopted noise standards in areas of regulation not preempted by the Federal government. State standards regulate noise levels of motor vehicles, sound transmission through buildings, occupational noise control, and noise insulation. Title 24 of the California Code of Regulations, also known as the California Buildings Standards Code (CBSC), establishes building standards applicable to all occupancies throughout the State. The Code provides acoustical regulations for both exterior-to-interior sound insulation, as well as sound and impact isolation between adjacent spaces of various occupied units. Title 24 regulations generally state that interior noise levels generated by exterior noise sources shall not exceed 45 A-weighted dB (dBA) Day-night average level/Community Noise Equivalent Level (Ldn/CNEL), with windows closed, in any habitable room for general residential uses. Impacts to noise levels under the CBSC are analyzed in Chapter 11, Noise and Vibration, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.3.2 Geology, Seismicity, and Soils

Minimum standards for structural design and construction are outlined in the CBSC (Title 24, California Code of Regulations). The CBSC is based on the Uniform Building Code (UBC), which is widely used throughout the United States and has been modified for California conditions with numerous, more detailed and/or more stringent regulations.

The CBSC requires that “classification of the soil at each building site…be determined when required by the building official” and that “the classification be based on observation and any necessary test of the materials disclosed by borings or excavations.” In addition, the CBSC states that “the soil classification and design-bearing capacity shall be shown on the (building) plans, unless the foundation conforms to specified requirements.” The CBSC provides standards for various aspects of construction, including but not limited to excavation, grading, and earthwork construction; fill placement and embankment construction; construction on expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, project design and construction would be required to comply with provisions of the CBSC.

Impacts to structural standards under the CBSC are analyzed in Chapter 25, Geology, Seismicity, and Soils, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.4 California Clean Air Act

The California Clean Air Act (CCAA) substantially added to the authority and responsibilities of the State's air pollution control districts. The CCAA establishes an air quality management process that generally parallels the Federal process. The CCAA, however, focuses on attainment of the California Ambient Air Quality Standards (CAAQS) that, for certain pollutants and averaging periods, are typically more stringent than the comparable NAAQS. The CCAA requires that the CAAQS be met as expeditiously as practicable, but does not set precise attainment deadlines. Instead, the act established increasingly stringent requirements for areas that will require more time to achieve the standards.

The air quality attainment plan requirements established by the CCAA are based on the severity of air pollution problems caused by locally generated emissions. Upwind air pollution control districts are required to establish and implement emission control programs commensurate with the extent of pollutant transport to downwind districts.

The California Air Resources Board (CARB) is responsible for developing emission standards for on-road motor vehicles and some off-road equipment in the State. In addition, CARB develops guidelines for the local districts to use in establishing air quality permit and emission control requirements for stationary sources subject to the local air district regulations.

Chapter 7, Air Quality, analyzes the emissions of criteria pollutants, and these compliance requirements would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.5 California Department of Fish and Wildlife Species Designations

The California Department of Fish and Wildlife (CDFW) maintains an informal list of species called "species of special concern." These are broadly defined as plant and wildlife species that are of concern to CDFW because of population declines and restricted distributions and/or because they are associated with habitats that are declining in California. These species are inventoried in the California Natural Diversity Database (CNDDB) regardless of their legal status. Impacts on species of special concern may be considered significant. Species of special concern are analyzed in Chapter 14, Fisheries Resources, and Chapter 15, Terrestrial Resources, and designations would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.6 California Department of Resources Recycling and Recovery

The California Department of Resources Recycling and Recovery (CalRecycle) promotes recycling, waste reduction and product reuse through various programs promoting technology innovation which help to achieve a statewide goal of 75 percent recycling by 2020. The department works with local governments to enforce regulations related to, among other things, the handling and disposal of non-hazardous waste and the cleanup of illegal disposal sites (CalRecycle 2014). Title 14, Natural Resources—Division 7 of the California Code of Regulations (CCR), contains current CalRecycle regulations regarding the disposal of nonhazardous waste in California. Title 27, Environmental Protection—Division 2, Solid Waste of the CCR contains current CalRecycle and SWRCB regulations about disposal of waste to land (CalRecycle 2017a). Impacts to solid water disposal are analyzed in Chapter 22, Public Utilities, Services, and Power, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.7 California Department of Transportation Guide for the Preparation of Traffic Impact Studies

Traffic analysis in the State of California is guided by standards set at the State level by the California Department of Transportation (Caltrans), and by local jurisdictions. State highways fall under the jurisdiction of Caltrans. Other roadways fall under the local jurisdiction, either city or county, in which they are located.

Each jurisdiction has adopted standards regarding the desired performance level of traffic conditions on the circulation system within its jurisdiction. A performance measure called “Level of Service” (LOS) is used to characterize traffic operating conditions of a circulation element. Progressively worsening traffic operating conditions are given the letter grades “A” through “F”. Traffic operating conditions associated with each LOS designation, the LOS criteria for freeways using average densities, and the LOS criteria for roadways using daily traffic volumes are included in Appendix G2.

While most motorists consider LOS A, B, and C as satisfactory travel conditions, LOS D is considered marginally acceptable. Congestion and delay are considered unacceptable to most motorists and are given the LOS E or F ratings. Table 28-2 presents local and regional LOS standards established by each jurisdiction within the study area.

Table 28-2. LOS Standards of Significance

Regulatory Agency	LOS Standards
Caltrans[1]	LOS C for rural interregional routes and LOS D for urban interregional routes
Merced County[2]	LOS D for freeways and urban roadways, LOS C for other rural roadways
City of Los Banos[3]	LOS C for roadway segments
City of Gustine[4]	LOS D for major roadways

Notes:
[1] Source: Merced County Association of Governments 2014
[2] Source: Merced County 2013
[3] Source: City of Los Banos 2009
[4] Source: City of Gustine 2002

Impacts to LOS are analyzed in Chapter 12, Traffic and Transportation, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.8 California Department of Water Resources, Division of Safety of Dams

At the State level, the responsibility for the supervision of dams and reservoirs is assigned to the DWR and delegated to the Division of Safety of Dams. California Water Code Division 3 regulates alterations; repairs and maintenance; operation; and, removal of dams and reservoirs. Impacts to dam safety are analyzed in Chapter 9, Flood Protection, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.9 California Department of Water Resources, Division of Flood Management

Through the Division of Flood Management, DWR conducts flood forecasting, and emergency response activities as well as permitting of flood protection projects. The Division of Flood Management coordinates with Federal, State, and local agencies to provide integrated flood management and emergency response systems throughout California as part of DWR's FloodSAFE California Program (DWR 2017). Impacts to flood management are analyzed in Chapter 9, Flood Protection, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.10 California Department of Water Resources, Non-Project Water Acceptance Criteria

Acceptance criteria has been developed by DWR to govern the water quality of non-Project water that may be conveyed through the California Aqueduct. These criteria require DWR to consult with SWP contractors and SWRCB on drinking water quality issues relating to non-Project water as needed to assure the protection of SWP water quality. DWR uses a two-tier approach for accepting non-Project water pumped into the California Aqueduct. Tier 1 programs have "no adverse impact" criteria and are tied to historical water quality levels in the California Aqueduct. Programs meeting all Tier 1 criteria are approved by DWR.

Tier 2 programs have water quality levels that exceed the historical water quality levels in the California Aqueduct and have potential to cause adverse effects to SWP contractors. Tier 2 programs are referred to the State Water Contract Facilitation Group for review. The Facilitation Group reviews the program and, if needed, makes recommendations to DWR during consideration of the project.

Impacts to water quality under the criteria are analyzed in Chapter 4, Water Quality, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.11 California Endangered Species Act

CDFW is responsible for administration of the CESA. Unlike the Federal ESA, there are no State agency consultation procedures under the California Endangered Species Act (CESA). For projects that affect a species that is both State and Federal listed, compliance with the Federal Endangered Species Act will satisfy the CESA if the CDFW determines that the Federal incidental take authorization is “consistent” with the CESA. Projects that result in a “take” of a State-listed species require an ITP under the CESA. The State act also lends protection to species that are considered rare enough by the scientific community and trustee agencies to warrant special consideration, particularly with regard to protection of isolated populations, nesting or den locations, communal roosts, and other essential habitat. The area of analysis is known to support species listed under the CESA.

Fully Protected Species under California Fish and Game Code – Protection of fully protected species is described in four sections of the California Fish and Game Code that list 37 fully protected species (California Fish and Game Code Sections 3511, 4700, 5050, and 5515). These statutes prohibit take or possession at any time of fully protected species at any time.

Impacts to protected species under CESA are analyzed in Chapter 14, Fisheries Resources, and Chapter 15, Terrestrial Resources, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.12 California Environmental Protection Agency Unified Program

The California Environmental Protection Agency (CalEPA) Unified Program was developed to protect Californians from hazardous waste and materials. CalEPA has certified 81 local government agencies as California Unified Program Agencies (CUPAs), including Merced County Department of Public Health, which is responsible for implementing the hazardous waste and materials standards for five different State agencies including: CalEPA, DTSC, Governor’s Office of Emergency Services (CalOES), CalFire and the SWRCB (CalEPA 2017a). Under the Unified Program, the administration, permit, inspection and enforcement activities are consolidated for the following environmental and emergency management programs (CalEPA 2017b).

- Aboveground Petroleum Storage Act (APSA) Program
- Area Plans for Hazardous Materials Emergencies
- California Accidental Release Prevention (CalARP) Program
- Hazardous Materials Release Response Plans and Inventories (Business Plans)
- Hazardous Material Management Plan (HMMP) and Hazardous Material Inventory Statements (HMIS) (California Fire Code)
- Hazardous Waste Generator and Onsite Hazardous Waste Treatment (tiered permitting) Programs
- Underground Storage Tank Program

Chapter 13, Hazards and Hazardous Materials, analyzes hazardous waste and materials and these standards would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative. A more in depth discussion of some of these programs that have applicability to the construction of these alternatives are described below.

28.1.2.12.1 Hazardous Material Management Plan and Hazardous Material Inventory Statements

The Hazardous Material Business Plans program mandates the creation of a planning document by businesses and other entities who handle hazardous materials of certain quantities. The Business Plan shall include, among other things, an inventory of hazardous materials, a site location map, emergency plan and training program for their employees. These plans are to be submitted electronically to the California Environmental Reporting System (CERS). The local CUPA agency may be contacted for assistance with preparation of Business Plans. The CUPA will verify this information and provide it to "local emergency responders such as firefighters, health officials, planners, public safety officers, health care providers, regulatory agencies and other interested" parties. This information is prepared in response to Federal community right-to-know laws (CalOES 2017a).

28.1.2.12.2 California Accidental Release Prevention Program

The California Accidental Release Prevention (CalARP) program was developed to assist with prevention of harmful substances releases which could seriously harm the public and/or the environment. Businesses that handle certain quantities of regulated substances are required to prepare a Risk Management Plan (RMP) that includes an engineering analysis of potential accident scenarios with mitigation measures. The mitigation measures, when implemented, would reduce the accident potential at a business. CalARP is implemented at the local government level (CUPA) who work directly with the regulated business (CalOES 2017b):

28.1.2.12.3 California Area Plan Program

The Area Plan Program requires CUPAs to prepare a plan utilizing information from CalARP and HMBP. The Area Plan includes emergency response procedures to minimize impacts from a hazardous material release or threatened release. Provisions for multi-agency coordination and notification during emergency responses are also to be addressed in the Area Plan (CalOES 2017c).

28.1.2.13 California Environmental Quality Act Guidelines

28.1.2.13.1 Greenhouse Gas Emissions

On March 18, 2010, the California Natural Resources Agency (CNRA) adopted amendments to the California Environmental Quality Act (CEQA) Guidelines to include provisions for evaluating the significance of greenhouse gas (GHG) emissions. The amended guidelines give the Lead Agency leeway in determining whether GHG emissions should be evaluated quantitatively or qualitatively but requires that the following factors be considered when assessing the significance of impacts from GHG emissions (Section 15064.4):

- The extent to which the project may increase or reduce GHG emissions as compared to the existing environmental setting
- Whether the project emissions exceed a threshold of significance that the lead agency determines apply to the project
- The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions

The amended guidelines also specify that Lead Agencies must analyze potentially significant impacts associated with placing projects in locations susceptible to hazardous conditions (e.g., floodplains, coastlines, and wildfire risk areas), including those that could be affected by climate change (Section 15126.2(a)).

