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Managing Water in the West

Upper San Joaquin River Basin Storage Investigation

Draft Environmental Impact Statement

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

August 2014

Upper San Joaquin River Basin Storage Investigation

Draft Environmental Impact Statement
Executive Summary

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United States Department of the Interior
Bureau of Reclamation, Mid-Pacific Region
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This Draft Environmental Impact Statement (EIS) for the Upper San Joaquin River Basin Storage Investigation (Investigation) has been prepared by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), Mid-Pacific Region, consistent with requirements of the National Environmental Policy Act (NEPA). Cooperating agencies pursuant to NEPA include the California Department of Parks and Recreation; Friant Water Authority; Madera-Chowchilla Water and Power Authority; San Joaquin River Exchange Contractors Water Authority; U.S. Army Corps of Engineers; U.S. Department of Commerce, National Marine Fisheries Service; U.S. Department of the Interior, Bureau of Indian Affairs; U.S. Department of the Interior, Bureau of Land Management; U.S. Department of the Interior, Fish and Wildlife Service; and U.S. Environmental Protection Agency.

The Investigation is a feasibility study that is one of five studies for potential surface water storage projects recommended in the 2000 CALFED Bay-Delta Program (CALFED) Programmatic Record of Decision (ROD), and is being conducted under the authority of Public Law 108-7 (Division D, Title II, Section 215) enacted in February 2003. This act authorized the Secretary of the Interior to conduct feasibility studies for several storage projects identified in the CALFED ROD, including the Investigation. Authorization was reaffirmed and supplemented by the October 2004 Water Supply, Reliability, and Environmental Improvement Act (Public Law 108-361, Title I, Section 103).

This Draft EIS documents the analysis of the potential environmental effects of alternatives to increase storage of water from the upper San Joaquin River watershed to improve water supply reliability and operational flexibility in Central Valley Project San Joaquin Valley areas and other regions of California, and enhance water temperature and flow conditions in the San Joaquin River downstream from Friant Dam for salmon and other native fish. In addition to the No-Action Alternative, this Draft EIS considers five action alternatives, which include constructing a dam in the upstream portion of Millerton Lake at river mile 274, and which vary based on operations and intake feature configurations.

This Draft EIS is being circulated for public and agency review and comment for 45 days following the date when the EPA publishes the notice of availability of weekly receipt of environmental impact statements in the Federal Register. Reclamation will hold public hearings during the public review period. Comments provided during the public review period will be addressed in the Final EIS.

For further information, please contact Melissa Harris, Project Manager, at the address above, by telephone at (916) 978-5075, or by e-mail at mmharris@usbr.gov.

Executive Summary

Introduction and Background

This Draft Environmental Impact Statement (EIS) has been prepared as part of the Upper San Joaquin River Basin Storage Investigation (Investigation) to document potential physical, biological, cultural, and socioeconomic effects of alternatives to expand water storage capacity in the upper San Joaquin River watershed. The Investigation is led by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), in cooperation with the California Department of Water Resources (DWR). The purpose of the Investigation is to determine the type and extent of Federal, State of California (State), and regional interest in a potential project to expand water storage capacity in the upper San Joaquin River watershed to (1) improve water supply reliability and flexibility of the water management system for agricultural, municipal and industrial (M&I), and environmental uses; and (2) enhance water temperature and flow conditions in the San Joaquin River downstream from Friant Dam for salmon and other native fish.

This document, pursuant to the National Environmental Policy Act (NEPA), tiers from the CALFED Bay-Delta Program (CALFED) Final Programmatic Environmental Impact Statement/Environmental Impact Report (PEIS/R) and Record of Decision (ROD) (CALFED 2000a and 2000b) for developing the project purpose and a range of reasonable alternatives. This document also supports the Draft Feasibility Report (Reclamation 2014) prepared for the Investigation and confirms the draft findings of environmental feasibility.

Reclamation, as the Federal Lead Agency under NEPA, has prepared this Draft EIS to disclose the potential direct, indirect, and cumulative impacts of alternatives. Cooperating agencies pursuant to NEPA are those that have jurisdiction by law or special expertise in a resource area affected. Cooperating agencies for this Investigation include the California Department of Parks and Recreation (State Parks); Friant Water Authority (FWA); Madera-Chowchilla Water and Power Authority; San Luis & Delta-Mendota Water Authority; San Joaquin River Exchange Contractors Water Authority; U.S. Army Corps of Engineers (USACE); U.S. Department of

Commerce, National Marine Fisheries Service (NMFS); U.S. Department of the Interior, Bureau of Indian Affairs (BIA); U.S. Department of the Interior, Bureau of Land Management (BLM); U.S. Department of the Interior, Fish and Wildlife Service (USFWS); and U.S. Environmental Protection Agency (EPA). Agencies consulted under NEPA (consistent with Section 1501.2 of the Council on Environmental Quality (CEQ) Regulations) include the California Department of Fish and Wildlife (CDFW), Central Valley Regional Water Quality Control Board (Central Valley Water Board), San Joaquin Valley Air Pollution Control District (SJVAPCD), and Federal Energy Regulatory Commission (FERC).

DWR is the California Environmental Quality Act (CEQA) Lead Agency for the Investigation, but has had limited funding to be an active participant. This Draft EIS has also been prepared in consideration of CEQA and State CEQA Guidelines to support the CEQA Lead Agency and Responsible and Trustee agencies that would be involved in approving a proposed action. However, at the time of release of this Draft EIS, DWR was unable to provide CEQA review. When a project (such as the Investigation) requires compliance with CEQA and NEPA, and the NEPA document is ready before the CEQA document – as is the case here – the CEQA Lead Agency (DWR) should use the EIS rather than preparing an EIR when the following two conditions occur:

1. An EIS will be prepared before an EIR would otherwise be completed for the project

2. The EIS complies with the CEQA Guidelines (see CEQA Guidelines section 15221)

Despite the similarities between NEPA and CEQA, there are several differences that require careful coordination between the Federal and State agencies responsible for complying with NEPA and CEQA. For example, CEQA requires discussions of mitigation measures and growth inducing impacts, and more recently a greenhouse gas emissions impact analysis. The approach to preparing this Draft EIS consistent with both NEPA and CEQA requirements is described where appropriate throughout this Draft EIS, including an overview of the considerations for conducting the impact analyses provided in Chapter 3, “Considerations for Describing the Affected Environment and Environmental Consequences.”

The Investigation's progress and results have been documented in a series of interim reports. The Investigation will culminate in a Final Feasibility Report and Final EIS, consistent with the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G) (WRC 1983); Reclamation policies, and directives and standards; State policies and guidance; and applicable environmental laws, regulations, and policies. The Draft Feasibility Report (Reclamation 2014) and this Draft EIS document the results of the feasibility study process to date, and build on the results and findings of previous planning documents, including the CALFED PEIS/R and ROD (CALFED 2000a and 2000b), *Phase 1 Investigation Report* (Reclamation and DWR 2003), *Initial Alternatives Information Report* (Reclamation and DWR 2005), and *Plan Formulation Report* (Reclamation and DWR 2008).

Extensive alternatives analysis was performed as part of the plan formulation process for the Investigation, with 22 reservoir sites evaluated for their ability to meet project objectives and/or the purpose and need, and in consideration of environmental effects, cost-effectiveness, and overall feasibility. The number of alternative dam and reservoir sites was reduced through a phased evaluation process. As alternative sites were eliminated from further detailed consideration, evaluation of the remaining alternative sites was conducted in progressively greater level of detail. This process resulted in the selection of Temperance Flat River Mile (RM) 274 Reservoir as the site which best meets the objectives, purpose and need, planning criteria, and provides the greatest overall and net benefits.

Study Authorization

Authorizations for the Investigation are described below.

Federal Authorization

In 2003, Federal authorization was provided to conduct a feasibility study for storage in the upper San Joaquin River Basin (Public Law 108-7, Division D, Title II, Section 215). This act authorized the Secretary of the Interior to conduct feasibility studies for several storage projects identified in the CALFED ROD (2000b), including the Investigation. Authorization was reaffirmed and supplemented by the October 2004 Water Supply, Reliability, and Environmental Improvement Act (Public Law 108-361).

State Authorization

California Water Code Section 227 authorizes DWR to study reservoirs or reservoir systems for gathering and distributing flood or other water not under beneficial use in any stream, stream system, lake, or other body of water.

Relationship to CALFED and Tiering

CALFED is a collaboration of 25 Federal and State agencies with regulatory and management responsibilities in the San Francisco Bay/Sacramento–San Joaquin Delta (Bay-Delta), originally established to develop a long-term comprehensive plan to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The objective of the collaborative planning process is to identify comprehensive solutions to the problems of ecosystem quality, water delivery reliability, water quality, and Sacramento-San Joaquin Delta (Delta) levee integrity.

In July 2000, the CALFED agencies released the Final CALFED PEIS/R (CALFED 2000a), which analyzed a range of alternatives to solve Bay-Delta system problems. Preliminary studies in support of the CALFED PEIS/R considered more than 50 surface water storage sites throughout California and recommended more detailed study of five sites identified in the subsequent ROD, issued in August 2000 (CALFED 2000a, 2000b, 2000c). The CALFED ROD described a Storage Program that included five surface water storage projects in the Central Valley as follows:

> *Expanding water storage capacity is critical to the successful implementation of all aspects of the CALFED Program. Not only is additional storage needed to meet the needs of a growing population but, if strategically located, it will provide much needed flexibility in the system to improve water quality and support fish restoration efforts. Water supply reliability depends on capturing water during peak flows and during wet years.*

The Investigation is one of the five surface water storage studies recommended in the ROD. For the upper San Joaquin River Basin, the CALFED ROD states the following:

> *… 250-700 [thousand acre-feet (TAF)] of additional storage in the upper San Joaquin watershed… would be designed to contribute to restoration of and improve water quality for the San Joaquin River and facilitate conjunctive water management and water exchanges that improve the quality of water deliveries to urban communities. Additional storage could come from enlargement of Millerton Lake at Friant Dam or a functionally equivalent storage program in the region.*

This document tiers from the CALFED Final PEIS/R (CALFED 2000a) and ROD (including CEQA certification) (CALFED 2000b). The CALFED Final PEIS/R can be reviewed at http://calwater.ca.gov/calfed/library/. Tiering is provided for in CEQ Regulations Section 1502.20 and CEQA Guidelines Section 15152.