Furthermore, the guidelines also suggest measures to mitigate GHG emissions, including implementing project features to reduce emissions, obtaining carbon offsets to reduce emissions, or sequestering GHG. Chapter 8, Greenhouse Gas Emissions, analyzes the emissions of GHGs, and these measures would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.13.2 Cultural Resources

CEQA is the central law governing cultural resources at the State level. *CEQA Guidelines* Section 15064.5 states that a project may have a significant impact on the environment if it causes a substantial adverse change in the significance of a historical resource. Pursuant to Section 15064.5(a)(3), a historical resource is a resource that is included in, or eligible for inclusion in, the California Register of Historical Resources (CRHR); a resource listed in a local register of historical resources, as defined in Public Resources Code (PRC) Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be significant. Resources automatically listed in the CRHR are those formally determined eligible for, or listed in, the National Register of Historic Places (NRHP), State Historical Landmarks numbered 770 or higher, and California Points of Historical Interest. If a lead agency determines that a cultural resource constitutes a historical resource, the provisions of PRC Section 21084.1 and CEQA Guidelines Section 15064.5 would apply. If a cultural resource does not meet the criteria for a historical resource, it may yet be regarded as a "unique" archaeological resource (PRC Section 21083.2). CEQA Guidelines Section 15064.5(c)(4) notes that if a resource is neither a unique archaeological resource nor a historical resource, the effects of a project on that resource shall not be considered a significant effect on the environment. Human remains, including those interred outside formal cemeteries, are protected under several State laws, including PRC Section 5097.98 and Health and Safety Code Section 7050.5.

Signed in 2014, Assembly Bill 52 amends CEQA and creates a new category of environmental resource: "tribal cultural resources." These resources are defined as any site, feature, place, cultural landscape, sacred place, or object that has cultural value to a California Native American tribe. The bill further establishes a consultation process with all California Native American tribes listed by the Native American Heritage Commission (NAHC), regardless of their Federal recognition status.

Impacts to cultural resources are analyzed in Chapter 23, Cultural Resource, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.14 California Executive Order S-3-05

On June 1, 2005, former California Governor Arnold Schwarzenegger signed EO S-03-05. This executive order established the following GHG emission reduction targets for California:

- By 2010, reduce GHG emissions to 2000 levels.
- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

The order also requires the Secretary of the California Environmental Protection Agency (CalEPA) to report to the Governor and the State Legislature biannually on progress made toward meeting the GHG emission targets, commencing in January 2006. The Secretary of the CalEPA is also required to report about impacts on water supply, public health, agriculture, the coastline, and forestry.

Mitigation and adaptation plans to combat these impacts must also be developed.

California GHG emissions were estimated to be 446.06 million tonnes (metric tons) of CO_2 (carbon dioxide) equivalent (CO_2e) in 2010, compared to 467.19 million tonnes of CO_2e in 2000 (CARB 2017a). The GHG emissions inventory indicates that emissions decreased by over 21 million tonnes of CO_2e over the decade, representing a 4 percent decrease in statewide emissions. Thus, the State was successful in meeting the first milestone of S-3-05.

Chapter 8, Greenhouse Gas Emissions, analyzes the emissions of GHGs, and these reductions would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.15 California Executive Order B-30-15 and Senate Bill 32

California Governor Edmund G. Brown issued EO B-30-15 to reduce California GHG emissions to 40 percent below 1990 levels by 2030. The order aligns California's GHG reduction targets with the United Nations Climate Change Conference in Paris. In 2016, SB 32 codified the EO B-30-15 target and directed State regulatory agencies to develop rules and regulations to meet the 2030 State target. Chapter 8, Greenhouse Gas Emissions, analyzes the emissions of GHGs, and these rules and regulations would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.16 California Farmland Conservancy Program

The California Farmland Conservancy Program (CFCP) is a voluntary program that seeks to encourage the long-term, private stewardship of agricultural lands through the use of agricultural conservation easements. The CFCP provides grant funding for projects that use and support agricultural conservation easements for protection of agricultural lands. An agricultural conservation easement is a voluntary, legally recorded deed restriction that is placed on a specific property used for agricultural production. The goal of an agricultural conservation easement is to maintain agricultural land in active production by removing the development pressures from the land. Such an easement prohibits practices that would damage or interfere with the agricultural use of the land. Because the easement is a restriction on the deed of the property, the easement remains in effect even when the land changes ownership. Chapter 18, Agricultural Resources, analyzes impacts to agricultural land and this program would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.17 California Fish and Game Code Section 1600, Streambed Alterations

Section 1600 et seq. of the California Fish and Game Code, as administered by CDFW, mandates that "it is unlawful for any person to substantively divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambeds, without first notifying the department of such activity." Streambed alteration must be permitted by CDFW through a Streambed Alteration Agreement. CDFW defines streambeds as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life" and lakes as "natural lakes and man-made reservoirs." CDFW jurisdiction includes ephemeral, intermittent, and perennial watercourses, and can extend to habitats adjacent to watercourses, including flood plains. Wetlands near watercourses would also be considered "habitats adjacent to watercourses." A Lake and Streambed Alteration Agreement application may need to be submitted under the Crest Raise Alternative for construction actions disturbing the bed and bank of rivers or reservoirs. Impacts to streambed and lakes are analyzed in Chapter 15, Terrestrial Resources, and this code would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.18 California Fish and Game Code Sections 3500 - 3705, Migratory Bird Protection

Sections 3500 through 3705 of the California Fish and Game Code regulate the taking of migratory birds and their nests. These codes prohibit the taking of nesting birds, their nests, eggs, or any portion thereof during the nesting season. Typically, the breeding/nesting season is from March 1 through August 30. Depending on each year's seasonal factors, the breeding season can start earlier and/or end later. Several species of migratory birds are known to occur in the area of analysis. Impacts to migratory birds are analyzed in Chapter 15, Terrestrial Resources, and this code would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.19 California Global Warming Solutions Act of 2006 (Assembly Bill 32)

California Assembly Bill (AB) 32, the Global Warming Solutions Act of 2006, codifies the state's GHG emissions targets by requiring the state's global warming emissions to be reduced to 1990 levels by 2020 and directs CARB to enforce the statewide cap that began to phase in during 2012. In 2007, CARB recommended and adopted a 1990 GHG emissions level and 2020 emissions limit of 427 million metric tons CO_2e ($MMTCO_2e$); however, this limit has subsequently been updated to 431 $MMTCO_2e$ using the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report global warming potentials (GWPs) (CARB 2017b). The limit is a statewide limit and does not require individual sectors or facilities to reduce emissions equally.

Key AB 32 milestones are as follows (CARB 2014a):

- January 1, 2009 – Scoping Plan adopted indicating how emissions will be achieved from significant sources of GHGs via regulations, market mechanisms, and other actions.

- During 2009 – CARB staff drafted rule language to implement its plan and held a series of public workshops on each measure (including market mechanisms).
- January 1, 2010 – Early action measures took effect.
- During 2010 – CARB conducted series of rulemakings, after workshops and public hearings, to adopt GHG regulations, including rules governing market mechanisms.
- January 1, 2011 – Completion of major rulemakings for reducing GHGs, including market mechanisms.
- January 1, 2012 – GHG rules and market mechanisms adopted by CARB and are legally enforceable.
- November 14, 2012 – CARB held first quarterly auction of GHG emissions allowances as part of the cap-and-trade program.
- January 1, 2013 – Cap-and-trade program began with a GHG emissions cap that declines over time.
- September 17, 2013 – CARB issued first carbon offset credits as part of the cap-and-trade program.
- May 22, 2014 – CARB approved First Update to the Climate Change Scoping Plan.
- December 31, 2020 – Deadline for achieving 2020 GHG emissions cap.

CARB has been proactive in its implementation of AB 32 and has met each of the milestones identified above that have already passed and is on track to meet the last milestone. Chapter 8, Greenhouse Gas Emissions, analyzes the emissions of GHGs, and these milestones would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.19.1 Scoping Plan

The initial Scoping Plan (CARB 2008) provides a framework for the State’s strategy to reduce GHG emissions to 1990 levels by 2020. This reduction goal means reducing GHG emissions by approximately 30 percent from business-as-usual emission levels projected for 2020 or approximately 15 percent from 2005 levels. Key features of the State’s plan for reducing emissions include six main recommendations:

- Expand and strengthen existing energy efficiency programs and building and appliance standards
- Achieve a statewide renewables energy mix of 33 percent
- Develop a cap-and-trade program that links other partner programs to create a regional market system

- Establish targets for transportation-related GHG emissions for regions throughout the State, and pursue policies and incentives to achieve those targets
- Adopt and implement measures, including California's clean car standards, goods movement measures, and the low carbon fuel standard
- Create targeted fees to fund the administrative costs of the State's long-term commitment to AB 32 implementation

The Scoping Plan recommends 39 measures that would achieve an emissions reduction of 174 $MMTCO_2e$/year if fully implemented. The recommended measures cover nine sectors: 1) transportation, 2) electricity and natural gas, 3) green buildings, 4) water, 5) industry, 6) recycling and waste management, 7) forests, 8) high GWP gases[4], and 9) agriculture. Additionally, nine discrete early actions were adopted to reduce GHG emissions.

The First Update to the Climate Change Scoping Plan (CARB 2014b) builds on the 2008 Scoping Plan by identifying the next steps that are required to meet the State's emission reductions beyond 2020 (i.e., 80 percent below 1990 levels by 2050). The update adjusts the 2020 statewide limit to 431 $MMTCO_2e$ to reflect updated GWPs.

In November 2017, CARB finalized *California's 2017 Climate Change Scoping Plan* to describe potential policies that could be implemented to achieve the 2030 target established by EO B-30-15 (CARB 2017c).

28.1.2.20 California Integrated Waste Management Act

To minimize the amount of solid waste that must be disposed of by transformation and land disposal, the California Legislature passed the California Integrated Waste Management Act (CIWMA) of 1989 (AB 939), effective January 1990. According to the CIWMA, all cities and counties were required to divert 25 percent of all solid waste from landfill facilities by January 1, 1995 and 50 percent by January 1, 2000. Each city is required to develop solid waste plans demonstrating integration of the CIWMA plan with the county plan. Provisions in the law are focused on source reduction, recycling and composting, and environmentally safe transformation and land disposal (CalRecycle 2017b). Impacts to solid waste are analyzed in Chapter 22, Public Utilities, Services, and Power, and the requirements would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.21 California LESA Model

Similar to the Federal Land Evaluation & Site Assessment Model (LESA) system, the California LESA model was developed in 1997 to provide Lead Agencies with an optional methodology to ensure that significant effects associated with agricultural land conversions are fully considered in the

[4] GWP is a metric that measure how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to 1 ton of CO_2.

environmental review process. The California LESA model is used to determine a project's potential significance by evaluating the project size, soil quality, water resource availability, and surrounding agricultural and protected resource lands. Chapter 18, Agricultural Resources, analyzes impacts to agricultural land and this model would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.22 California Occupational Safety and Health Administration Standards

The California Occupational Safety and Health Administration (CalOSHA) enforces laws and regulations related to the safety and health of workers in the workplace. Laws and regulations enforced by CalOSHA include regulations related to construction and handling of carcinogens and asbestos (CalOSHA 2017). Chapter 13, Hazards and Hazardous Materials, analyzes hazardous waste and these standards would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.23 California Natural Resources Agency

Under Executive Order B-10-11 it is policy that every state agency and Department subject to executive control to implement effective government-to-government consultation with California Indian Tribes. The purpose of California Natural Resources Agency Tribal Consultation Policy is to ensure effective government-to-government consultation between the Natural Resources Agency, its Departments of the Natural Resources Agency and Indian tribes and tribal communities. It is only by engaging in open, inclusive and regular communication efforts that the interests of California's Tribes and tribal communities will be recognized and understood in the larger context of complex decision-making. The goal of the policy is to engage in the timely and active process of respectfully seeking, discussing and considering the views of California Indian Tribes, Tribal communities and Tribal Consortia in an effort to resolve concerns of as many parties as possible. As detailed in Chapter 23, Cultural Resources, in coordination with Reclamation, DWR is consulting with Native American tribal representatives identified by the NAHC in accordance with CEQA, EO B-10-11, and AB 52, DWR tribal policy and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.24 California Office of Historic Preservation

The California Office of Historic Preservation (OHP) implements the policies of the NHPA on a Statewide level and maintains the State Historic Resources Inventory database. The State Historic Preservation Officer (SHPO) is responsible for the operation and management of the OHP and implements historic preservation programs within the State's jurisdiction while serving as a consulting party in the Federal process described above. Impacts to cultural resources are analyzed in Chapter 23, Cultural Resource, and would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.25 California Porter-Cologne Water Quality Control Act

The California Porter-Cologne Water Quality Act (Porter-Cologne Act) was enacted in 1969 and established the SWRCB. The Porter-Cologne Act defines water quality objectives as the limits or levels of water constituents that are established for reasonable protection of beneficial uses, described in detail in Chapter 4, Water Quality. Unlike the CWA, the Porter-Cologne Act applies to both surface and groundwater. The Porter-Cologne Act requires that each of nine semi-autonomous RWQCB establish water quality objectives, while acknowledging that water quality may be changed to some degree without unreasonably affecting beneficial uses. Beneficial uses, together with the corresponding water quality objectives, are defined as standards, per Federal CWA regulations. Therefore, the regional plans provide the regulatory framework for meeting State and Federal requirements for water quality control. Changes in water quality are only allowed if the change is consistent with the most restrictive beneficial use designation identified by the State, does not unreasonably affect the present or anticipated beneficial uses, and does not result in water quality less than that prescribed in the Regional Water Quality Control Plans (Basin Plans) (SWRCB 2017a). Impacts to water quality and beneficial uses are analyzed in Chapter 4, Water Quality, and the requirements would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.25.1 State Water Resources Control Board Decision 1641

SWRCB Decision-1641 presents the current water right requirements to implement the Delta flow-dependent objectives. In SWRCB Decision-1641, the SWRCB assigned responsibilities to Reclamation and DWR for meeting these requirements. These responsibilities require that the CVP and the SWP be operated to protect water quality, and that DWR and/or Reclamation will ensure that the flow dependent water quality objectives are met in the Delta (SWRCB 2000).