Findings in the CALFED ROD established the initial basis for potential Federal interest in the Investigation; hence, the objectives and guidance identified in the CALFED ROD represent important context for the Investigation-specific planning objectives (2000b).

Relationship to San Joaquin River Restoration Program

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit challenging the renewal of long-term water service contracts between the United States and Central Valley Project (CVP) Friant Division contractors. After more than 18 years of litigation, the lawsuit, known as *NRDC et al. v. Kirk Rodgers et al.*, reached a Stipulation of Settlement (Settlement). The Settling Parties, including NRDC, Friant Water Users Authority, and the U.S. Departments of the Interior and Commerce, agreed on the terms and conditions of the Settlement, which was subsequently approved on October 23, 2006.

The Settlement establishes two primary goals:

- **Restoration Goal** – To restore and maintain fish populations in "good condition" in the mainstem San Joaquin River below Friant Dam to the confluence with

the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.

- **Water Management Goal** – To reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

The San Joaquin River Restoration Program (SJRRP) implements the Settlement, as authorized in 2009 by the San Joaquin River Restoration Settlement Act (Settlement Act).

The actions included in the Selected Alternative described in the SJRRP ROD (Reclamation 2012) are included in the future conditions evaluated in this Draft EIS. Achievement of the Settlement goals is independent of any alternatives evaluated in this Draft EIS.

Intended Use of Environmental Impact Statement

The purpose of this Draft EIS is to disclose the potential direct, indirect, and cumulative impacts of implementing a proposed action and a range of reasonable alternatives including the No Action Alternative, consistent with NEPA and CEQA requirements. This Draft EIS serves as an informational document for decision makers, public agencies, nongovernmental organizations, and the general public regarding the potential environmental consequences of implementing a proposed Federal action and a range of reasonable alternatives.

This Draft EIS is being circulated for public review. Comments received during the public review period will be considered by the lead agency, and responses to comments will be included in the Final EIS. Continued public outreach, including public hearings, will be conducted before completion of the Final EIS. Please see http://www.usbr.gov/mp/sccao/storage/ for more information on these meetings.

After the Final EIS is published, Reclamation may prepare and adopt a ROD to implement a recommended plan/preferred alternative, if authorized. This Draft EIS has been prepared consistent with CEQA requirements to support required State and/or local agency decisions and permits.

Purpose and Need for Action, and Objectives

NEPA regulations require a statement of "the underlying purpose and need to which the agency is responding in proposing the alternatives, including the Proposed Action" (40 Code of Federal Regulations [CFR] 1502.13). The State CEQA Guidelines require a clearly written statement of objectives, including the underlying purpose of a project (Section 15124(b)). The purpose, need, and objectives provided below are consistent with CALFED objectives and guidance.

Project Purpose and Need

The purpose of the proposed action is to increase storage of water from the upper San Joaquin River watershed to improve water supply reliability and operational flexibility in CVP San Joaquin Valley areas and other regions of California; and to enhance water temperature and flow conditions in the San Joaquin River downstream from Friant Dam for salmon and other native fish.

Alternatives were evaluated for their ability to meet the project purpose and need during alternatives development and screening. Action alternatives respond to needs related to water supply reliability and operational flexibility, San Joaquin River ecosystem enhancement opportunities, and other resource needs, as summarized below.

Water Supply Reliability and Operational Flexibility

California's water supply system faces critical challenges with demands exceeding supplies for urban, agricultural, and environmental (fisheries, wildlife refuges) water uses across the State. Without further investment in water management and infrastructure, current statewide shortages are expected to increase to approximately 4.9 million acre-feet per year by 2030. Challenges will be greater during drought years, when available surface water for environmental and agricultural purposes is in short supply, resulting in users turning to pumping water from an overdrafted groundwater system, exacerbating overdraft (DWR 2009).

Urban and required environmental water uses have each increased, resulting in increased competition and conflicting demands for limited water supplies. Increasing CVP and State Water Project (SWP) operational constraints have reduced the timing and volume of available water supply for agricultural and urban uses, leading to growing competition for limited

water resources. In addition, over time, projected climate change could impact precipitation and runoff, snowpack, flood risk management, water demand, and sea levels, and will further reduce water supply reliability. In light of current and future water supplies and demands and climate change effects, the CVP and SWP systems lack the flexibility in water delivery timing, location, and storage capacity that is needed to fully meet their multiple purposes.

In the Friant Division of the CVP, the 520 thousand acre-feet (TAF) storage capacity of Millerton Lake, located on the upper San Joaquin River, is small relative to the average annual inflow to the lake of approximately 1.8 million acre-feet. The development of additional storage capacity would provide Reclamation with operational flexibility and the ability to capture sufficient water in wet years to meet demands in other years.

San Joaquin River Ecosystem

Chinook salmon (*Oncorhynchus tshawytscha*) populations are known to be affected by many factors, including water temperature and flow conditions. The development of additional storage capacity provides opportunities to manage stored water supplies in a way that could enhance temperature and flow conditions in the San Joaquin River downstream from Friant Dam.

Other Resources

Several other needs associated with the San Joaquin River have been identified by various Federal and State agencies. Major storms during the past three decades have demonstrated that Friant Dam has little capacity to store water from large runoff events, resulting in flood releases downstream in almost 50 percent of the years. Demands for hydropower and ancillary services are expected to increase in the future. Demands are also increasing for water-oriented recreation in the Central Valley. San Joaquin River water quality downstream from Mendota Pool is degraded due to low flow and poor quality discharges. Additionally, urban drinking water treatment costs are rising.

Project Objectives

A set of primary and secondary planning objectives was developed for the Investigation to address the purpose and need. Primary objectives are those for which specific alternatives are formulated to address. Secondary planning objectives are actions, operations, or features that should be

considered in the plan formulation process, but only to the extent possible through pursuit of the primary objectives.

Primary Objectives

The primary planning objectives are as follows:

- Increase water supply reliability and system operational flexibility for agricultural, M&I, and environmental purposes in the Friant Division of the CVP, other San Joaquin Valley areas, and other regions of California.

- Enhance water temperature and flow conditions in the San Joaquin River downstream from Friant for salmon and other native fish.

Secondary Objectives

The secondary planning objectives are as follows:

- Reduce flood damages downstream from Friant Dam.

- Maintain the value of hydropower attributes in the study area.

- Maintain and increase recreational opportunities in the study area.

- Improve San Joaquin River water quality downstream from Friant Dam.

- Improve the quality of water supplies delivered to urban areas.

Study Area

The Study Area evaluated in this Draft EIS includes both a primary and an extended study area to reflect the localized effects of a potential new major dam and reservoir upstream from Friant Dam in the upstream portion of Millerton Lake, and the effects of subsequent water deliveries over a larger geographic area. The primary study area was refined as the Investigation progressed and the number and location of feasible storage sites narrowed. The primary study area presented in this Draft EIS includes the following (Figure ES-1):

- San Joaquin River upstream from Friant Dam to Kerckhoff Dam, including Millerton Lake and the area that would be inundated by the proposed Temperance Flat RM 274 Reservoir
- Areas that could be directly affected by construction-related activities, including the footprint of proposed temporary and permanent facilities upstream from Friant Dam

The extended study area encompasses the following (Figure ES-2):

- San Joaquin River downstream from Friant Dam, including the Sacramento-San Joaquin Delta
- Lands served by San Joaquin River water rights
- Friant Division of the CVP, including underlying groundwater basins in the eastern San Joaquin Valley
- South-of-Delta (SOD) water service areas of the CVP and SWP

Detailed descriptions of the Study Area and existing conditions of physical, biological, cultural, and socioeconomic resources within the study area are included in this Draft EIS.