28.1.2.26 California Public Utilities Commission

The California Public Utilities Commission (CPUC) is a regulatory body overseeing privately owned electric, natural gas, telecommunications, water, railroad, rail transit and passenger transportation companies since 1912. The CPUC ensures the provision of safe, reliable utility service and infrastructure to consumers (CPUC 2017). The CPUC is responsible for ensuring that electric utilities meet the State's Renewable Portfolio Standard; administering gas-related conservation programs; and ensuring water utilities meet all Federal and State water quality standards (CPUC 2013). Impacts to utilities are analyzed in Chapter 22, Public Utilities, Services, and Power, and the standards would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.27 California State Park Guidelines

The California State Parks system does not have regulations regarding noise impacts on campgrounds. For CEQA purposes, the park system defines significant adverse noise impacts as an increase above background that would be clearly discernible and objectionable to park users (California Department of

Parks and Recreation [CDPR] 2006). Noise impacts on campgrounds are analyzed in Chapter 11, Noise and Vibration, and these guidelines would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.28 California Water Code, Water Rights

The California Water Code defines the types of water rights recognized by the State, beneficial uses, and rules on the powers and responsibilities of the SWRCB. Rules pertaining to water law are found in Title 23, Sections 640 to 1024. After the enactment of the State Water Commission Act in 1914, the State required any person or agency seeking to use surface water, without an existing riparian right, to apply for and receive approval for such use from the SWRCB. Water rights permits granted by the SWRCB include detailed descriptions of the amounts, conditions, and construction timetables under which the proposed water project must comply. Prior to permit issuance, the SWRCB must take into account all prior rights and the availability of water in the basin. The SWRCB must also consider the flows needed to preserve instream uses such as recreation and fish and wildlife habitat. The SWRCB may impose additional conditions to ensure that these criteria are satisfied and it may use its continuing authority to enforce and revise the conditions of water right permits over time. The SWRCB is also empowered to revoke a permit or issue cease and desist orders if conditions of the permit are not being met. Impacts to water rights are analyzed in Chapter 5, Surface Water Supply, and these rules would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.29 California Water Code, Groundwater

Groundwater use is subject to statewide regulation; additionally, all water use in California is subject to constitutional provisions that prohibit waste and unreasonable use of water. Impacts to groundwater use are analyzed in Chapter 6, Groundwater, and these requirements would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.29.1 Section 10750 or Assembly Bill 3030

Assembly Bill 3030 (AB3030), commonly referred to as the Groundwater Management Act permits local agencies to develop groundwater management plans. Subsequent legislation has further amended the Water Code to make the adoption of a management program mandatory if an agency is to receive public funding for groundwater projects, creating an incentive for the development and implementation of plans.

28.1.2.29.2 Section 10753.7 or Senate Bill 1938

Senate Bill 1938 (SB 1938), requires local agencies seeking State funds for groundwater construction or groundwater quality projects to have the following: (1) a developed and implemented groundwater management plan that includes basin management objectives[5] (BMOs) and addresses the monitoring and

[5] BMOs are management tools that define the acceptable range of groundwater levels, groundwater quality, and inelastic land subsidence that can occur in a local area without causing significant adverse impacts.

management of groundwater levels, groundwater quality degradation, inelastic land subsidence, and surface water/groundwater interaction; (2) a plan addressing cooperation and working relationships with other public entities; (3) a map showing the groundwater subbasin the project is in, neighboring local agencies, and the area subject to the groundwater management plan; (4) protocols for the monitoring of groundwater levels, groundwater quality, inelastic land subsidence, and groundwater/surface water interaction; and (5) groundwater management plans with the components listed above for local agencies outside the groundwater subbasins delineated by Bulletin 118 (DWR 2003).

28.1.2.29.3 Section 10920-10936 and 12924 or Senate Bill X7 6

Senate Bill X7 6 (SBX7 6), established a voluntary statewide groundwater monitoring program and requires that groundwater data collected be made readily available to the public. The bill requires DWR to: (1) develop a statewide groundwater level monitoring program to track seasonal and long-term trends in groundwater elevation; (2) conduct an investigation of the state's groundwater basins delineated by Bulletin 118 and report its findings to the Governor and Legislature no later than January 1,2012 and thereafter in years ending in five or zero; and (3) work cooperatively with local Monitoring Entities to regularly and systematically monitor groundwater elevation to demonstrate seasonal and long-term trends. Assembly Bill 1152 (AB 1152), Amendment to Water Code Sections 10927, 10932 and 10933, allows local Monitoring Entities to propose alternate monitoring techniques for basins meeting certain conditions and requires submittal of a monitoring plan to DWR for evaluation. Santa Clara Valley Water District (SCVWD) is the designated monitoring entity for the Santa Clara Valley and Llagas Area subbasin (DWR 2013).

28.1.2.29.7 Section 10722.2 or Basin Boundary Emergency Regulation

Senate Bill 1168 (SB 1168) established a procedure for local agencies to request adjustment of basin boundaries identified in Bulletin 118. Boundary modification can be requested based on geologic or hydrologic criteria (scientific modification) or to promote sustainable groundwater management (jurisdictional modification). The Basin Boundary Emergency Regulation specifies the information a local agency is required to provide for the requested boundary adjustment and the procedure for the modification request and public input (DWR 2015).

28.1.2.29.8 Section 10722.4 and 10730 or Assembly Bill 939

Assembly Bill 939 (AB 939) authorizes a GSA to impose fees to fund the GSP and requires the GSA to hold at least one public meeting prior to imposing the fee or increasing the same. The GSA is required to make the data upon which the proposed fee is based available to the public at least 10 days prior to the public meeting (Salas 2015).

28.1.2.29.9 Section 10540, 10721, 10727.4, 10727.8, 10733.4, 10726.5 and 10732.2 or Assembly Bill 617

Assembly Bill 617 (AB 617) requires measures addressing in-lieu use to be included in the groundwater sustainability plan. This bill also requires groundwater sustainability planning to be incorporated into the integrated regional water management plan (Perea 2015).

28.1.2.29.10 Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA) is a three-bill package consisting of Senate Bill 1168, Assembly Bill 1739, and Senate Bill 1319 and resulted in newly added statutory provisions in the California Water Code.

Section 10927, 10933, 12924, 10750.1 and 10720 or Senate Bill 1168

SB 1168 requires the establishment of Groundwater Sustainability Agencies (GSA) and adoption of Groundwater Sustainability Plans (GSP). GSAs must be formed by June 30, 2017. GSAs are new entities that consist of local agency(ies) and include new authority to: 1) investigate and determine the sustainable yield of a groundwater basin; 2) regulate groundwater extractions; 3) impose fees for groundwater management; 4) require registration of groundwater extraction facilities; 5) require groundwater extraction facilities to use flow measurement devices; and 6) enforce the terms of a GSP.

Additionally, this bill requires groundwater basins to be prioritized as high-, medium-, low- or very low- with respect to groundwater conditions, adverse impacts on local habitat and adverse impacts on local stream flow no later than January 31, 2015. DWR has determined that the initial basin prioritization developed in June 2014 will be the prioritization adopted under this legislation. DWR has identified and finalized 21 basins/subbasins with critical overdraft conditions as of January 2016.

GSPs for groundwater basins designated by DWR as high- and medium-priority with critical overdraft conditions (per SB X7 6) are required to be developed by January 31, 2020. GSPs for the remaining high- and medium-priority groundwater basins are to be developed by January 31, 2022. GSPs are encouraged to be developed for groundwater basins prioritized as low- or very low-priority (Pavley 2014a). All high- and medium-priority basins must achieve sustainability within 20 years of adopting a GSP.

Section 10729, 10730, 10732, 10733 and 10735 or Assembly Bill 1739

Assembly Bill 1739 (AB 1739) establishes the following: (1) provides the specific authorities to a GSA (as defined by SB 1168); (2) requires DWR to publish best management practices for the sustainable management of groundwater by January 1, 2017; and (3) requires DWR to estimate and report the amount of water available for groundwater replenishment by December 31,

2016. The bill authorizes DWR to approve and periodically review all GSPs (Dickinson 2014).

The bill authorizes the SWRCB to: (1) conduct inspections and obtain an inspection warrant; (2) designate a groundwater basin as a probationary groundwater basin; (3) develop interim plans for probationary groundwater basins in consultation with DWR if the local agency fails to remedy a deficiency resulting in the designation of probationary; and (4) issue cease and desist orders or violations of restrictions, limitations, orders, or regulations issued under AB 1739 (Dickinson 2014).

Section 10735.2 and 10735.8 or Senate Bill 1319

Senate Bill 1319 (SB 1319) authorizes the SWRCB to designate high- and medium-priority basins (defined by SB 1168) as a probationary basin after January 31, 2025. This bill allows the SWRCB to develop interim management plans that may override a local agency. However, if the appointed GSA can demonstrate compliance with sustainability goals for the basin, then the SWRCB has to exclude the groundwater basin or a portion of the groundwater basin from probationary status (Pavley 2014b).

Per Senate Bill 13 (SB 13) the local agency or GSA has a 90-180 day window to remedy certain deficiencies that caused the SWRCB to designate a basin as probationary. The SWRCB could develop an interim plan for certain probationary basins one year after the designation (Pavley 2015).

28.1.2.29 California Water Plan

The California Water Plan is the State's strategic plan for sustainably managing and developing water resources for current and future generations. Required by Water Code Section 10005(a), it presents the status and trends of California's water-dependent natural resources; water supplies; and agricultural, urban, and environmental water demands for a range of plausible future scenarios. The plan is updated every 5 years and provides a way for various groups to collaborate on findings and recommendations and make informed decisions regarding California's water future.

28.1.2.30 Farmland Mapping and Monitoring Program

The Farmland Mapping and Monitoring Program (FMMP) was established in California in 1982 and provides maps and statistical data for analyzing potential impacts on agricultural resources within the State. The FMMP provides agricultural resource maps based on soil quality and land use and irrigation status. These maps are updated every two years with information gathered from aerial imagery, a computer mapping system, public review, and field reconnaissance. Chapter 18, Agricultural Resources, analyzes impacts to agricultural resources and this program would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.31 Hazardous Waste Control Act

The Hazardous Waste Control Act (HWCA) was passed in 1972 by the State Legislature. The Hazardous Waste Control Law (Health and Safety Code sections 25100 et seq.) mandates regulatory standards for the generation, handling, processing, storage, transportation, and disposal of hazardous wastes through a “cradle to grave” system. The California Department of Toxic Substances Control (DTSC) and local CUPAs are responsible for administration of the California Hazardous Waste Control Program (DTSC 2015). Chapter 13, Hazards and Hazardous Materials, analyzes hazardous waste and these standards would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.32 Natural Community Conservation Planning Program

CDFW’s Natural Community Conservation Planning (NCCP) program is an effort by the State of California, and numerous private and public partners, that takes a broad-based ecosystem approach to planning for the protection and perpetuation of biological diversity. The NCCP program began in 1991 as a cooperative effort to protect habitats and species. These laws are designed to identify and protect individual species that have already declined in number significantly. An NCCP identifies and provides for the regional protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. Chapter 17, Land Use, analyzes impacts to NCCP conservation plans and this program would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.33 Pacheco State Park General Plan

The Pacheco SP is owned and managed by CDPR. The CDPR approved the *Pacheco SP General Plan* on May 12, 2006 (CDPR 2006). Impacts to recreation are analyzed in Chapter 19, Recreation, and the goals in the Pacheco SP General Plan would apply to all of the alternatives evaluated in this EIS/EIR. Goals listed within the general plan that are relevant to this analysis are:

- Goal VIS-F1 - Provide visitor facilities that enhance enjoyment of the site’s history and character and avoid resource degradation.
- Goal VIS-T1 - Ensure that trails are designed and used to preserve natural resources and provide optimum visitor experience.
- Goal VIS-T2 - Provide a variety of trail experiences for a variety of trail users.
- Goal VIS-T3 - Provide an appropriate amount of trails in a variety of locations throughout the park.