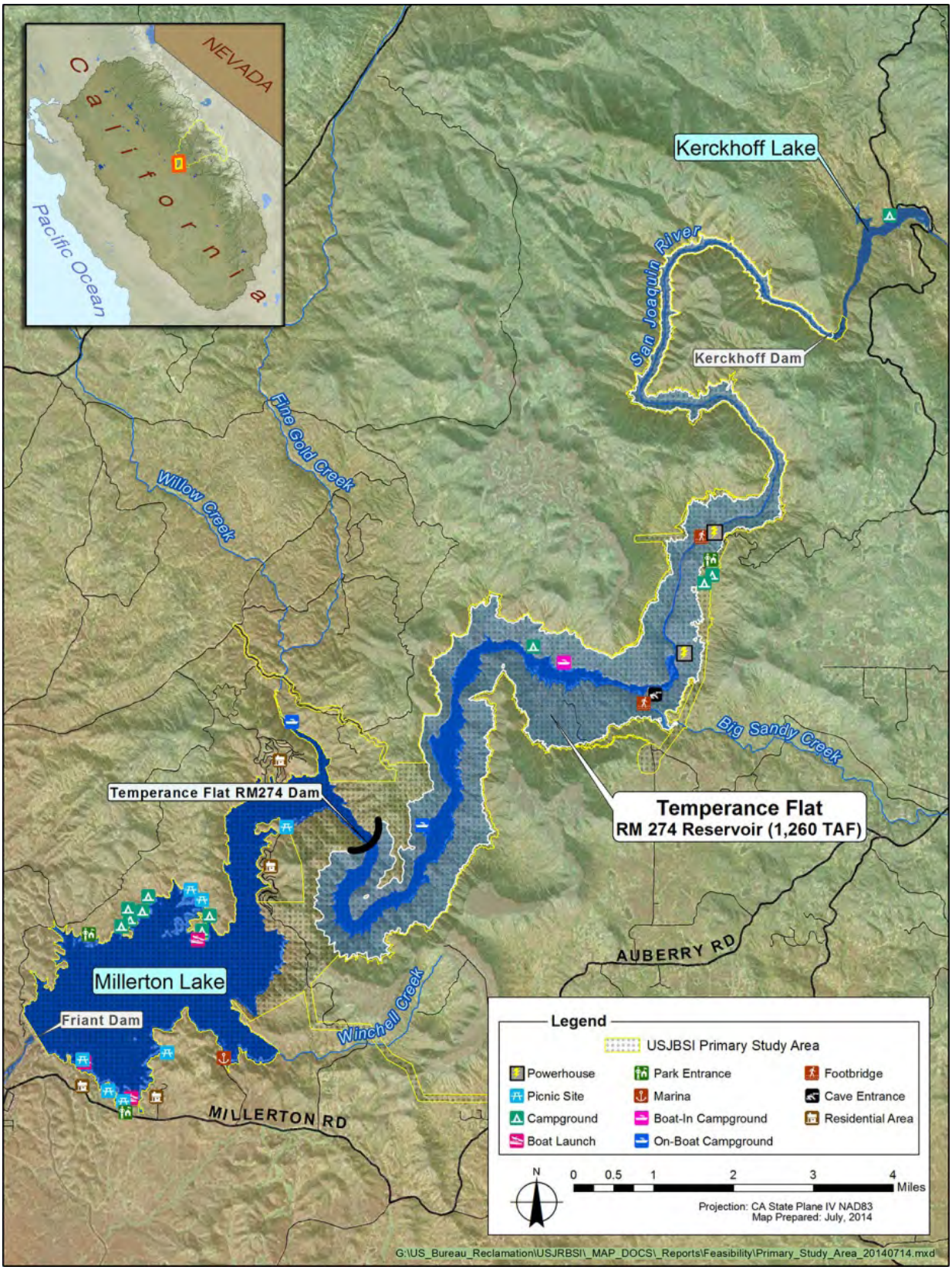

Figure ES-1. Primary Study Area Including Proposed Temperance Flat RM 274 Reservoir and Dam

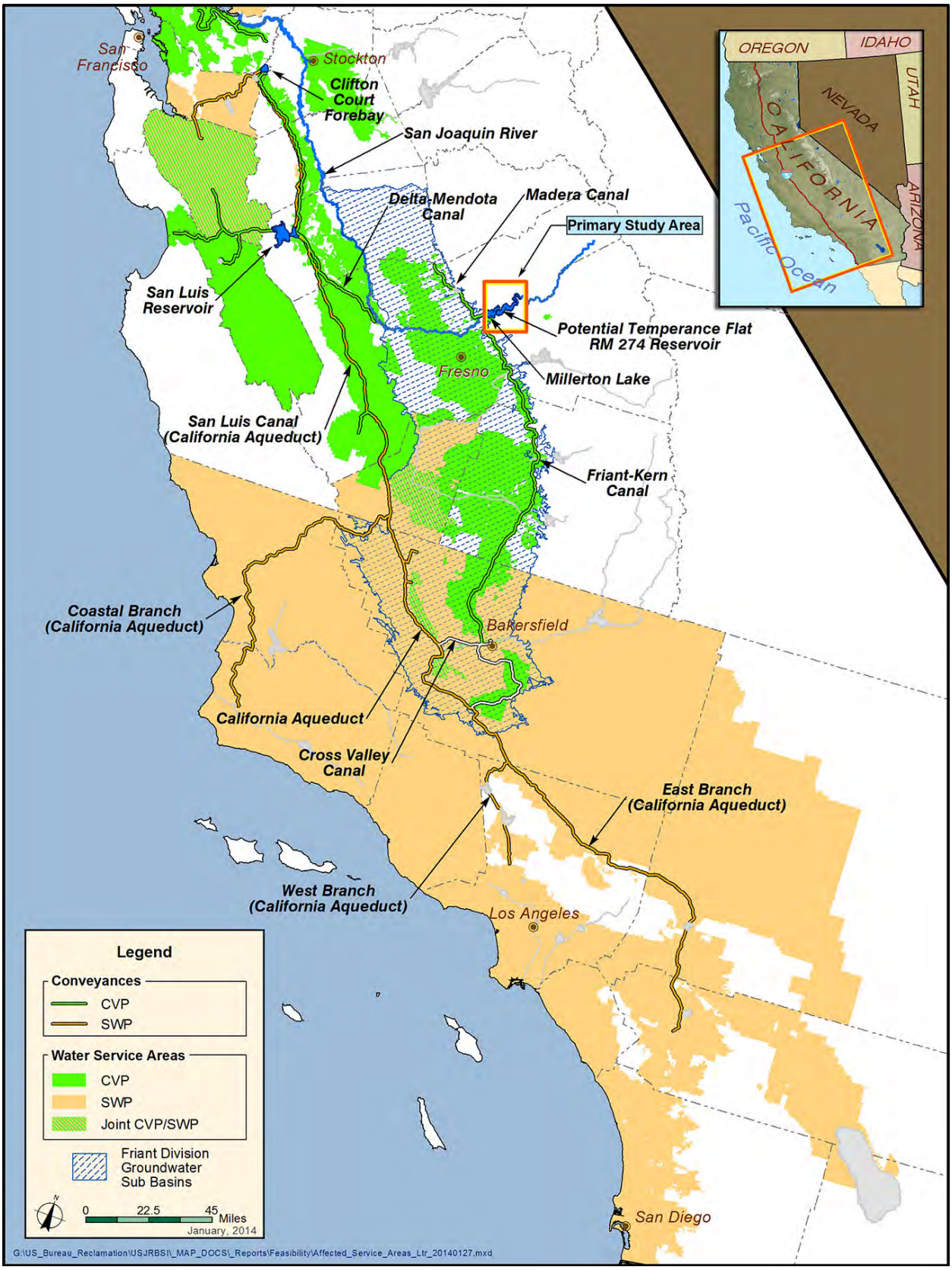

Figure ES-2. Extended Study Area

Description of Alternatives

The plan formulation process for the Investigation was divided into five phases, as shown in Figure ES-3. The Plan Formulation Phase included refinement of management measures, and formulation and refinement of initial alternatives, including selection of Temperance Flat RM 274 Reservoir as the site to be carried forward for more detailed analysis in the feasibility phases of the Investigation. The Temperance Flat RM 274 site was chosen for further evaluation after a detailed plan formulation and site selection process during the Investigation considering the ability to achieve site specific project objectives and/or the purpose and need. The site selection process evaluated 22 separate dam and reservoir sites, in addition to the 52 sites considered in the *CALFED Initial Surface Water Storage Screening* (2000c) and documented in the Plan Formulation Appendix to this Draft EIS. Alternative dam and reservoir sites included options suggested during the scoping process.

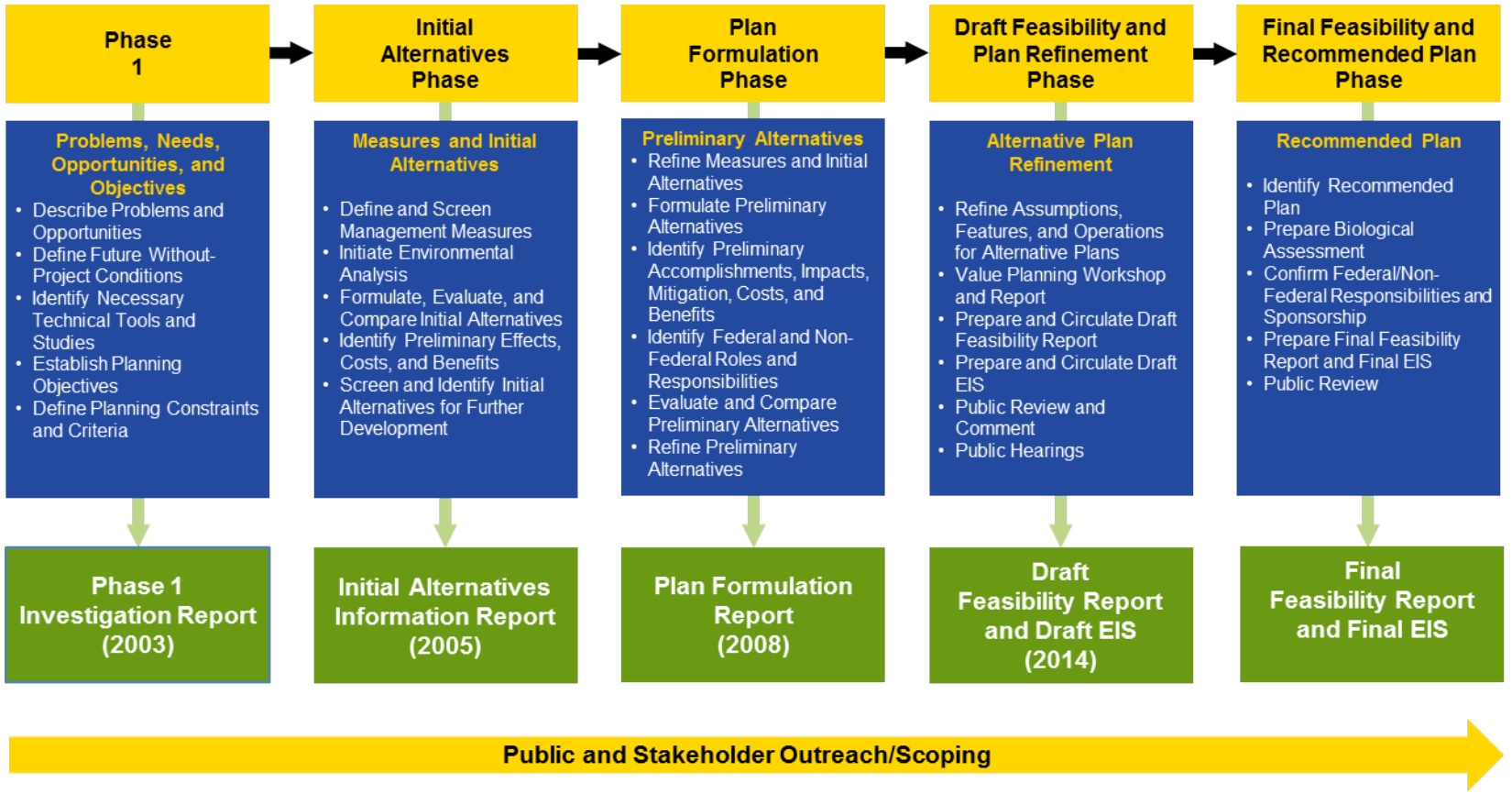

Figure ES-3. Plan Formulation Process

Action alternatives considered in the Draft EIS fundamentally consist of constructing new surface water storage facilities and operating them to address the primary planning objectives of increasing water supply reliability and enhancing temperature and flow conditions in the San Joaquin River. All of the action alternatives include the following management measures:

- **Temperance Flat RM 274 Reservoir** – All action alternatives would increase surface water storage capacity by constructing a dam in the upstream portion of Millerton Lake at RM 274.

- **Modify storage and release operations at Friant Dam** – All action alternatives would modify Friant Dam operations to facilitate coordinated operations with the additional storage in Temperance Flat RM 274 Reservoir and provide multi-purpose benefits.

- **Increase flood storage space in or upstream from Millerton Lake** – All action alternatives would increase incidental flood storage space by constructing a dam in the upstream portion of Millerton Lake at RM 274.

- **Construct new hydropower generation facilities –** All action alternatives would generate hydropower with a new powerhouse using releases from the new reservoir.

- **Replace or upgrade recreational facilities** – All action alternatives would develop replacement facilities to provide similar or greater recreational opportunities at Millerton Lake and the new reservoir.

No Action Alternative

Under the No Action Alternative, the project would not be implemented. The No Action Alternative (which also constitutes the No Project Alternative under CEQA) is considered the basis for comparison with potential action alternatives, consistent with NEPA and CEQA guidelines and the Federal P&G (WRC 1983) and *Principles and Requirements for Federal Investments in Water Resources* (CEQ 2013). NEPA and CEQA require consideration of future conditions under the No Action Alternative and No Project Alternative, respectively. Accordingly, the No Action Alternative reflects projected conditions in 2030 if the project is not implemented. CEQA also requires consideration of

existing conditions as a basis of comparison with the action alternatives for the impact analysis.

SJRRP Reasonably Foreseeable Actions Included in No Action Alternative

SJRRP actions implemented as of January 2014 are considered part of the existing conditions evaluated in this Draft EIS. These actions include the management and release of Restoration Flows pursuant to Paragraph 13 of the Settlement, recapture of Restoration Flows at existing facilities on the San Joaquin River, and recirculation of those flows to the Friant Division of the CVP, pursuant to Paragraph 16 of the Settlement (Natural Resources Defense Council et al. 2006).

Actions from the SJRRP PEIS/R ROD Preferred Alternative are included in the future conditions evaluated in this Draft EIS. All actions included under the existing conditions are also included in the future conditions. Additional SJRRP actions anticipated to be implemented in the future are reasonably foreseeable under the No Action Alternative, and are included in the future conditions.

Water Temperature and Flow Conditions

The No Action Alternative includes release of full Restoration Flows from Friant Dam to the San Joaquin River as provide in the Settlement. No actions other than SJRRP actions would be taken to enhance water temperature and flow conditions in the San Joaquin River downstream from Friant Dam under the No Action Alternative.

Water Supply Reliability and System Operational Flexibility

Under the No Action Alternative, Friant Dam would continue operating similarly to existing conditions (with implementation of the Settlement, including Restoration Flows). The No Action Alternative would continue to meet water supply demands at levels similar to existing conditions.

Flood Management, Hydropower Attributes, Recreation, San Joaquin River Water Quality, Urban Water Quality

Flood system improvements along the San Joaquin River downstream from Friant Dam are currently underway or will be initiated in the future by USACE, DWR, and local/regional flood management districts. Additionally, modifications to San Joaquin River flow conveyance features downstream from Friant Dam will be initiated in the future by Reclamation under the SJRRP.

California's demand for electricity is expected to substantially increase in the future. Under the No Action Alternative, Pacific Gas and Electric Company (PG&E) is assumed to relicense the existing Kerckhoff Hydroelectric Project under the Federal Energy Regulatory Commission in 2022. PG&E will have decommissioned the No. 2 unit in the Kerckhoff Powerhouse (PG&E 2012), which would decrease the powerhouse capacity below the 30-megawatt Renewable Portfolio Standard limit.

As California's population continues to grow, demands for water-oriented recreation at and near the lakes, reservoirs, streams, and rivers of the Central Valley would grow significantly. Regional population growth in the vicinity of Millerton Lake is expected to result in increased demand for recreation and increased visitation at Millerton Lake (Reclamation and State Parks 2010).

Several activities to improve San Joaquin River water quality conditions through reducing pollutant concentrations and/or reducing pollutant loading to the river are underway, including continued implementation of the Westside Regional Drainage Plan and the Grassland Bypass Project.

Under the No Action Alternative, there would be no actions to increase storage in the upper San Joaquin River Basin that could enhance CVP and/or SWP operational flexibility to meet water quality goals in the Delta or facilitate water quality exchanges and similar programs to improve urban water quality.

Action Alternatives

Each of the action alternatives includes Temperance Flat RM 274 Dam and Reservoir, including constructing a roller-compacted concrete arch gravity dam located 6.8 miles upstream from Friant Dam and 1 mile upstream from the confluence of Fine Gold Creek and Millerton Lake (see Figure ES-4 through ES-7). Temperance Flat RM 274 Reservoir would provide about 1,260 TAF of additional storage capacity. In addition, each action alternative includes features and related construction activities such as the following:

- Constructing diversion works and cofferdams; an intake structure; a powerhouse and transmission facilities; a valve house; and access roads

- Creating and using an aggregate quarry, batch plant, staging area, and waste area; specific locations are

subject to change based on further engineering and geotechnical analyses

- Modifying existing PG&E hydroelectric project facilities
- Relocating recreational facilities and reservoir area utilities
- Clearing vegetation from within the inundation area
- Coordinate with the SJRRP to revise Restoration Flow Guidelines, the Recapture and Recirculation Plan, and accounting for Recovered Water Account and delivery of water under Paragraph 16b, as necessary
- Coordinate with the SJRRP on scheduling of releases from Friant Dam for downstream delivery of additional water supply developed by Temperance Flat RM 274 Reservoir, and floodplain habitat planning efforts for Reach 2B and Reach 4B.

The action alternatives are designed to address the purpose and need, and project objectives, to varying degrees. The action alternatives vary based on operations (conveyance routing of new water supply, potential water supply beneficiaries, and reservoir minimum carryover storage targets), and intake feature configurations (low level or selective level intake for water temperature management). Operations of the action alternatives are summarized in Table ES-1.

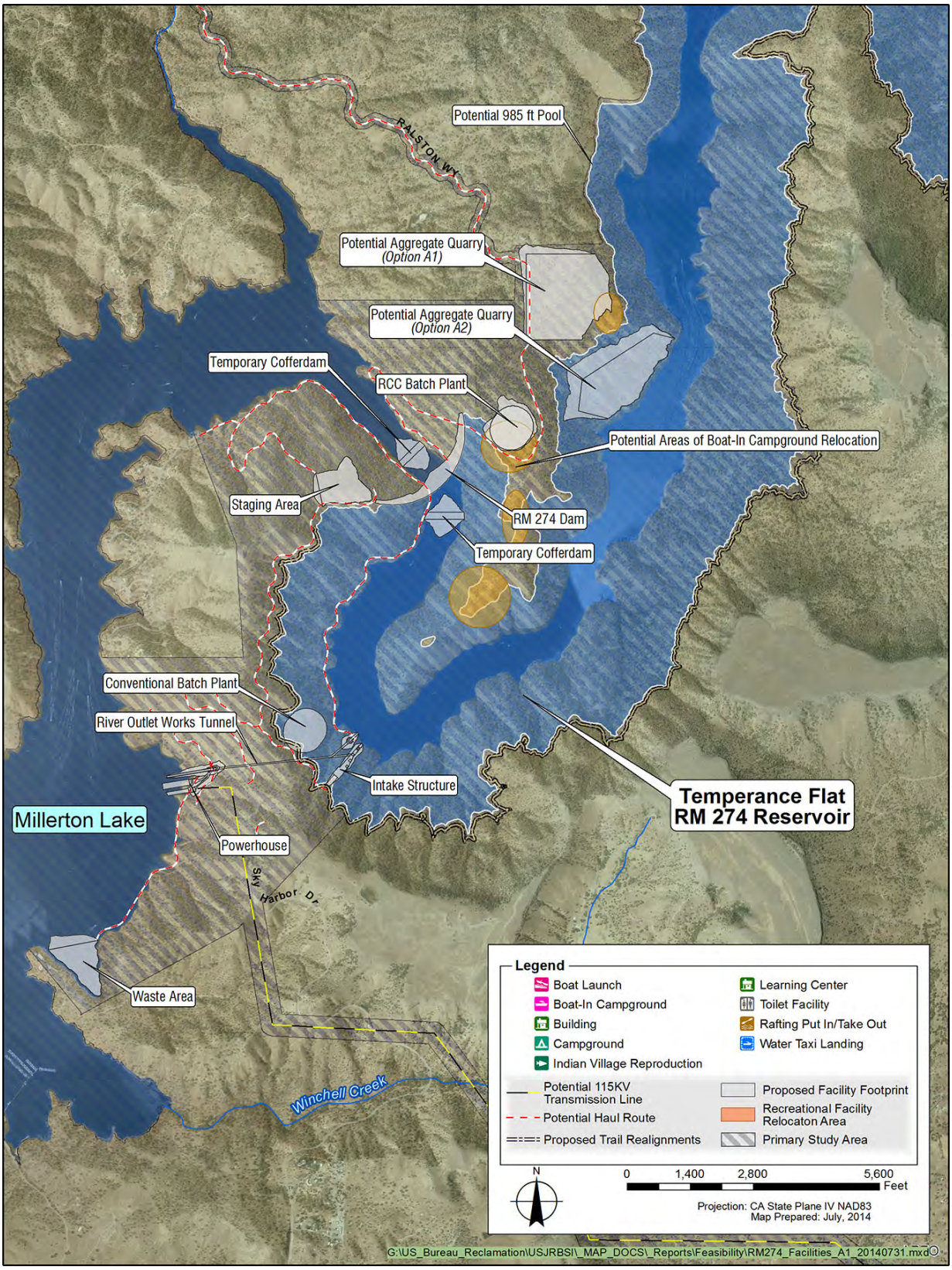

Figure ES-4. Proposed Temperance Flat RM 274 Reservoir Project Features for Quarry, Batch Plant, and Haul Road Option A