- Goal REG-D1 - Incorporate visitor use data and regional population and demographic information in planning and construction projects at the Park.

28.1.2.34 Noise Element Guidelines

The State of California also provides guidance for the preparation of general plans and noise ordinances. In 1976, the State Department of Health Services (now the Department of Public Health) issued *Noise Element Guidelines* (Health and Safety Code §46050.1). In 1977, the State Office of Noise Control (ONC) published a model noise ordinance and mandated that each county develop a noise element as part of its general plan (Section 65203[f] of the California Government Code). The purpose of this element is to identify and appraise noise problems in the community. The ONC's model ordinance recommends limits on temporary construction noise levels and operational noise levels in residential, commercial, and industrial areas.

The State's *General Plan Guidelines* recommend that local governments "'analyze and quantify' noise levels and the extent of noise exposure through actual measurement and the use of noise modeling." In addition to other requirements, the guidelines state that "technical data relating to mobile and point sources must be collected and synthesized into a set of noise control policies and programs that 'minimizes the exposure of community residents to excessive noise'" (California Governor's Office of Planning and Research [OPR] 2003).

As part of the county-level planning process, analysis of existing conditions and community tolerance for noise are used to dictate the normally acceptable community noise exposure. Measured in dBA, a normally acceptable community noise exposure is used by the State to signify satisfactory land use in relation to noise exposure. Other terms used by the State to analyze community noise exposure are:

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

- **Conditionally Acceptable -** New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

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

- **Clearly Unacceptable -** New construction or development should generally not be undertaken.

Table 28-3 displays land use categories and community noise exposure levels.

Table 28-3. Noise Compatible Land Use Planning

Land Use	Normally Acceptable L_{dn} or CNEL (dBA) [1]	Conditionally Acceptable L_{dn} or CNEL (dBA) [1]	Normally Unacceptable L_{dn} or CNEL (dBA) [1]	Clearly Unacceptable L_{dn} or CNEL (dBA) [1]
Residential – Low Density Single Family, Duplex, Mobile Homes	50-60	55-70	70-75	75+
Residential – Multi Family	50-65	60-70	70-75	75+
Transient Lodging – Motels, Hotels	50-65	60-70	70-80	80+
Schools, Libraries, Churches, Hospitals, Nursing Homes	50-70	60-70	70-80	80+
Auditoriums, Concert Halls, Amphitheaters	N/A	50-70	N/A	65+
Sports Arena, Outdoor Spectator Sports	N/A	50-75	N/A	70+
Playgrounds, Neighborhood Parks	50-70	N/A	67-75	72+
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50-75	N/A	70-80	80+
Office Buildings, Business Commercial and Professional	50-70	67-77	75+	N/A
Industrial, Manufacturing, Utilities, Agriculture	50-75	70-80	75+	N/A

Source: OPR 2003.

Note:

[1] Ranges in the community noise exposure levels (and any subsequent overlaps in the different categories) reflect the differing noise goals of a community, the community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution (OPR 2003).

Key:

CNEL = Community Noise Equivalent Level

dBA = A-weighted decibel scale

L_{dn} = day-night average level

N/A – = Not Applicable

Construction and operation noise levels are analyzed in Chapter 11, Noise and Vibration, and these guidelines would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.35 Regional Water Quality Control Plans

The California Water Code (Section 13240) requires the preparation and adoption of Basin Plans, and the Federal CWA (Section 303) supports this requirement. According to Section 13050 of the California Water Code, Basin Plans consist of a designation or establishment for the waters within a specified area of beneficial uses to be protected, water quality objectives to protect those uses, and an implementation program needed for achieving the objectives. State law also requires that Basin Plans conform to the policies set forth in the Water Code, beginning with Section 13000, and any State policy for water quality control. The Basin Plans are regulatory references for meeting the State and Federal requirements for water quality control (40 Code Federal Regulations 131.20).

Basin Plans are adopted and amended by nine regional water boards under a structured process involving full public participation and State environmental review. Basin Plans and amendments thereto do not become effective until approved by the SWRCB. Regulatory provisions must be approved by the Office of Administrative Law. Adoption or revision of surface water standards is subject to the approval of the USEPA.

Basin Plans complement other Water Quality Control Plans adopted by the SWRCB, such as the Water Quality Control Plan for Temperature Control and Ocean Waters. The SWRCB and the regional water boards maintain each Basin Plan in an updated and readily available edition that reflects the current water quality control programs.

Three different Water Quality Control Plans govern water bodies within the B.F. Sisk Dam SOD Project area of analysis.

- The *Central Valley Region Basin Plan* covers the drainage areas of the entire Sacramento and San Joaquin river basins, involving an area bound by the crests of the Sierra Nevada on the east and the Coast Range and Klamath Mountains on the west. The area covered in this WQCP extends some 400 miles, from the California – Oregon border to the headwaters of the San Joaquin River.

- *San Francisco Bay/Sacramento-San Joaquin Delta Estuary Plan* establishes water quality objectives for water bodies within the region in order to protect beneficial uses. The WQCP includes beneficial uses to be protected, water quality objectives, and a program to help achieve the water quality objectives. This plan supplements other water quality control plans, by the SWRCB and RWQCBs, relevant to the Bay-Delta Estuary watershed. These other plans and policies establish water quality standards and requirements for parameters such as toxic chemicals, bacterial contamination, and other factors which have the potential to adversely affect beneficial uses or cause nuisance conditions (SWRCB 2006).

- *Water Quality Control Plan for the Tulare Lake Basin* covers the drainage area of the San Joaquin Valley south of the San Joaquin River. The Basin encompasses approximately 10.5 million acres, of which approximately 3.25 million acres are in federal ownership (SWRCB 2015). The WQCP includes existing and potential beneficial uses, water quality objectives, and an implementation plan.

Impacts to water quality are analyzed in Chapter 4, Water Quality, and the plans would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.36 San Luis Reservoir State Recreation Area Resource Management Plan/ General Plan

Through an agreement between Reclamation and CDPR, a Resource Management Plan (RMP)/General Plan (GP) was prepared for the San Luis Reservoir State Recreation Area (SRA) and adjoining Reclamation land (Reclamation and CDPR 2013). These areas are managed by State agencies including CDPR, California Department of Water Resources, California Department of Fish and Wildlife, and Reclamation.

28.1.2.36.1 Visual Resources

Elements of the plan include limiting areas of future development and avoiding environmentally sensitive areas. Chapter 10, Visual Resources, analyzes aesthetics and these elements would apply to all of the alternatives evaluated in this EIS/EIR. The aesthetic resource goals of the plan include:

- Preserve scenic vistas that overlook open land and water through the identification and definition of significant vista points and viewsheds (Goal RES-S1).
- Maintain large expanses of open space free of visual and physical interruptions (Goal RES-S2).
- Make new structures architecturally compatible with their use as recreation facilities and distinguishable from the water operations structures but in keeping with overall site character (Goal RES-S3).
- Identify a common and unified set of site-related details and materials (signage, gates, surface materials, fences, etc.) so that new facilities and infrastructure are compatible with the character of the site and are distinctive for recreation facilities (Goal RES-S4).
- Prevent aesthetic and environmental damage from duration and intensity of lighting and fixtures (Goal RES-S5).

28.1.2.36.2 Terrestrial Resources

The San Luis Reservoir SRA RMP/GP sets forth the following goals for the protection, management, and restoration of vegetation and wildlife. Impacts to vegetation and wildlife are analyzed in Chapter 15, Terrestrial Resources, and these goals would apply to all of the alternatives evaluated in this EIS/EIR.

- Vegetation Goal RES-V1: Protect, maintain, and, where appropriate, restore the site’s locally and regionally important native plant communities.

- Vegetation Goal RES-V2: Document and protect special-status plants and communities and manage for their perpetuation and enhancement.
- Vegetation Goal RES-V3: Control invasive and non-native species.
- Vegetation Goal RES-V4: Restore the project area's native grasslands through the use of best management practices.
- Wildlife Goal RES-W1: Maintain, protect, and enhance wildlife habitat for common, sensitive, and special-status wildlife species.

28.1.2.36.3 Recreation

The SRA RMP/GP identifies a series of policies in the form of goals and guidelines. Impacts to recreation are analyzed in Chapter 19, Recreation, and the goals and guidelines in the SRA RMP/GP would apply to all of the alternatives evaluated in this EIS/EIR. Goals and guidelines related to recreation include:

- Goal VIS-F1 - Maintain and provide new visitor facilities and uses that enhance recreational enjoyment of the site's history and character while avoiding resource degradation.
  - Plan for recreational opportunities within a regional context and in coordination with other plans (e.g., the Millerton Lake Resource Management Plan, Pacheco State Park, Hollister Hills State Vehicular Recreation Area, and Merced County and Santa Clara County parks) so that facilities are balanced within the region and are compatible with the location and resources.
  - Provide for a variety of day-use activities and overnight camping facilities that accommodate visitors of varying abilities.
- Goal VIS-F2 - Provide adequate shoreline and upland support facilities and management at each reservoir and use area to address current and future demand for permitted recreational uses, consistent with management zones and natural and cultural resource goals and guidelines.
  - Ensure that campground and day use additions and improvements respond to and are prioritized based on user demand.
- Goal VIS-F3 - Manage water surfaces and use areas to accommodate a variety of different user groups and minimize resource degradation and conflicts among users.

  - Resolve water surface use conflicts using a variety of methods, such as but not limited to seasonal and time-of-day restrictions and “no wake” or “reduced speed” zones.

  - Optimize and coordinate water and land based recreational uses by development of a boating management plan.

- Goal VIS-T1 - Provide an appropriate amount and variety of trails in a range of locations throughout the Plan Area as well as improved connectivity from existing trails.

  - Maintain a system of multi-use trails to meet visitor demand.

- Goal VIS-T2 - Balance the optimum visitor experience while avoiding habitat fragmentation or other site degradation.

  - Use BMPs to maintain trails and minimize erosion.

28.1.2.36.4 Public Utilities, Services, and Power

Section 4.2.4.4 of the plan includes a guideline to identify other utility needs and implement utility improvements comprehensively to avoid unnecessary site disturbance and expensive rerouting of utility corridors and junctions over time. Section 4.2.4.5 establishes goals and guidelines for the implementation and use of renewable energy including solar for future improvements, maintenance and operations. In addition, approximately 1,200 acres of Federally-owned land is being considered for development of renewable energy resources (Reclamation and CDPR 2013). Impacts to utilities are analyzed in Chapter 22, Public Utilities, Services, and Power, and the goals and guidelines in the SRA RMP/GP would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.37 Seismic Hazards Mapping Act

The 1990 Seismic Hazards Mapping Act (California Public Resources Code [PRC] Section 2690-2699.6) was enacted to minimize loss of life and property from strong ground shaking, liquefaction, landslides, or other ground failures as a result of earthquakes. The Act requires the California Geological Survey (CGS) to identify and map areas with the potential for liquefaction, landslides, or ground shaking. These maps are used by cities and counties in their land use permitting process and to adequately prepare the safety element of their general plans (CGS 1991). Permits for development projects are not issued until geologic investigations have been completed and mitigation has been developed to address any seismic hazard issues. Impacts to seismic safety under the Seismic Hazards Mapping Act are analyzed in Chapter 25, Geology, Seismicity, and Soils, and would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.38 State Scenic Highway Program

California's Scenic Highway Program was created by the Legislature in 1963. Applicable State regulations protecting visual resources stem from the protection of State scenic highways running through or near the project area. There are two officially designated State scenic highway, State Route (SR) 152 and Interstate 5 (I-5) from SR 152 to SR 205 near the City of Tracy, in the area of analysis (Caltrans 2011). Caltrans has full control and possession of all State highways, and the Scenic Highway Program is under their stewardship as well. Scenic highway legislation establishes the State's responsibility to protect and enhance California's scenic beauty by identifying portions of the State highway system and adjacent scenic corridors, which require special conservation treatment. The legislation also assigns responsibility for regulating land use and development along scenic highways to the appropriate local governmental agencies (Caltrans 2008). Chapter 10, Visual Resources, analyzes impacts to scenic highways and this program would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.2.39 State Water Resource Control Board Hazardous Waste Programs

The California SWRCB is responsible for several programs related to cleanup and management of hazardous waste sites in California including: the Site Cleanup Program, UST Program, Department of Defense Program, and Land Disposal (SWRCB 2017b). All of these programs are administered by the Central Valley RWQCB in Merced County (SWRCB 2013). The Cleanup Program regulates unauthorized releases to soils and groundwater, and in some cases surface waters or sediments. The purpose of the UST Program is to "protect public health and safety and the environment from releases of petroleum and other hazardous substances from tanks." The Land Disposal program regulates the discharge of waste "to land for treatment, storage and disposal" (SWRCB 2017b). Chapter 13, Hazards and Hazardous Materials, analyzes hazardous waste and this program would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.2.40 Surface Mining and Reclamation Act of 1975

The Surface Mining and Reclamation Act (SMARA) of 1975 (Public Resources Code, Division 2, Chapter 9, § 2710 et. seq.) addresses surface mining and requires mitigation to reduce adverse impacts to public health, property, and the environment. Through the law, the State Geologist instated mineral land classifications to help identify and protect mineral resources in the State that may be subject to urban development pressures or other "irreversible land uses" which would inhibit mineral extraction (California Department of Conservation [DOC], State Mining and Geology Board [SMGB] and Division of Mines and Geology Nd.). Following classification by the State Geologist, the SMGB designates lands containing mineral deposits as being of regional or statewide significance (California DOC, SMGB and Division of Mines and Geology Nd.).

The SMARA applies to anyone (including a government agency) that disturbs more than one acre or removes more than 1,000 cubic yards of material through surface mining activities, even if activities occur on Federally managed lands

(California DOC, Office of Mine Reclamation 2007). Local city and county Lead Agencies are required to develop ordinances for permitting that provide the regulatory framework for mining and reclamation activities. The SMGB reviews Lead Agency ordinances to ensure they comply with SMARA (California DOC, Office of Mine Reclamation 2007).

The SMARA regulations, Article 2, describes areas designated as having regional significance due to the presence of mineral resources. Construction aggregate resources in the South San Francisco Bay Region are identified in Article 2 (§3550.10). There are no areas designated as having regional mineral significance within the area where construction of the alternatives would take place; the closest area is located northeast of Lexington Reservoir, located south of Los Gatos (United States Geological Survey [USGS] 1982). There are no areas in the vicinity of San Luis Reservoir that are mined for aggregate mineral resources or that have been determined to contain minerals of regional, statewide, or multi-community significance (Kohler 2006).

28.1.2.41 Williamson Act

The Williamson Act, formally known as the California Land Conservation Act of 1965, enables local governments to enter into contracts with private landowners for the purpose of promoting the continued use of relevant land for agricultural or related open space use. The Williamson Act empowers local governments to establish “agricultural preserves” consisting of lands devoted to agricultural and other compatible uses. After such preserves are established, the locality may offer the owners of included agricultural land the opportunity to enter into annually renewable contracts that restrict the land to agricultural or open space use for a minimum of 10 years.

The Williamson Act was enhanced in 1998 with the Farmland Security Zones (FSZs; also known as Super Williamson Act lands) provisions. These provisions offer a minimum 20-year contract and must be located in an “agricultural preserve” and designated as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance. Chapter 18, Agricultural Resources, analyzes impacts to farmland and these provisions would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.3 Local/Regional Requirements

28.1.3.1 California Department of Water Resources, San Luis Division

The San Luis Field Division of the DWR Emergency Action Plan details response plans for emergencies at all DWR reservoirs in the division including San Luis Reservoir. The Emergency Action Plan describes procedures for emergency response to different types of emergencies including hazardous materials spills. The plan includes procedures for the containment and reporting of spills. The plan also details assistance to operators available from outside emergency responders (DWR 2006). Outside emergency responders may include Merced County Fire Department and CalFire. Chapter 13, Hazards and

Hazardous Materials, analyzes emergency response and these plans would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.3.2 Merced County Code

28.13.2.1 Noise

The Merced County Code (Section 10.60.030) sets sound level limitations for the county. General limitations state that no sound source should exceed the background sound level at the receiving property line by 10 dBA or more during the daytime hours (7 a.m. to 10 p.m.) and by 5 dBA or more during the nighttime hours (10 p.m. to 7 a.m.). The maximum permissible sound levels for residential property are 65 dBA L_{dn} or 75 dBA L_{max}. The maximum permissible sound levels for property other than residential property are 70 dBA L_{dn} or 80 dBA L_{max} (Merced County 2009).

The County's ordinance exempts construction activities, "provided that all construction in or adjacent to urban areas shall be limited to the daytime hours between 7 a.m. and 6 p.m., and all construction equipment shall be properly muffled and maintained." Operation of construction equipment outside of these daytime hours or at any time on a weekend day or legal holiday is prohibited (Merced County 2009).

Construction and operation noise levels are analyzed in Chapter 11, Noise and Vibration, and these limitations would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.13.2.2 Vibration

Section 18.41.090 of the Merced County Code states that no use shall create any disturbing ground vibration based on typical human reaction beyond the boundaries of the site (Merced County 1977).

28.13.2.3 Geology, Seismicity, and Soils

The Merced County Code Title 16, Chapter 16.16 requires construction projects within the county's jurisdiction to follow the International Building Code standards and California State Amendments to the code (Ord. 1856 § 2, 2009). Among other important specifications, the International Building Code includes requirements and standards for geotechnical investigations (Section 1803); excavation, grading, and fill (Section 1804); structural design (Chapter 16); and, earthquake loads (Section 1613).

Chapter 18.43 establishes the county's surface mining and reclamation ordinance. Merced's ordinance was certified in 1997. The purpose of the county's ordinance is to regulate surface mining and reclamation operations consistent with the county general plan and the SMARA at the State level. The county's SMARA ordinance was certified by the SMGB in 1997.

Chapter 18.41 of the county code sets performance standards to ensure compatibility between land uses by limiting such things as fumes, odor, noise, and dust. Section 030 covers dust mitigation from construction activities including clearing, grading, earth moving and other site preparation activities. The ordinance requires the application of water to prevent dust from leaving the project site.

Geotechnical and structural impacts are analyzed in Chapter 25, Geology, Seismicity, and Soils, and the requirements and standards would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.3.3 Merced County Office of Environmental Services

Emergency preparedness, coordination and direction of wide-scale disasters and emergencies are provided by the Merced County Office of Environmental Services (OES). The Merced County OES coordinates planning, response, recovery, and mitigation activities with many partners including incorporated and unincorporated cities, special districts, and some private agencies. The Merced County OES and their partner agencies coordinate and maintain Emergency Operations Plans according to the National Incident Management System for the County. Contained within the Merced County Emergency Operations Plan is guidance for handling and managing large-scale incidents and disasters including public health threats (Merced County 2017). Chapter 13, Hazards and Hazardous Materials, analyzes emergency response and these plans would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.3.4 Merced County General Plan

As required by State law, counties in the project area have developed their own general plans. At a minimum, these documents must address the topics of land use, transportation, housing, conservation, open space, noise, and safety. These documents serve as statements of county goals, policies, standards, and implementation programs for the physical development of a county.

The following goals and policies from the Merced County General Plan are relevant to B.F. Sisk SOD Project resources. The Merced General Plan, adopted in 2013, has established the year 2030 as the plan’s time horizon (Merced County 2013).

28.1.3.4.1 Water Quality

The Water Element contains the following goal and policies related to water quality, which are analyzed in Chapter 4, Water Quality, and would apply to all of the alternatives evaluated in this EIS/EIR.:

Goal W-2: Protect the quality of surface and groundwater resources to meet the needs of all users.

- Policy: Ensure that land uses and development on or near water resources will not impair the quality or productive capacity of these water resources.

- Policy: Prepare updated development regulations, such as best management practices, that prevent adverse effects on water resources from construction and development activities.

- Policy: Encourage the use of natural channels for drainage and flood control to benefit water quality and other natural resource values.

- Policy: Encourage agriculture and urban practices to comply with the requirements of the RWQCB for irrigated lands and confined animal facilities, which mandate agricultural practices that minimize erosion and the generation of contaminated runoff to ground or surface waters by providing assistance and incentives

- Policy: Monitor and enforce provisions of the United States Environmental Protection Agency National Pollution Discharge Elimination System program to control non-point source water pollution.

- Policy: Coordinate with the SWRCB, RWQCB, and other responsible agencies to ensure that sources of water contamination (including boron, salt, selenium and other trace element concentrations) do not enter agricultural or domestic water supplies and will be reduced where water quality is already affected.

28.1.3.4.2 Flood Protection

The Health and Safety Element provides guidance concerning floodplain management, flood emergency response, funding development to finance construction of flood control facilities, flood risk consideration when developing within floodplains, flood control design and construction, public awareness programs and adapting infrastructure to accommodate for climate change. The plan directs that certain high occupancy or critical facilities, such as schools or hospitals should be discouraged in floodplains while open space uses are logical uses of flood prone areas. Impacts to flood management are analyzed in Chapter 9, Flood Protection, and the element would apply to all of the alternatives evaluated in this EIS/EIR. The Health and Safety Element contains the following policy related to flood control:

- Policy: Within areas subject to 100-year and 200-year frequency floods, all public utilities and facilities, such as roads, structures, wastewater treatment plants, gas, electrical and water systems, should be located and constructed to minimize or eliminate flood damage to the facilities.

28.1.3.4.3 Visual Resources

The Natural Resources Element and a Recreation and Cultural Resources Element provide goals and policies for visual resources in the county. Chapter 10, Visual Resources, analyzes impacts to visual resources and these goals and polices would apply to all of the alternatives evaluated in this EIS/EIR. The following policies are relevant to the protection of visual resources in the project area:

- Scenic Resources: Protect scenic resources and vistas (Goal NR-4).
- Scenic Resource Preservation: Promote the preservation of agricultural land, ranch land, and other open space areas as a means of protecting the County's scenic resources (Policy NR-4.1).
- Special Review Process for Structures Adjacent to Scenic Highways: Coordinate with Caltrans, during the review of proposed structures and activities located adjacent to State-designated scenic highways, to ensure that scenic vistas and local scenic values are not significantly degraded (Policy NR-4.2).
- New Roads: Consider the surrounding landscape, topography, and existing scenic values when determining the location and construction of new roads (Policy NR-4.4).
- Light Pollution Reduction: Require good lighting practices, such as the use of specific light fixtures that reduce the light pollution, minimize light impacts, and preserve views of the night sky (Policy NR-4.5).
- Preserve, enhance, expand, and manage Merced County's diverse system of regional parks, trails, recreation areas, and natural resources for the enjoyment of present and future residents and park visitors (Goal RCR-1).
- Scenic Resource and Public Land Protection: Encourage the use of regional parks and open space areas as a mechanism to preserve the County's natural scenic beauty and protect land for public purposes (Policy RCR-1.11).

28.1.3.4.4 Fisheries Resources

The Natural Resources Element sets forth the following goal and policies regarding fisheries resources. Impacts to fish species are analyzed in Chapter 14, Fisheries Resources, and these goals and policies would apply to all of the alternatives evaluated in this EIS/EIR.

Goal NR-1: Preserve and protect, through coordination with the public and private sectors, the biological resources of the County.

- Policy NR-1.1: Habitat Protection- Identify areas that have significant long-term habitat and wetland values including riparian corridors, wetlands, grasslands, rivers and waterways, oak woodlands, and vernal pools, and provide information to landowners.

- Policy NR-1.2: Protected Natural Lands- Identify and support methods to increase the acreage of protected natural lands and special habitats, including but not limited to, wetlands, grasslands, and vernal pools, potentially through the use of conservation easements.

- Policy NR-1.4: Important Vegetative Resource Protection- Minimize the removal of vegetative resources which stabilize slopes, reduce surface water runoff, erosion, and sedimentation.

- Policy NR-1.5: Wetland and Riparian Habitat Buffer- Identify wetlands and riparian habitat areas and designate a buffer zone around each area sufficient to protect them from degradation, encroachment, or loss.

- Policy NR-1.11: On-Going Habitat Protection and Monitoring- Cooperate with local, State, and Federal agencies to ensure that adequate on---going protection and monitoring occurs adjacent to rare and endangered species habitats or within identified significant wetlands.

- Policy NR-1.12: Wetland Avoidance- Avoid or minimize loss of existing wetland resources by careful placement and construction of any necessary new public utilities and facilities, including roads, railroads, high speed rail, sewage disposal ponds, gas lines, electrical lines, and water/wastewater systems.

- Policy NR-1.13: Wetland Setbacks- Require an appropriate setback, to be determined during the development review process, for developed and agricultural uses from the delineated edges of wetlands.

- Policy NR-1.15: Urban Forest Protection and Expansion- Protect existing trees and encourage the planting of new trees in existing communities. Adopt an Oak Woodland Ordinance that requires trees, larger than a specified diameter, that are removed to accommodate development be replaced at a set ratio.

- Policy NR-1.17: Agency Coordination- Coordinate with private, local, State, and Federal agencies to assist in the protection of biological resources and prevention of degradation, encroachment, or loss of resources managed by these agencies.