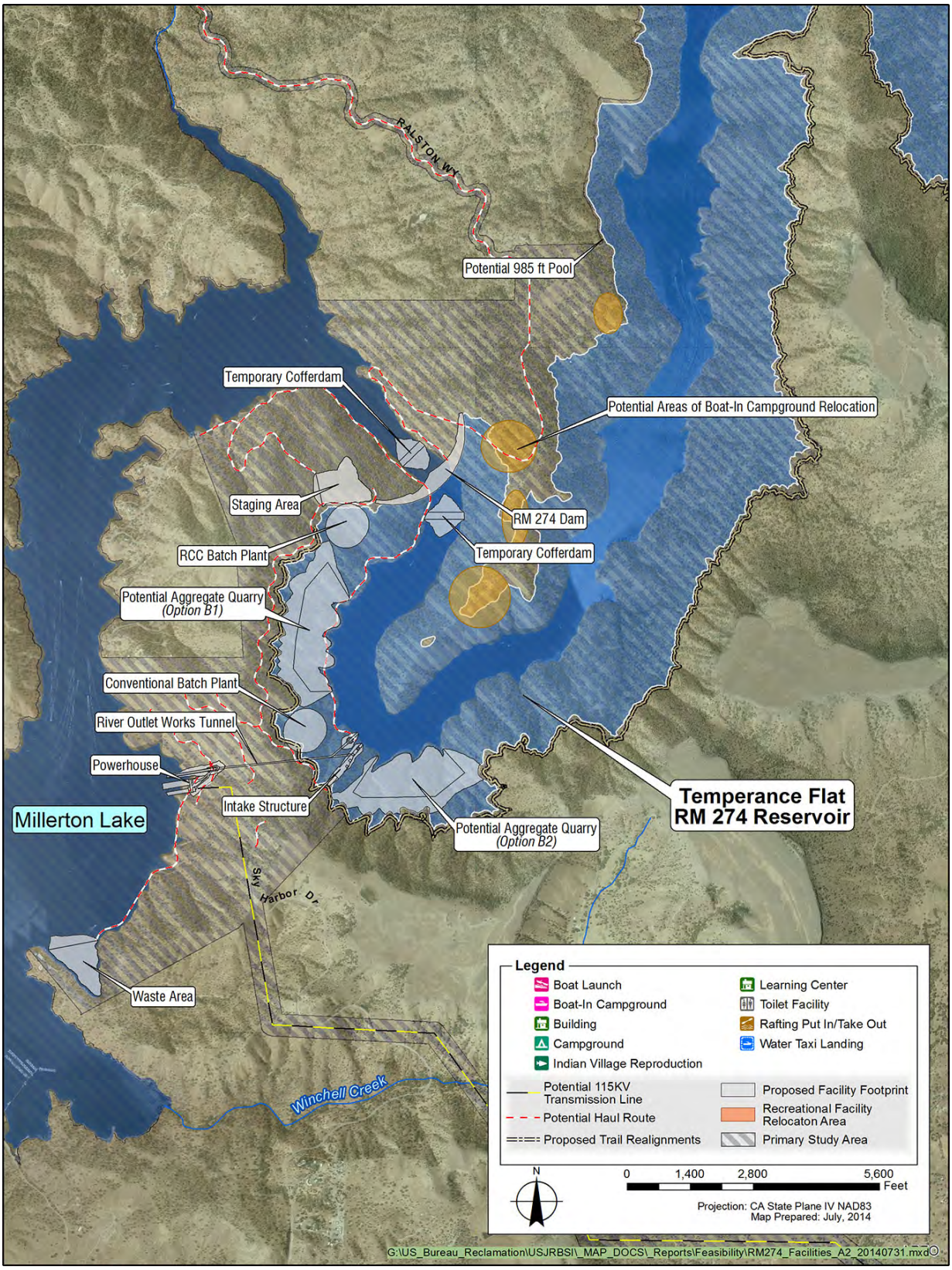

Figure ES-5. Proposed Temperance Flat RM 274 Reservoir Project Features for Quarry, Batch Plant, and Haul Road Option B

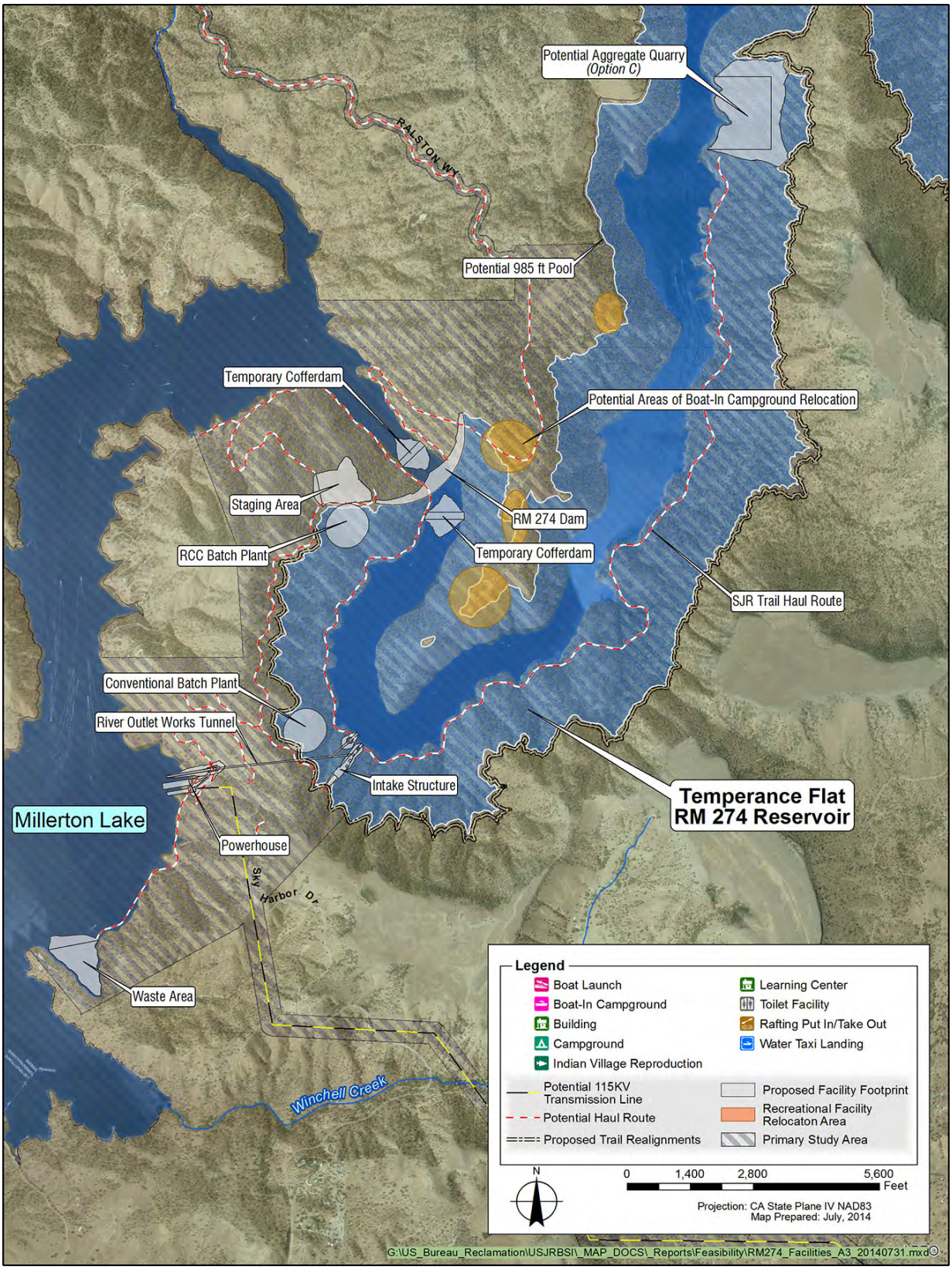

Figure ES-6. Proposed Temperance Flat RM 274 Reservoir Project Features for Quarry, Batch Plant, and Haul Road Option C

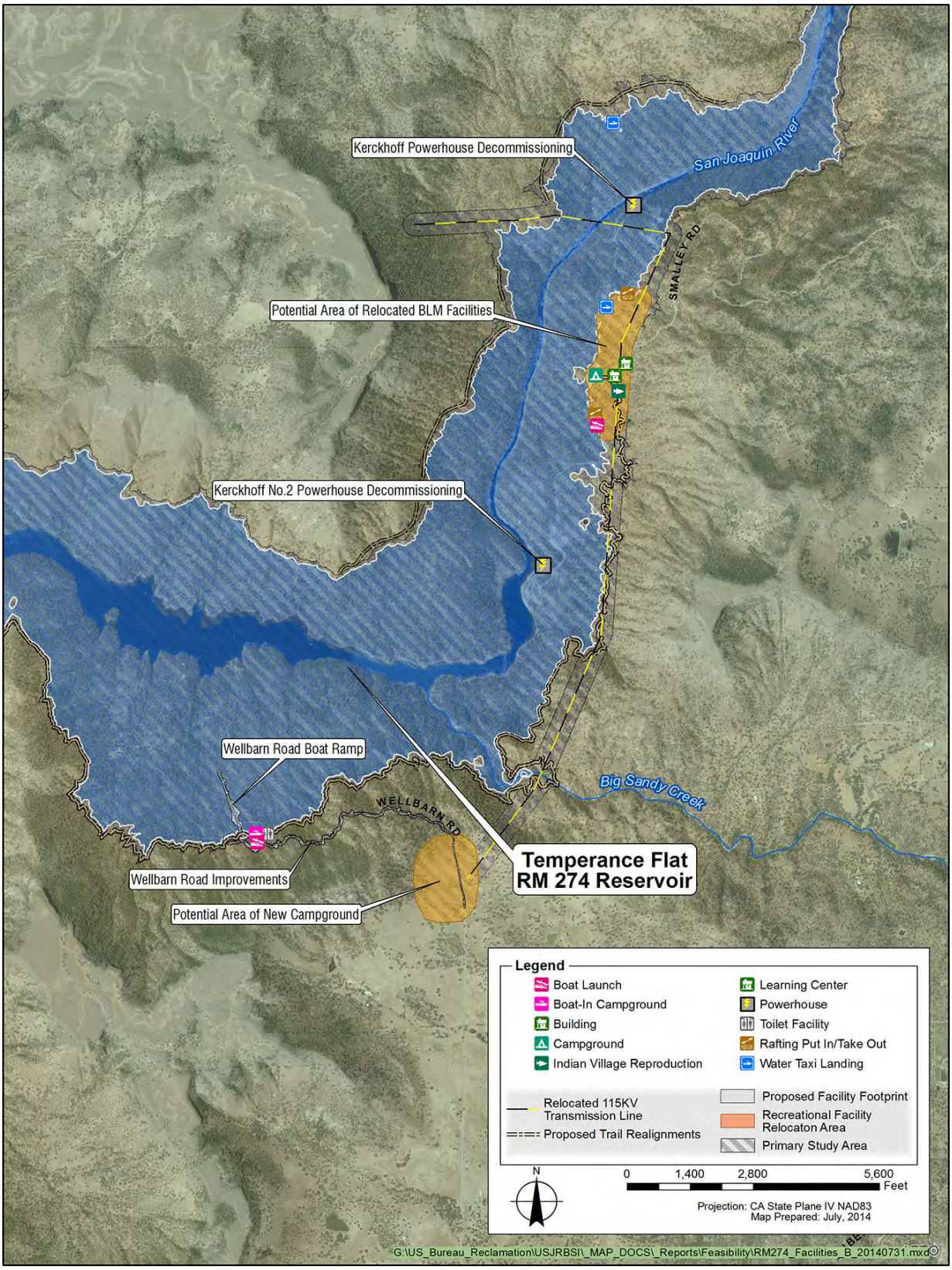

Figure ES-7. Proposed Temperance Flat RM 274 Reservoir Upstream Project Features

Table ES-1. Summary of Operations of Action Alternatives

Action Alternative	Conveyance Route to Friant Division of the CVP	Conveyance Route to CVP SOD Contractors	Conveyance Route to SWP SOD M&I Contractors	Millerton Lake Carryover Storage (TAF)	Temperance Flat Carryover Storage (TAF)	Intake Structure Type[1]
Alternative Plan 1	Friant-Kern/ Madera Canals	N/A	San Joaquin River[2]	340 TAF	200 TAF	LLIS
Alternative Plan 2	Friant-Kern/ Madera Canals	San Joaquin River[2, 3]	San Joaquin River[2]	340 TAF	200 TAF	LLIS
Alternative Plan 3	Friant-Kern/ Madera Canals	San Joaquin River[2, 3]	Friant-Kern Canal	340 TAF	200 TAF	LLIS
Alternative Plan 4	Friant-Kern/ Madera Canals	San Joaquin River[2, 3]	San Joaquin River[2]	340 TAF	325 TAF	SLIS
Alternative Plan 5	Friant-Kern/ Madera Canals	San Joaquin River[2, 3]	N/A	130 TAF[4]	100 TAF	LLIS

Notes:

[1] SLIS may be used for water temperature management.

[2] Water supply delivered via the San Joaquin River to Mendota Pool could be available for exchange with CVP SOD contractors, CVPIA Level 2 refuge supplies, or San Joaquin River Exchange Contractor supplies.

[3] Alternative Plans 2 through 5 would exchange Temperance Flat RM 274 Reservoir water supply for Level 2 refuges supplies delivered from the Delta, diversifying the CVPIA Level 2 water supply, and freeing up Delta supplies to be delivered to CVP SOD contractors.

[4] Millerton Lake would be operated with a preference for maintaining minimum storage at 340 TAF (when Temperance Flat is not full), but allows for Millerton Lake to be drawn down to 130 TAF when needed for water supply delivery.

Key:
CVP = Central Valley Project
CVPIA = Central Valley Project Improvement Act
Delta = Sacramento-San Joaquin Delta
LLIS = low-level intake structure
M&I = municipal and industrial
N/A = not applicable
RM = river mile
SLIS = selective-level intake structure
SOD = South-of-Delta
SWP = State Water Project
TAF = thousand acre-feet

Alternative Plan 1

Alternative Plan 1 would provide new water supplies to the Friant Division and SWP SOD M&I contractors. New supplies to SWP SOD M&I contractors would be delivered via the San Joaquin River and exchanged for Delta supplies at Mendota Pool, where an equivalent amount of Delta water could be delivered to SWP SOD M&I contractors via the California Aqueduct. Alternative Plan 1 would include a 200 TAF minimum carryover storage target in Temperance Flat RM 274 Reservoir. Millerton Lake would maintain a 340 TAF minimum carryover storage target, with a preference to store water in Temperance Flat RM 274 Reservoir before increasing Millerton Lake storage above the target.

Alternative Plan 1 would include a fixed, low level intake structure (LLIS) on Temperance Flat RM 274 Reservoir. The LLIS would be an inclined reinforced-concrete structure, located approximately 7,200 feet upstream from the dam and adjacent to and upstream from the outlet works entrance. The LLIS would consist of two, low-level fixed-wheel gates sized

in combination to pass 20,000 cubic feet per second during high-flow conditions. Water through each gate would flow directly into the outlet works tunnel. Because the lower gates would also function to release higher flood flows, both would be necessary but only one gate would be opened, as needed, for normal releases.

Alternative Plan 2

Alternative Plan 2 would provide new water supplies to Friant Division contractors via the Friant-Kern Canal and Madera Canals; and SWP SOD M&I contractors and CVP SOD contractors via the San Joaquin River through exchange at Mendota Pool and the California Aqueduct. This action alternative includes an LLIS and a 200 TAF minimum carryover storage target in Temperance Flat RM 274 Reservoir. Millerton Lake would maintain a 340 TAF minimum carryover storage target, with a preference to store water in Temperance Flat RM 274 Reservoir before increasing Millerton Lake storage above the target.

Alternative Plan 3

Alternative Plan 3 would provide new water supplies to: the Friant Division contractors via the Friant-Kern and Madera Canals; SWP SOD M&I contractors via existing cross-valley conveyance and the California Aqueduct; and CVP SOD contractors via the San Joaquin River through exchange at Mendota Pool and the California Aqueduct. This action alternative includes an LLIS and a 200 TAF minimum carryover storage target in Temperance Flat RM 274 Reservoir. Millerton Lake would maintain a 340 TAF minimum carryover storage target, with a preference to store water in Temperance Flat RM 274 Reservoir before increasing Millerton Lake storage above the target.

Alternative Plan 4

Alternative Plan 4 would provide new water supplies to the Friant Division contractors via the Friant-Kern and Madera Canals; and SWP SOD M&I contractors and CVP SOD contractors via the San Joaquin River through exchange at Mendota Pool and the California Aqueduct. This action alternative would include a selective-level intake structure (SLIS) and a 325 TAF minimum carryover storage target in Temperance Flat RM 274 Reservoir. Millerton Lake would maintain a 340 TAF minimum carryover storage target, with a preference to store water in Temperance Flat RM 274 Reservoir before increasing Millerton Lake storage above the target.

Alternative Plan 5

Alternative Plan 5 would provide new water supplies to Friant Division contractors via the Friant-Kern and Madera Canals; and CVP SOD contractors via the San Joaquin River through exchange at Mendota Pool and the California Aqueduct. This action alternative includes a LLIS and a 100 TAF minimum carryover storage target in Temperance Flat RM 274 Reservoir. Millerton Lake would maintain a 130 TAF minimum carryover storage target. This action alternative considers an operational preference for keeping Millerton Lake storage at 340 TAF, but allows for Millerton Lake to be drawn down to 130 TAF when needed for water supply delivery and to fill completely (to 450 TAF) once Temperance Flat RM 274 Reservoir is full. Alternative Plan 5 also includes modification of the water supply allocation operational rules to increase drier year water supply reliability with minimal impact to long term average annual water supply reliability.

Environmental Commitments

Reclamation, its contractors, and/or its construction partners would implement the following specified environmental commitments and best management practices as part of any action alternative identified for implementation to avoid or minimize potential impacts:

- **Develop and Implement Construction Management Plans –** If any action alternative is approved and authorized for implementation, Reclamation would then develop and implement construction management plans to avoid or minimize potential impacts on public health and safety during project construction, to the greatest extent feasible.

- **Comply with Permit Terms and Conditions** – If any action alternative is approved and authorized for construction, Reclamation would then require its contractors and suppliers, its general contractor, and all of the general contractor's subcontractors and suppliers to comply with all of the terms and conditions of all required project permits, approvals, and conditions attached thereto.

- **Provide Relocation Assistance through Federal Relocation Assistance Program** – All relocation and property acquisition activities, such as those associated with temporary easements during construction or condemnation for permanent changes in the study area,

would be performed in compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act) (49 CFR 24).

- **Develop and Implement Comprehensive Mitigation Strategy** – Reclamation would develop and implement a comprehensive mitigation strategy to minimize potential impacts to physical, biological, and socioeconomic resources described in this Draft EIS. The mitigation strategy, including a framework for mitigation implementation and monitoring, will be included in the Final EIS.

- **Develop and Implement Resource Management Plan** – Reclamation would lead development of a Resource Management Plan, in collaboration with BLM and State Parks, for lands potentially affected by implementation of action alternatives. The plan would be prepared as a long-term plan to coordinate management of resources in the area and define the roles and responsibilities of each agency.