28.1.3.4.5 Land Use and Agricultural Resources

The action alternative components are located in Merced County on lands that fall within the Foothill Pasture land use designation. This designation is applied to lands in Merced County that support non-cultivated agricultural practices over larger areas with poor soil quality, limited water availability, and steeper slopes. Chapter 17, Land Use, analyzes impacts to land use and Chapter 18, Agricultural Resources, analyzes impacts to agricultural resources and land use polices would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative. Specific land use policies included in the General Plan for this designation include:

- Policy LU-2.2: Foothill Pasture Designation: Apply the Foothill Pasture land use designation on agricultural and open space lands located on the eastern and western edges of the County which are recognized for their value as grazing, cropland, and open space.

- Policy LU-2.3: Land Use Activity Limitations: Limit allowed land use within Agricultural and Foothill Pasture areas to agricultural crop production, farm support operations, and grazing and open space uses.

28.1.3.4.6 Recreation

The Recreation and Cultural Resources Element provides policy context to achieve the county's vision for recreation opportunities. Impacts to recreation are analyzed in Chapter 19, Recreation, and the goals in the general plan would apply to all of the alternatives evaluated in this EIS/EIR. The overarching goal for recreation resources throughout the county is described as follows:

- Preserve, enhance, expand, and manage Merced County's diverse system of regional parks, trails, recreation areas, and natural resources for the enjoyment of present and future residents and park visitors.

The following general plan recreation policies pertain to the proposed project:

- Policy RCR-1.1: Public Recreation Land Use - Encourage the continuation and expansion of existing public recreation land uses, including, but not limited to, public beaches, parks, recreation areas, wild areas, and trails.

- Policy RCR-1.11: Scenic Resource and Public Land Protection - Encourage the use of regional parks and open space areas as a mechanism to preserve the County's natural scenic beauty and protect land for public resources.

- Policy RCR-1.12 Recreation Services - Support recreation services to promote the full use of recreation facilities within their design capacity, and improve connections and access to a wide range of recreation opportunities in order to improve the quality of life for residents and visitors.

28.1.3.4.7 Public Utilities, Services, and Power

The Public Facilities and Services Element outlines the following goals for public utilities, services, and power related to proposed project (Merced County 2013). Impacts to utilities are analyzed in Chapter 22, Public Utilities, Services, and Power, and the goals in the general plan would apply to all of the alternatives evaluated in this EIS/EIR.

- Goal PFS -1 - Ensure adequate funding for new, expanded, and upgraded public facilities and services.
- Goal PFS-2 - Ensure the adequate wastewater collection, treatment, and disposal within the County.
- Goal PFS-3 - Ensure the management of stormwater in a safe and environmentally sensitive manner through the provision of adequate storm drainage facilities that protect people, property, and the environment.
- Goal PFS-4 - Ensure the safe and efficient disposal and recycling of solid and hazardous waste generated in the County.
- Goal PFS-5 - Ensure the provision of adequate utilities to the residents of Merced County.
- Goal PFS-6 - Ensure the provision of timely and adequate law enforcement through proper management and staffing of the Sheriff Department in Merced County.
- Goal PFS-7 - Provide adequate fire and emergency medical facilities and services to protect County residents from injury and loss of life, and to protect property from fire.
- Goal PFS-8 - Coordinate with school districts, colleges, and universities to provide for the educational and literary needs of Merced County residents.

28.1.3.4.8 Cultural Resources

The main goals and policies governing cultural resources at the regional or local level in Merced County are outlined in the *2030 Merced County General Plan* (Merced County 2013). The most inclusive of these is Goal RCR-2, which calls for the protection and preservation of cultural, archaeological, and historic resources to maintain the unique character of Merced County. Impacts to cultural resources are analyzed in Chapter 23, Cultural Resource, and this goal would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

28.1.3.4.9 Noise and Vibration

The plan includes noise standards for new noise-sensitive land uses such as residences, hospitals, and churches that are affected by transportation noise sources, as shown in Table 28-4 (Merced County 2013). Table 28-5 summarizes the interior and exterior noise level standards for noise-sensitive areas affected by existing non-transportation noise sources.

Table 28-4. Noise Standards for New Uses Affected by Traffic, Railroad and Airport Noise in Merced County

New Land Use	Sensitive Outdoor Area[1] – L_{dn} (dBA)	Sensitive Indoor Area[2] – L_{dn} (dBA)
All residential[3]	65	45
Transient Lodging[3,4]	65	45
Hospitals & Nursing Homes[3,4,5]	65	45
Theaters & Auditoriums[4]	---	35
Churches, Meeting Halls, Schools, Libraries, etc.[4]	65	40
Office Buildings[4]	65	45
Commercial Buildings[4]	---	50
Playgrounds, Parks, etc.	70	---
Industry[4]	65	50

Source: Merced County 2013.

Notes:

1. Sensitive Outdoor Areas include primary outdoor activity areas associated with any given land use at which noise-sensitivity exists and the location at which the County's exterior noise level standards are applied.
2. Sensitive Interior Areas includes any interior area associated with any given land use at which noise-sensitivity exists and the location at which the County's interior noise level standards are applied. Examples of sensitive interior spaces include, but are not limited to, all habitable rooms of residential and transient lodging facilities, hospital rooms, classrooms, library interiors, offices, worship spaces, theaters. Interior noise level standards are applied within noise-sensitive areas of the various land uses with windows and doors in the closed positions.
3. Railroad warning horn usage shall not be included in the computation of L_{dn}.
4. Only the interior noise level standard shall apply if there are no sensitive exterior spaces proposed for these uses.
5. Since hospitals are often noise-generating uses, the exterior noise level standards are applicable only to clearly identified areas designated for outdoor relaxation by either hospital staff or patients.

Table 28-5. Non-Transportation Noise Standards Median (L_{50}) / Maximum (L_{max})[1]

Receiving Land Use	Outdoor Daytime (dBA)	Outdoor Nighttime (dBA)	Interior Day or Night (dBA)
All residential	55 / 75	50 / 70	35 / 55
Transient Lodging[4]	55 / 75	---	35 / 55
Hospitals & Nursing Homes[5,6]	55 / 75	---	35 / 55
Theaters & Auditoriums[6]	---	---	30 / 50
Churches, Meeting Halls, Schools, Libraries, etc.[6]	55 / 75	---	35 / 60
Office Buildings[6]	60 / 75	---	45 / 65
Commercial Buildings[6]	55 / 75	---	45 / 65
Playgrounds, Parks, etc.[6]	65 / 75	---	---
Industry[6]	60 / 80	---	50 / 70

Source: Merced County 2013.

Notes:

[1] These standards shall be reduced by 5 dB for sounds consisting primarily of speech or music, and for recurring impulsive sounds. If the existing ambient noise level exceeds the standards in this table, then the noise level standards shall be increased at 5 dB increments to encompass the ambient.

[2] Sensitive Outdoor Areas include primary outdoor activity areas associated with any given land use at which noise-sensitivity exists and the location at which the County's exterior noise level standards are applied.

[3] Sensitive Interior Areas includes any interior area associated with any given land use at which noise-sensitivity exists and the location at which the County's interior noise level standards are applied. Examples of sensitive interior spaces include, but are not limited to, all habitable rooms of residential and transient lodging facilities, hospital rooms, classrooms, library interiors, offices, worship spaces, theaters. Interior noise level standards are applied within noise-sensitive areas of the various land uses with windows and doors in the closed positions.

[4] Outdoor activity areas of transient lodging facilities are not commonly used during nighttime hours.

[5] Since hospitals are often noise-generating uses, the exterior noise level standards are applicable only to clearly identified areas designated for outdoor relaxation by either hospital staff or patients.

[6] The outdoor activity areas of these uses (if any) are not typically used during nighttime hours.

These standards are enforced to protect noise-sensitive land uses in the county and do not pertain to short-term construction noise. Impacts to noise-sensitive land uses are analyzed in Chapter 11, Noise and Vibration, and these standards would apply to all of the alternatives evaluated in this EIS/EIR.

28.1.3.4.10 Geology, Seismicity, and Soils

The Health and Safety Element outlines the following goals and policies related to seismic and geologic hazards (Merced County 2013). Impacts to seismic and geologic hazards are analyzed in Chapter 25, Geology, Seismicity, and Soils, and the goals and polices of the general plan would apply to all of the alternatives evaluated in this EIS/EIR.

- Goal HS-1: Minimize the loss of life, injury, and property damage of County residents due to seismic and geologic hazards.
  - Policy HS-1.1: Require that all new habitable structures be located and designed in compliance with the Alquist-Priolo Special Studies Zone Act and related State earthquake legislation.

- Policy HS-1.2: Support efforts to obtain financial assistance from Federal and State agencies in order to implement corrective seismic safety measures required for existing County buildings and structures.
- Policy HS-1.3: Require all new structures located within dam inundation areas to conform to standards of dam safety as required by the State Division of SOD.
- Policy HS-1.4: Require earthquake resistant design for proposed critical structures such as hospitals, fire stations, emergency communication centers, private schools, high occupancy buildings, bridges and freeway overpasses, and dams that are subject to County permitting requirements.
- Policy HS-1.5: Encourage educational programs to inform the public of earthquake dangers in Merced County.
- Policy HS-1.6: Prohibit habitable structures on areas of unconsolidated landslide debris or in areas vulnerable to landslides.
- Policy HS-1.7: Discourage construction and grading on slopes in excess of 30 percent.
- Policy HS-1.8: Require that the provisions of the International Building Code be used to regulate projects subject to hazards from slope instability.
- Policy HS-1.9: Require and enforce all standards contained in the International Building Code related to construction on unstable soils.

The Natural Resources Element addresses goals, objectives, and policies related to soil and mineral resources in the county. Applicable policies include:

- Goal NR-3: Facilitate orderly development and extraction of mineral resources while preserving open space, natural resources, and soil resources and avoiding or mitigating significant adverse impacts.
  - Policy NR-3.1: Protect soil resources from erosion, contamination, and other effects that substantially reduce their value or lead to the creation of hazards.
  - Policy NR-3.2: Require minimal disturbance of vegetation during construction to improve soil stability, reduce erosion, and improve stormwater quality.

- Policy NR-3.3: Encourage landowners to participate in programs that reduce soil erosion and increase soil productivity. This shall include promoting and coordinating the efforts of University of California Cooperative Extension, various Resource Conservation Districts, and other similar agencies and organizations.

28.1.3.5 Guide to Building Permits and Inspections in Merced County (Unincorporated Areas)

The Merced County Public Works Department regulates building and building safety within the unincorporated county. The Building and Safety Division and the Planning and Community Development Department are responsible for assessing proposed building projects and issuing building permits (Merced County 2011). Merced County does not have a grading ordinance and does not require permits for proposed grading.

28.1.3.6 San Joaquin Valley Air Pollution Control District Air Quality Management Plans

The San Joaquin Valley Air Pollution Control District (SJVAPCD) has jurisdiction over the San Joaquin Valley Air Basin, which includes O_3, PM_{10}, and $PM_{2.5}$ nonattainment areas. Figure 28-1 depicts the location of the SJVAPCD and nearby air districts in relation to the components associated with the action alternatives.

The air districts have adopted a series of air quality management plans (AQMPs) to meet the CAAQS and NAAQS (see Appendix C1 for a summary of the applicable AQMPs). These plans require, among other emissions-reducing activities, control technology for existing sources; control programs for area sources and indirect sources; a permitting system designed to ensure no net increase in emissions from any new or modified permitted sources of emissions; transportation control measures; sufficient control strategies to achieve a five percent or more annual reduction in emissions (or 15 percent or more in a three-year period) for volatile organic compound (VOC), nitrogen oxides (NOx), CO, and PM_{10}; and demonstration of compliance with CARB's established reporting periods for compliance with air quality goals.