- **Cultural Resources** – If a project is authorized, then Reclamation would implement regulations at 36 CFR Part 800 to identify historic properties (including traditional cultural properties, sacred sites, and sacred areas, as appropriate), assess effects, and resolve adverse effects through the consultation process. To further avoid, minimize, or mitigate adverse effects to cultural resources, Reclamation would implement the following actions, as part of the Section 106 process or independently:

    - Develop a Cultural Resources Data Recovery Plan.

    - Conduct subsurface archaeological investigations before ground disturbing activities.

    - Stop work for discovery of previously undiscovered cultural resources during project construction.

    - Stop potentially damaging work if human remains are uncovered during construction.

    - Reduce through the Secretary of the Interior Standards to Heritage Documentation Programs

standards for buildings that are listed, or are eligible for listing, on the National Register of Historic Places.

- **Develop and Implement Stormwater Pollution Prevention Plan** – Any project authorized for construction would be subject to construction-related stormwater permit requirements of the Federal Clean Water Act National Pollutant Discharge Elimination System program. Reclamation would obtain any required permits through the Central Valley Regional Water Quality Control Board before conducting any ground-disturbing construction activity.

- **Fisheries Conservation** – To minimize potential adverse effects on fish species, Reclamation would implement in-water construction work windows timed to cause the least disturbance to sensitive fish species, monitor construction activities for potential impacts to important fishery resources, perform fish rescue/salvage within the construction area, and prepare a letter report detailing the methodologies used and the findings of fish monitoring and rescue efforts.

- **Water Quality Protection** – To minimize potential adverse effects to water quality, Reclamation would implement in-water construction work windows, comply with all water quality permits and regulations, and implement water quality best management practices.

- **Revegetation Plan** – Reclamation, in conjunction with cooperating agencies and private landowners, would prepare a comprehensive revegetation plan to be implemented in conjunction with other management plans.

- **Invasive Species Management** – Reclamation would develop and implement a control plan to prevent the introduction of zebra/quagga mussels (*Dreissena rostriformis bugensis*), invasive plants, and other invasive species to project areas.

- **Construction Material Disposal** – Reclamation's contractors would take measures to recycle or reuse demolished materials, such as steel or copper wire,

concrete, asphalt, and reinforcing steel, as required and where practical.

- **Asphalt Removal** – Per California Fish and Game Code 5650 Section (a), all asphaltic roadways and parking lots inundated by project implementation would be demolished and removed according to Fresno or Madera County standards, as applicable. Asphalt would be disposed of at an approved and permitted waste facility.

- **Reduce Fugitive Dust Emissions** – For reducing construction-related fugitive dust emissions, Reclamation would submit a dust control plan, and construction activities would not commence until SJVAPCD has approved the plan. Reclamation would also implement the additional SJVAPCD-recommended enhanced and additional control measures to further reduce fugitive dust emissions.

- **Fire Protection and Prevention Plan** – To minimize the risk of wildfire or threat to workers, property, and the public, Reclamation would prepare and implement a fire protection and preventions plan addressing dispensing of flammable/combustible liquids; welding and cutting; use, storage, and transport of compressed gas cylinders; management of open and enclosed storage yards or facilities; fire prevention measures; and fire emergency response.

Summary of Alternative Plan Accomplishments

Accomplishments of the action alternatives are summarized in Table ES-2.

Table ES-2. Potential Physical Accomplishments of Action Alternatives

Potential Physical Accomplishments[1,2]	Alternative Plan 1	Alternative Plan 2	Alternative Plan 3	Alternative Plan 4	Alternative Plan 5
Dry and Critical Year Increase in Total Delivery (TAF)	19	24	30	21	121
Long-Term Average Annual Increase in Agricultural Delivery (TAF)[3]	30	49	52	41	94
Long-Term Average Annual Increase in M&I Delivery (TAF)	40	22	24	20	-7
Long-Term Average Annual Increase in Total Delivery (TAF)	70	71	76	61	87
Long-Term Average Annual Spring-Run Chinook Abundance Increase–High SAR (percent)[4]	2.8%	2.8%	0.6%	4.9%	-8.8%
Dry and Critical Year Spring-Run Chinook Abundance Increase–High SAR (percent)[4]	15.9%	13.2%	14.7%	13.2%	18.3%
Long-Term Average Annual Spring-Run Chinook Abundance Increase–Low SAR (percent)[4]	0.6%	0.4%	-0.6%	2.8%	-13.1%
Dry and Critical Year Spring-Run Chinook Abundance Increase–Low SAR (percent)[4]	14.0%	9.2%	13.3%	11.1%	16.3%
Net Increase in Friant Dam Hydropower Generation (GWh/year)	15.7	15.6	15.6	15.7	14.0
Replacement of Kerckhoff Hydroelectric Project Value (percent)[5]	83.8%	83.8%	83.8%	91.2%	73.4%
Increase in Recreation (thousands of visitor-days)[6]	108	109	106	120	69
Increase in Incidental Flood Space (TAF)[7]	354 – 481	353 – 479	351 – 470	243 – 347	406 – 555

Notes:

[1] Operations based on Reclamation March 2012 CalSim II Benchmark with Formal ESA Consultation on the Proposed Coordinated Operations of the CVP and SWP (USFWS 2008) and Biological Opinion and Conference Opinion on the Long-Term Operations of the CVP and SWP (NMFS 2009).

[2] Accomplishments are reported as changes in comparison to No Action Alternative.

[3] Simulated water demands in the Friant Division of the CVP are based on existing Class 1 and Class 2 contracts.

[4] Action alternatives are compared to the No Action Alternative, which varies depending on the SAR.

[5] Impacts to Kerckhoff Hydroelectric Project will be mitigated. Costs include additional reimbursement required after onsite replacement.

[6] Sum of potential annual visitor days at Millerton Lake and Temperance Flat RM 274 Reservoir.

[7] Incidental flood space is the flood space available during November through March at the 90 percent exceedance.

Key:
CVP = Central Valley Project
GWh/year = gigawatt hours per year
M&I = municipal and industrial
mg/L = milligrams per liter
NE = not evaluated
RM = river mile
SAR = smolt-to-adult return rate
SWP = State Water Project
TAF = thousand acre-feet
TDS = total dissolved solids

Alternatives Considered but Eliminated from Detailed Evaluation

A wide range of alternatives were formulated and evaluated in the feasibility study and this Draft EIS based on the study authorities and other pertinent direction, problems, needs, and opportunities, primary and secondary planning objectives, and project purpose and needs. The number of alternatives, including 22 dam and reservoir sites, was reduced through a phased evaluation process. Some project alternatives were not retained because they did not adequately meet (or were beyond the scope of) the purpose and need statement, did not contribute to both primary planning objectives, had extremely high costs, or had high social or environmental impacts. These alternatives are not analyzed in the Draft EIS, but are described in the Plan Formulation Appendix to this Draft EIS, along with assumptions, findings, and rationale for their elimination from further consideration.

Major Conclusions of the Environmental Analysis

An environmental document prepared to comply with NEPA must consider the context and intensity of the potential environmental effects that would be caused by, or result from, the proposed action. Under NEPA, the significance of an effect is a determining factor in whether an EIS must be prepared. An environmental document prepared to comply with CEQA must identify the significance of the environmental effects of a proposed project. State CEQA Guidelines, Section 15382, defines a significant effect on the environment as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project.”

This Draft EIS documents the analysis of the potential direct and indirect effects of the No Action Alternative and action alternatives, and cumulative effects of the action alternatives, for each environmental resource area. Direct effects are those that would be caused by the action and would occur at the same time and place. Indirect effects are reasonably foreseeable consequences that may occur at a later time or at a distance from the project area. Examples of indirect effects are growth inducement and other effects related to changes in land use patterns, population density, or growth rate, and related effects on the physical environment. Cumulative effects are those

which would result from the incremental impact of the action alternatives when added to other past, present, and reasonably foreseeable future actions.

The effects of the No Action Alternative and action alternatives were determined by comparing estimates of resulting conditions with baseline conditions. These baseline conditions differ between NEPA and CEQA. Under NEPA, the No Action Alternative (i.e., expected future conditions without the project) is the baseline to which the action alternatives are compared; the No Action Alternative is also compared to existing conditions. Under CEQA, existing conditions are the baseline to which alternatives are compared.

Summary of Impacts

The action alternatives would affect environmental resources in the primary and extended study areas. Some of the impacts would be temporary, construction-related effects that would be less than significant or would be reduced to less-than-significant levels through mitigation. Other impacts would be permanent. In addition, some effects of the project would be beneficial. Under CEQA, potentially significant impacts are treated as significant impacts. Therefore, consistent with CEQA, unless feasible mitigation measures have been identified to reduce the magnitude of a significant or potentially significant impact to less than significant, the level of significance after mitigation is considered significant and unavoidable.

Table ES-3 summarizes the environmental impacts of the action alternatives, the level of significance of each impact before mitigation, recommended mitigation measures, and the level of significance of each impact after mitigation. Table ES-4 lists the cumulative impacts of the action alternatives.

Summary of Significant and Unavoidable Impacts

After consideration of actions, operations, and features to avoid, mitigate, and/or compensate for adverse effects, the action alternatives would likely result in some significant and unavoidable or potentially significant and unavoidable impacts. Direct and indirect impacts, including potentially significant and unavoidable or significant and unavoidable impacts, are listed in Table ES-3. Cumulative impacts are listed in Table ES-4. These impacts are described in Chapters 4 through 26 (direct and indirect impacts) and Chapter 27 (cumulative impacts).

Areas of Controversy

Federal, State, and local stakeholders identified several areas of concern during the public outreach activities for the Investigation, including public scoping activities, agency meetings, public review and comment on the Draft Feasibility Report, and related ongoing public outreach activities. Major concerns include: impacts on air quality, biological resources, cultural resources, hydropower generation, the Millerton Lake Cave system, and the San Joaquin River Gorge area; and the potential to induce growth.