Chapter 7, Air Quality, analyzes the emissions of criteria pollutants, and these compliance requirements would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

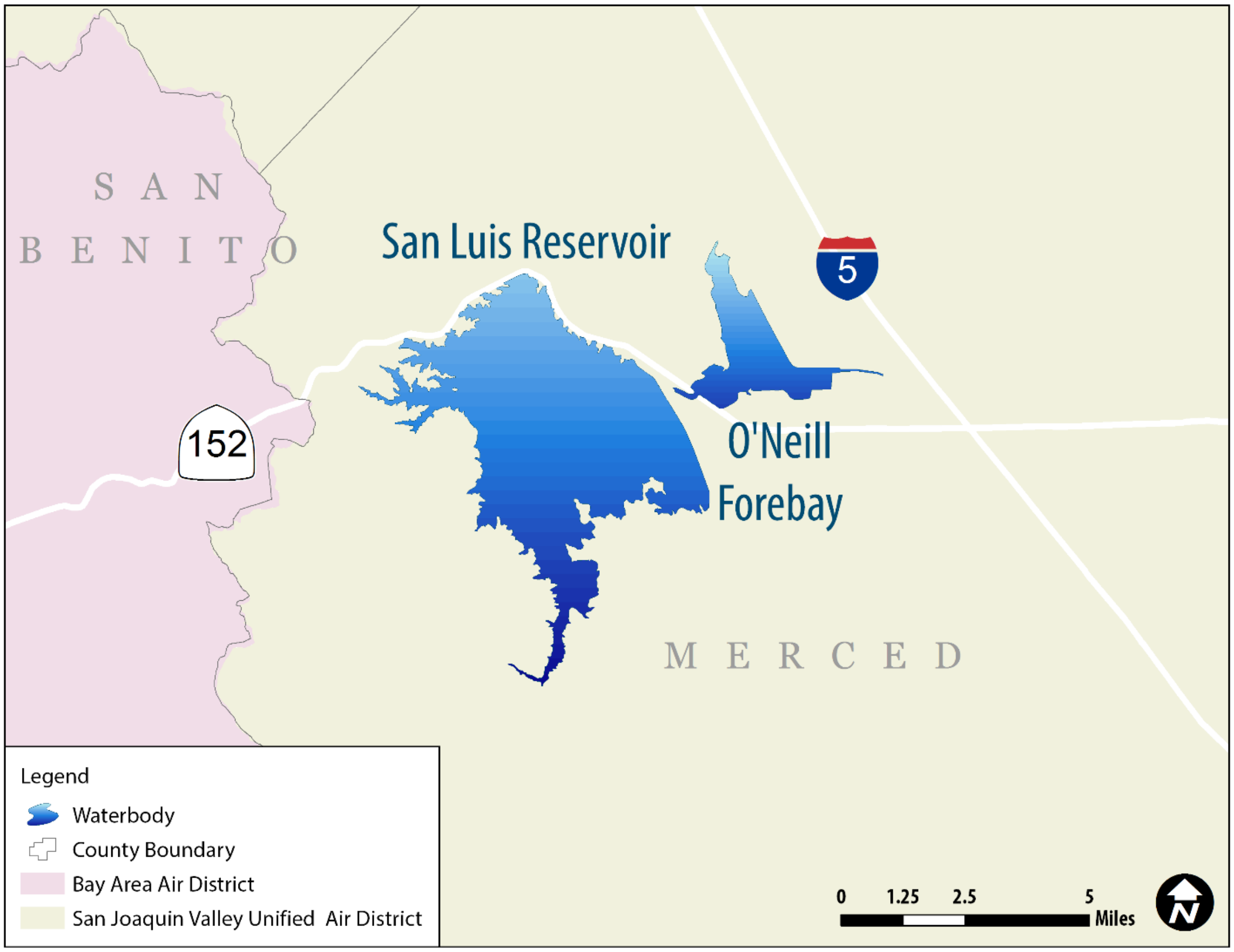

Figure 28-1. California Air Districts

28.1.3.7 San Joaquin Valley Air Pollution Control District Programs

The SJVAPCD is the local agency that is primarily responsible for regulating emissions from stationary sources. It also develops plans and implements control measures as required by State and Federal requirements. To assist the Lead Agency with analyzing GHG emission and climate change impacts under CEQA, the SJVAPCD adopted two policies:

- "Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency" (SJVAPCD 2009a)
- "Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA" (SJVAPCD 2009b)

The SJVAPCD has not adopted a quantitative threshold for evaluating the significance of GHG emissions; however, the SJVAPCD's guidance document for Valley land-use agencies (2009b) would be most relevant for assessing GHG-related impacts from the proposed restoration activities. In this guidance document, the SJVAPCD relies on the implementation of best performance standards (BPS), defined as the most effective achieved-in-practice means of reducing or limiting GHG emissions from a GHG emissions source, for evaluating a project's significance. Projects implementing BPS would be determined to have less than significant individual and cumulative impacts on global climate change.

Chapter 8, Greenhouse Gas Emissions, analyzes the emissions of GHGs, and these policies would apply to construction actions proposed under the Reservoir Restriction Alternative and the Crest Raise Alternative.

If a project does not implement BPS, then quantification of project-specific GHG emissions would be required. If project-related emissions would be reduced or mitigated by at least 29 percent compared to business-as-usual[6], then the project would be determined to have a less than significant individual and cumulative impact for GHG.

28.1.3.8 Santa Clara County General Plan

The *Santa Clara County General Plan* (1994) Parks and Recreation Element addresses three types of area and facilities that can contribute both to meeting recreation demand and to maintaining the county's natural resources and beauty: regional parks and public open space lands, trails, and scenic highways. Scenic highways are discussed further in Chapter 10, Visual Resources. Regional parks and public open space lands, as well as trails, are discussed below.

Impacts to recreation are analyzed in Chapter 19, Recreation, and the strategies in the general plan would apply to all of the alternatives evaluated in this EIS/EIR. General strategies concerning regional parks and public open space lands consist of developing parks and public open space lands, improving accessibility, balancing recreational and environmental objectives, facilitating interjurisdictional coordination, and encouraging private sector and non-profit involvement.

Santa Clara County trails serve the purpose of outdoor recreation, transportation, education, public health and physical well-being, social and economic well-being, and alternative emergency access and egress, and consist of both urban and rural trails. General strategies concerning trails consist of identifying trail routes which meet a public need while recognizing the rights of private property owners, maintaining safety requirements, and establishing environmental protection goals, and providing trails within the county that offer a range of convenient urban, rural, and open space experiences and a range of short to long trip opportunities.

[6] Business-as-usual "is referenced in the CARB's AB 32 Scoping Plan as the Business-as-usual emissions occurring in 2020 if the average baseline emissions during the 2002-2004 period were grown to 2020 levels, without controls. Therefore, 2002-2004 emissions factors, on a unit of activity basis, multiplied by the activity expected to occur in 2020, is an appropriate representative of 2020 business as usual (BAU)." (SJVAPCD 2009b)

28.2 Public Involvement

Both National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) encourage public involvement during preparation of EISs and EIRs. The following sections describe the public involvement opportunities that have occurred or will occur during the EIS/EIR process.

28.2.1 Public Scoping

In September 2009, Reclamation issued a Notice of Intent (NOI) and the DWR issued a Notice of Preparation (NOP) in order to inform agencies and the general public that an EIS/EIR will be prepared and invite specific comments on the scope and content of the document. The NOI/NOP also requested participation at a public scoping meeting. A meeting notice was distributed to a mailing list of approximately 900 stakeholders, and a press release was distributed to local newspapers to announce that a public scoping meeting would be held at the San Luis Recreation Area to take comments on the scope of the environmental document and invite input on alternatives for consideration in the EIS/EIR. The feedback provided during this public scoping process was summarized in a Public Scoping Report (Reclamation 2009).

28.2.2 Public Meetings and Comments on the Draft Supplemental Environmental Impact Statement/Environmental Impact Report

This document will be released to the public for 60 days of review and comment, as required by NEPA and CEQA. Public meetings will be held for the Draft EIS/EIR and comments on the Draft EIS/EIR will be accepted at the meetings as well as throughout the public comment period.

28.3 Agency Coordination

The development of the B.F. Sisk Dam SOD Project EIS/EIR has required coordination with a variety of Federal, State, and local agencies. The following sections describe these agencies and their roles in the process.

28.3.1 United States Fish and Wildlife Service

Reclamation initiated informal consultation with USFWS in July 2007 to ensure compliance with Endangered Species Act and the Fish and Wildlife Coordination Act. The USFWS provided Reclamation with a list of all the endangered species in each alternative’s area of analysis that was utilized to support the analysis in Chapter 15, Terrestrial Resources. The USFWS will receive a copy of the Draft EIS/EIR for review and Reclamation will be requesting concurrence that the project is not likely to affect listed species or critical habitat.

28.3.2 United States Army Corps of Engineers

The Crest Raise Alternative has the potential to impact wetlands. Therefore, Reclamation will coordinate with the Corps Regulatory Division regarding any development of a Clean Water Act Section 404 permit.

28.3.3 United States Environmental Protection Agency

The Crest Raise Alternative has the potential to impact wetlands. Therefore, Reclamation will coordinate with the USEPA regarding any development of a Clean Water Act Section 404 permit. The USEPA will receive a copy of the Draft EIS/EIR for review.

28.3.4 California Department of Parks and Recreation

CDPR manages the lands surrounding San Luis Reservoir. The NOI/NOP was sent to CDPR and CDPR will also receive a copy of this Draft EIS/EIR for their review. Reclamation will coordinate with CDPR to discuss potential impacts to recreation from B.F. Sisk Dam SOD Project EIS/EIR.

28.3.5 State Historic Preservation Officer

Implementation of the alternative selected for the B.F. Sisk Dam SOD Project will require compliance with 54 United States Code (U.S.C.) § 306108, commonly known as Section 106 of the National Historic Preservation Act (NHPA). To complete the Section 106 process, as outlined at 36 Code of Federal Regulations (CFR) Part 800, Reclamation is required to consult with the State Historic Preservation Officer (SHPO) and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment, regarding the effects of the proposed undertaking on historic properties. Historic properties are cultural resources that are listed, or eligible for listing, on the National Register of Historic Places. Reclamation must fully comply with NHPA Section 106 compliance requirements, as outlined at 36 CFR Part 800, prior to signing a Record of Decision regarding the B.F. Sisk Dam SOD Project.

28.3.6 Central Valley Regional Water Quality Control Board

The Crest Raise Alternative could require several permits from the Central Valley RWQCB including a dewatering permit and coverage under a National Pollution Discharge Elimination System (NPDES) permit for General Construction. Reclamation will be consulting with the Central Valley RWQCB to determine the correct permits and their requirements. Reclamation and the construction contractor will obtain these permits prior to construction. The Central Valley RWQCB will receive a copy of the Draft EIS/EIR for review.

28.3.7 San Joaquin Air Pollution Control District

The Crest Raise Alternative has the potential to impact air quality in Merced County. Reclamation will coordinate with the SJVAPCD regarding air quality impacts in Merced County. SJVAPCD will receive a copy of the Draft EIS/EIR for review.

28.3.8 California Department of Fish and Wildlife

The B.F. Sisk Dam SOD Project EIS/EIR has the potential to affect species covered under the California Endangered Species Act. DWR will consult with the CDFW to ensure compliance with the California Endangered Species Act. The CDFW will receive a copy of the Draft EIS/EIR for review.

28.3.9 Local Governments

The B.F. Sisk Dam SOD Project EIS/EIR has the potential to impact facilities within Merced County and the cities of Gustine and Los Banos in Merced County. These local governments will receive a copy of the Draft EIS/EIR for review. Reclamation will coordinate with these local governments potentially impacted by the B.F. Sisk Dam SOD Project.

Chapter 29
List of Preparers and Contributors

The following is a list of preparers who contributed to the development of the B.F. Sisk Dam Safety of Dams (SOD) Modification Project (Project) Draft Environmental Impact Statement (EIS)/Environmental Impact Report (EIR).

Federal Agencies

Preparers	Agency	Role In Preparation
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Joanne Goodsell	Bureau of Reclamation	Project objective identification, alternative formulation, EIS/EIR development and review
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State Agencies

Preparers	Agency	Role In Preparation
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Key:
DWR = California Department of Water Resources

CDM Smith

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
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Pacific Legacy

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
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Environmental Science Associates

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
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Liza Ryan	M.S. Ecology 10 years experience	Terrestrial Biologist	Terrestrial Resources

MBK Engineers

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role In Preparation
Lee Bergfeld	M.S. Civil Engineering, 18 years experience	Hydrological Modeling	Appendix B, CalSim modeling
Wesley Walker	M.S. Civil Engineering, 3 years experience	Hydrological Modeling	Appendix B, CalSim modeling

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Chapter 30 Glossary

100-year flood: A flood having a 1% chance of being equaled or exceeded in magnitude in any given year.

acre-foot: The quantity of water required to cover 1 acre to a depth of 1 foot. Equal to 1,233.5 cubic meters (43,560 cubic feet).

affect/effect: To affect (a verb) is to bring about a change. An effect (usually a noun) is the result of an action.

affected environment: Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as a result of a proposed human action.

air quality: Measure of the health-related and visual characteristics of the air, often derived from quantitative measurements of the concentrations of specific injurious or contaminating substances.

alternatives: Courses of action that may meet the objectives of a proposed action at varying levels, including the most likely future without the project or action. An environmental assessment or an environmental impact statement identifies and objectively evaluates and analyzes all reasonable alternatives, including a no action alternative.

Ambient Air Quality Standards (AAQS): The U.S. Environmental Protection Agency sets National Ambient Air Quality Standards (NAAQS), as required by the Clean Air Act, and the California Air Resources Board sets California Ambient Air Quality Standards (CAAQS), as required by the California Clean Air Act, for pollutants considered harmful to public health or the environment. AAQS are in place for six pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.

ambient noise: Also called background noise, ambient noise is the background sound pressure level at a given location, normally specified as a reference level to study a new intrusive sound source.

aquifer: An underground geologic formation of permeable rock that stores, transmits, and yields significant quantities of groundwater to wells and springs.

archaeology: The study of human activity through the recovery and analysis of material culture. The archaeological record consists of artifacts, architecture, biofacts or ecofacts, and cultural landscapes.

assimilative capacity: The ability of a body of water to cleanse itself; to receive waste waters or toxic substances without deleterious effects and without damage to aquatic life or humans who consume the water.

bedrock: The solid rock at the surface or underlying other surface materials.

beneficial use: As defined in Water Code §13050, beneficial uses of the waters of the state include domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

berm: A horizontal strip or shelf built into an embankment or cut to break the continuity of the slope, usually for the purpose of reducing erosion or to increase the thickness of the embankment at a point of change in a slope or defined water surface elevation. A horizontal step in the sloping profile of an embankment dam.

best management practice (BMP): A policy, program, practice, rule, regulation, or ordinance for the use of devices, equipment, or facilities that is an established and generally accepted practice resulting in more efficient use or conservation of water, or a practice that has been given to indicate that significant conservation benefits can be achieved.

borrow area: The area from which natural materials, such as rock, gravel or soil, used for construction purposes is excavated.

California Environmental Quality Act (CEQA): California legislation that requires State, regional, and local agencies to prepare environmental impact assessments of proposed projects with potentially significant environmental effects and to circulate these documents to other agencies and the public for comment before making decisions. CEQA requires the lead agency to make findings for all significant impacts identified in an Environmental Impact Report. The lead agency must adopt all mitigation to reduce environmental impacts to a less-than significant level, unless the mitigation is infeasible or unavailable and there are overriding considerations that require the project to be approved. See Public Res. Code 21001.1, 21002, 21080; Guidelines 15002(c).

CalSim model: CalSim is a planning tool and model designed to simulate the operations of the CVP and SWP reservoir and water delivery system under current and future conditions. CalSim predicts how reservoir storage and river flows would be affected based on changes in system operations. CalSim output is typically used to help assess impacts on water supply, water quality, aquatic resources, and recreation.

Central Valley Project (CVP): As defined by Section 3403(d) of the Central Valley Project Improvement Act, "all Federal reclamation projects located within or diverting water from or to the watershed of the Sacramento and San Joaquin rivers and their tributaries as authorized by the Act of August 26, 1937 (50 Stat. 850) and all Acts amendatory or supplemental thereto, ..."

Central Valley Project water service contractor: Water users who have contracted with Reclamation for water developed by and conveyed through CVP facilities.

crest: The top surface of a weir or dam.

critical habitat: A description of the specific areas with physical or biological features essential to the conservation of a listed species and that may require special management considerations or protection. These areas have been legally designated via Federal Register notices.

cubic feet per second (cfs): A measure of the volume rate of water movement. As a rate of stream flow, a cubic foot of water passing a reference section in 1 second of time. One cubic foot per second equals 0.0283 meters per second (7.48 gallons per minute). One cubic foot per second flowing for 24 hours produces approximately 2 acre-feet.

cultural resources: Prehistoric and historic archaeological sites, architectural/built-environment resources (e.g., levees, weirs, buildings), and places important to Native Americans and other ethnic groups, generally 50 years old or older regardless of their significance.

dam: An artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water.

dam failure: Catastrophic type of failure characterized by the sudden, rapid, and uncontrolled release of impounded water or the likelihood of such an uncontrolled release.

delta: A low, nearly flat alluvial tract of land formed by deposits at or near the mouth of a river.

Dissolved Oxygen (DO): A commonly employed measure of water quality. The concentration of free (not chemically combined) molecular oxygen (a gas) dissolved in water, usually expressed in milligrams per liter, parts per million, or percent of saturation. DO levels are considered the most important and commonly employed measurement of water quality and indicator of a water body's ability to support desirable aquatic life.

earthquake: A sudden motion or trembling in the earth caused by the abrupt release of accumulated stress along a fault.

electrical conductivity: A measure of the total concentration of dissolved salts in water. A measure of a water’s ability to conduct electricity.

embankment: An earth structure, the top of which is higher than the adjoining surface.

Endangered Species Act (ESA) of 1973, as Amended: Federal legislation that is intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend, and to provide programs for the conservation of those species, thus preventing extinction of plants and animals. The law is administered by the U.S. Department of the Interior’s Fish and Wildlife Service and Department of Commerce’s National Marine Fisheries Service, depending on the species.

erosion: The gradual wearing away of land by water, wind, and general weather conditions; the diminishing of property by the elements.

expansive soils: Soils that shrink and swell as a result of moisture changes.

exports: Water diverted from the Delta and conveyed to users outside the Delta.

fault: A fracture or fracture zone in the earth along which there has been displacement of the two sides relative to one another and which is parallel to the fracture.

filter: A material or constructed zone of earthfill that is designed to permit the passage of flowing water through it, but prevents the passage of significant amounts of suspended solids through it by the flowing water.

flood: A temporary rise in water levels resulting in inundation of areas not normally covered by water.

floodplain: Any land area susceptible to inundation by floodwaters from any source.

flow: The volume of water passing a given point per unit of time.

freeboard: Vertical distance between the reservoir surface elevation and the top of the dam.

groundwater: Any water naturally stored underground in aquifers, or that flows through and saturates soil and rock, supplying springs and wells.

groundwater basin: An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well defined boundaries in a lateral direction and having a definable bottom.

groundwater level: Refers to the water level in a well, and is defined as a measure of the hydraulic head in the aquifer system.

Groundwater Management Plan: A comprehensive written document developed for the purpose of groundwater management and adopted by an agency having appropriate legal or regulatory authority.

groundwater overdraft: A condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years.

groundwater pumping: Quantity of water extracted from groundwater storage.

groundwater recharge: The natural and intentional infiltration of surface water into the zones of saturation.

groundwater subbasin: A subdivision of the groundwater basin created by dividing the basin using geologic and hydrologic conditions or institutional boundaries.

habitat: The place or environment where a plant or animal naturally lives and grows.

habitat conservation plan: A plan that outlines ways of maintaining, enhancing, and protecting a given habitat type needed to protect species; usually includes measures to minimize impacts, and may include provisions for permanently protecting land, restoring habitat, and relocating plants or animals to another area.

hazard: A situation that creates the potential for adverse consequences such as loss of life, property damage, or other adverse impacts.

hydroseeding: a planting process which utilizes a slurry of seed and mulch.

Indian Trust Assets (ITAs): Indian trust assets are legal interests in property held in trust by the federal government for federally recognized Indian tribes or individual Indians. “Assets” are anything owned that has monetary value.

inflow: Water that flows into a body of water.

intake: Any structure through which water can be drawn into a waterway. Any structure in a reservoir, dam, or river through which water can be discharged.

landslide: The unplanned descent (movement) of a mass of earth or rock down a slope.

lead agency: The government agency that has the principal responsibility for carrying out or approving a project and therefore the principal responsibility for preparing CEQA/NEPA documents. For the B.F. Sisk Dam Corrective Action Study EIS/EIR, U.S. Department of the Interior, Bureau of Reclamation is the Federal lead agency under NEPA and the California Department of Water Resources is the State lead agency under CEQA.

levee: A natural or artificial barrier that helps keep rivers from overflowing their banks.

liquefaction: The process in which soil loses cohesion when subject to seismic activity (i.e., shaking).

mitigation: To moderate, reduce, or alleviate the impacts of a proposed activity; includes, in order, (1) avoiding the impact by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (5) compensating for the impact by replacing or providing substitute resources or environments.

National Environmental Policy Act (NEPA): Federal legislation establishing the national policy that environmental impacts will be evaluated as an integral part of any major Federal action. Requires the preparation of an Environmental Impact Statement for all major Federal actions significantly affecting the quality of the human environment.

Natural Community: A distinct and reoccurring assemblage of plants and animals associated with specific physical environmental conditions and ecological processes.

Notice of Determination (NOD): A brief notice to be filed by a public agency after it approves or determines to carry out a project subject to the requirements of CEQA.

outflow: The amount of water passing a given point downstream of a structure, expressed in acre-feet per day or cubic feet per second. Water flowing out of a body of water.

overtopping: Flow of water over the top of a dam or embankment.

paleontology: The study of the forms of life existing in prehistoric or geologic times, as represented by the fossils of plants, animals, and other organisms.

public involvement: Process of obtaining citizen input into each stage of the development of planning documents. Required as a major input into any Environmental Impact Statement or Environmental Impact Report.

qualitative: Having to do with quality or qualities. Descriptive of kind, type or direction, as opposed to size, magnitude or degree.

quantitative: Having to do with quantity, capable of being measured. Descriptive of size, magnitude or degree.

Reasonable and Prudent Alternative (RPA): Alternative action identified during formal consultation (under Section 7 of the ESA) that: (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction; (3) are economically and technologically feasible; and (4) U.S. Fish and Wildlife Service or National Marine Fisheries Service believes would avoid the likelihood of jeopardizing the continued existence of listed species or result in the destruction or adverse modification of critical habitat (50 CFR 402.02).

Record of Decision (ROD): Concise, public, legal document required under the National Environmental Policy Act that identifies and publicly and officially discloses the responsible official's decision on an alternative selected for implementation. It is prepared following completion of an Environmental Impact Statement.

reservoir: A body of water impounded by a dam and in which water can be stored.

riprap: A layer of large uncoursed stone, precast blocks, bags of cement, or other suitable material, generally placed on the slope of an embankment or along a watercourse as protection against erosion.

salinity: The amount of dissolved salts in a given volume of water.

San Luis Low Point Improvement Project: Prepared jointly by the U.S. Department of the Interior, Bureau of Reclamation and the Santa Clara Valley Water District to address water supply reliability and schedule certainty issues for Santa Clara Valley Water District associated with low water levels in San Luis Reservoir.

Safety of Dams Corrective Action Study: Prepared jointly by the United States Department of the Interior, Bureau of Reclamation and the California Department of Water Resources to address dam stability and safety concerns associated with several sections of the B.F. Sisk Dam.

scenic vista: A viewpoint that provides expansive views of a highly valued landscape for the benefit of the general public. Areas with Scenic Attractiveness Class A or Class B classifications are considered scenic vistas.

sediment: Any finely divided organic and/or mineral matter deposited by air or water in nonturbulent areas.

seismicity: The frequency, intensity, and distribution of earthquake activity in a given area.

shear key: A device to transfer shear across a joint, usually a moveable immersion joint.

south-of-Delta: Water storage supplied with water exported south from the Delta.

State Water Project (SWP): California's State-owned and -operated water project consisting of 22 dams and reservoirs, which delivers water 600 miles from the Sacramento Valley to Los Angeles.

State Water Project water service contractor: Water users who have contracted with the California Department of Water Resources for water developed by and conveyed through SWP facilities.

stormwater: Untreated surface runoff into a body of water during periods of precipitation.

subsidence: A local mass movement that involves principally the gradual downward settling or sinking of the earth's surface with little or no horizontal motion.

Sustainable Groundwater Management Act (SGMA): Requires that all groundwater basins categorized as medium- and high-priority form a Groundwater Sustainability Agency and be managed under a Groundwater Sustainability Plan by January 31, 2020.

total maximum daily load (TMDL): Estimates of the amount of specific pollutants that a body of water can safely take without threatening beneficial uses.

Toxic Air Contaminants: According to Section 39655 of the California Health and Safety Code, a toxic air contaminant is "an air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose present or potential hazard to human health." Section 39655 also incorporates all federal hazardous air pollutants as toxic air contaminants by reference.

turbidity: A measure of the cloudiness of water caused by the presence of suspended matter. Turbidity in natural waters may be composed of organic and/or inorganic constituents, and has direct implications to drinking water treatment.

visual resources: The natural and artificial features of a landscape that characterize its form, line, texture, and color.

water year: A continuous 12-month period for which hydrological records are compiled and summarized. In California, a water year begins October 1 and ends September 30 of the following year.

water year hydrologic classification: Characterization of the hydrologic record for streams into wet, normal, and dry periods. Based on the Sacramento Valley Index, water year classifications are determined using the following equation:

$$\text{INDEX} = 0.4 * X + 0.3 * Y + 0.3 * Z$$

Where: X = Current year's April – July Sacramento Valley unimpaired runoff

Y = Current October – March Sacramento Valley unimpaired runoff

Z = Previous year's index

Classification	Millions of Acre-Feet
Wet	Equal to or greater than 9.2
Above Normal	Greater than 7.8 and less than 9.2
Below Normal	Equal to or less than 7.8 and greater than 6.5
Dry	Equal to or less than 6.5 and greater than 5.4
Critical	Equal to or less than 5.4

Chapter 31
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