Issues to be Resolved

Special Designations

BLM concluded a preliminary determination to suggest that the San Joaquin River segment from Kerckhoff Dam to Kerckhoff Powerhouse is suitable for inclusion in the National Wild and Scenic Rivers System during development of the Draft Bakersfield Resource Management Plan and EIS (2011 and 2012). Inclusion of this segment of the San Joaquin may affect the Investigation. Next steps for inclusion of this segment in the National Wild and Scenic Rivers System would include Congressional determination of suitability or nonsuitability, or Secretary of the Interior's determination of suitability or nonsuitability and submittal of reports to the president. The president would then report recommendations to Congress, and propose designation.

Off-Site Mitigation for Impacts on Biological Resources

Potential mitigation lands containing wetland and special-status species habitat comparable to habitat that would be affected by the action alternatives have been identified near the study area. Reclamation is initiating informal consultation with the USFWS to identify appropriate mitigation requirements. Mitigation strategies for biological impacts will be discussed in more detail in the Final Feasibility Report and Final EIS.

Hydropower Mitigation

The onsite hydropower replacement option (powerhouse connected to the outlet works of Temperance Flat RM 274 Reservoir), combined with additional mitigation, as needed, would be cost effective and is Reclamation's preferred power mitigation option for the Investigation. Additional powerhouse refinements may be conducted before completing the

feasibility study, and additional operational scenarios could be evaluated in the future that may further improve the value of onsite hydropower mitigation. Additional mitigation components may also be needed and could include a range of onsite and offsite power generation and transmission actions. Hydropower mitigation issues will continue to be coordinated with affected stakeholders during development of the Final Feasibility Report and Final EIS.

Identification of Preferred Alternative/Recommended Plan

Consistent with the CEQ Regulations, the preferred alternative for implementation will be identified in the Final EIS. Ultimately, the alternative that best meets the stated objectives and maximizes net public benefits will be identified with supporting rationale and documentation. The alternative recommended for implementation, or Recommended Plan in the Final Feasibility Report, may or may not be identified as the Environmentally Preferable Alternative, consistent with NEPA; the National Economic Development Plan, consistent with the P&G; the Least Environmentally Damaging Practicable Alternative, consistent with the Clean Water Act; or the Environmentally Superior Alternative, consistent with CEQA. A non-Federal sponsor may prefer another plan (locally preferred plan), which may be considered and recommended by the Secretary of the Interior for approval and authorization by Congress.

Public Involvement and Next Steps

Reclamation and DWR initiated the formal environmental analysis process for the Investigation consistent with NEPA and CEQA in February 2004 with the issuance of a Notice of Intent (NOI) and a Notice of Preparation (NOP), respectively. Pursuant to NEPA, the NOI notified the public of Reclamation's intent to prepare an EIS and provided notice of public scoping meetings. The NOI was published on February 3, 2004 in the Federal Register (Volume 69, pages 5184-5185). Pursuant to CEQA, an NOP was submitted by DWR to the State Clearinghouse on February 6, 2004 and published on March 22, 2004 in the State Clearinghouse Newsletter (February 1 through 15, 2004, page 41).

Public scoping activities are conducted as part of compliance with both NEPA and CEQA. In 2004, Reclamation and DWR convened a set of four public scoping meetings in Sacramento

(March 16), Modesto (March 16), Friant (March 17), and Visalia (March 18), California to inform interested groups and individuals about the Investigation and to solicit ideas and comments. A Scoping Report was prepared consistent with Reclamation guidance and in compliance with NEPA requirements, and released in December 2004 (Reclamation and DWR 2004).

In addition to scoping activities, other public outreach activities have included seven workshops held during Phase 1 of the Investigation; more than 30 stakeholder briefings that have been organized by Reclamation at the request of agencies and stakeholder groups; four project update public meetings held during the initial alternatives and plan formulation phases of the Investigation; local stakeholder interviews regarding regional opportunities for groundwater storage and banking; Study area tours of Millerton Lake and alternative dam site location(s) given by the Investigation team to stakeholders and organized by local water resources interest groups; public release of major Reclamation studies and reports for the Investigation; and a project website for the Investigation (http://www.usbr.gov/mp/sccao/storage).

In addition to stakeholder and public outreach efforts, interagency coordination has assisted Reclamation in determining the scope of this Draft EIS, developing project components and objectives, identifying the range of alternatives, and defining potential environmental impacts, impact significance, and mitigation measures.

This Draft EIS will be circulated for public and agency review and comment for 45 days following the date when the EPA publishes the notice of availability of weekly receipt of environmental impact statements in the Federal Register. During the public comment period, Reclamation intends to hold public meetings/hearings. Comments provided during the public review period will be addressed in the Final EIS.

A Final EIS will be prepared and circulated in accordance with NEPA requirements and will include responses to all comments. When the Final EIS is complete, Reclamation will publish the document, along with the Final Feasibility Report, and the notice of availability will be printed in the Federal Register, which will mark the start of a 30-day public review period before Reclamation could issue a ROD to implement a recommended plan/preferred alternative, if authorized by Congress.

Table ES-3. Summary of Impacts and Mitigation Measures

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
AQ-1: Project-Generated Construction-Related Criteria Air Pollutant and Precursor Emissions that would Violate or Contribute Substantially to an Existing or Projected Violation, or Expose Sensitive Receptors to Substantial Pollutant Concentrations	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	AQ-1: Reduce Mobile-Source Exhaust Emissions	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
AQ-2: Project-Generated Construction-Related Toxic Air Contaminant Emissions that would Expose Sensitive Receptors to Substantial Pollutant Concentrations and Increased Health Risks	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	AQ-2: Implement Mitigation Measure AQ-1, Reduce Mobile-Source Exhaust Emissions	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
AQ-3: Project-Generated Operational Criteria Air Pollutant and Precursor Emissions that would Violate or Contribute Substantially to an Existing or Projected Violation, or Expose Sensitive Receptors to Substantial Pollutant Concentrations	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
AQ-4: Generation of Greenhouse Gas Emissions that would Significantly Impact the Environment	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	AQ-4: Reduce Greenhouse Gas Emissions	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-1: Loss of Riverine Habitat for Lotic Fish Species	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	None Available	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
FSH-2: Short-term Degradation of Aquatic Habitat from Accidental Spills or Seepage of Hazardous Materials during Construction of Temperance Flat RM 274 Dam and Other Facilities	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
FSH-3: Short-term Degradation of Aquatic Habitat from Increased Turbidity or Sedimentation during Construction of Temperance Flat RM 274 Dam and Other Facilities	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-4: Loss of Reservoir Fish Habitat Resulting from Changes in Water Temperature	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
FSH-5: Changes to Reservoir Fish Habitat Caused by Turbidity from Increased Surface Area of Exposed Shoreline	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-6: Loss of Reservoir Fish Caused by Entrainment	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
FSH-7: Change in Shallow-Water Habitat for Largemouth Bass, Spotted Bass, Smallmouth Bass, and Other Sport Fish Species	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	Beneficial		Beneficial
		Alternative Plan 2	Beneficial		Beneficial
		Alternative Plan 3	Beneficial		Beneficial
		Alternative Plan 4	Beneficial		Beneficial
		Alternative Plan 5	Beneficial		Beneficial
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-8: Change in Open-Water Habitat for Striped Bass and American Shad	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	Beneficial		Beneficial
		Alternative Plan 2	Beneficial		Beneficial
		Alternative Plan 3	Beneficial		Beneficial
		Alternative Plan 4	Beneficial		Beneficial
		Alternative Plan 5	Beneficial		Beneficial
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
FSH-9: Loss of Spawning Habitat of American Shad and Striped Bass	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	None Available	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-10: Change in Habitat Potential for Spring-Run Chinook Salmon	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	Beneficial	None Required	Beneficial
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	PS	None Available	PSU
FSH-11: Change in Water Temperature Conditions Supporting Juvenile Salmon and Steelhead Migration	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	S	None Available	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-12: Change to Habitat for Moderately Tolerant Native Fish Species from Altered Water Temperatures	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS and Beneficial	None Required	LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial
FSH-13: Changes to Habitat for Highly Tolerant Native Fish Species from Altered Water Temperatures	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS and Beneficial	None Required	LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-14: Changes to Spawning and Rearing Habitat from Changes to Flood Pulses and Floodplain Connectivity	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	PS and Beneficial	None Required	PSU and Beneficial
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
FSH-15: Change in Fish Habitat and Migratory Behaviors from Changes in Water Temperatures	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-16: Change in Fish Habitat and Migratory Behaviors from Changes in Flows	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS and Beneficial	None Required	LTS and Beneficial
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
FSH-17: Loss of Fish Habitat from Changes in Tributary Flows	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-18: Effects on Delta Fish Habitat from Changes in Water Temperatures and Dissolved Oxygen Concentrations	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	PS	None Available	PSU
		Alternative Plan 1	PS		PSU
		Alternative Plan 2	PS		PSU
		Alternative Plan 3	PS		PSU
		Alternative Plan 4	PS		PSU
		Alternative Plan 5	PS		PSU
FSH-19: Loss of Suitable Fish Habitat from Salinity Changes in the Delta	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-20: Loss of Suitable Fish Habitat from Change in Flow Patterns in the South Delta	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
FSH-21: Reduction in Fish Abundance from Changes in Exports and Entrainment in the South Delta	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	PS	None Required	PSU
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FSH-22: Loss of Suitable Fish Habitat Resulting from Changes in X2	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	PS	None Required	PSU
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
BOT-1: Loss of Special-Status Plants and Loss or Degradation of Special-Status Plant Habitat	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	BOT-1: Relocate Special-Status Plant Populations	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
BOT-2: Loss of Riparian Habitat and Other Sensitive Communities	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	BOT-2: Compensate for Loss of Specific Habitats	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
BOT-3: Loss or Degradation of Waters of the United States, Including Wetlands, and Waters of the State	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	BOT-3: Ensure No Net Loss of Wetlands	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
BOT-4: Introduction and Spread of Invasive Plants	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	BOT-4: Implement a Weed Management Plan	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
BOT-5: Elimination of a Plant Community or Substantial Reduction in the Number or Restriction of the Range of an Endangered, Rare, or Threatened Plant Species	Primary Study Area	No Action Alternative	NI		NI
		Alternative Plan 1	LTS	None Required	LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
BOT-6: Conflict with Local or Regional Policies and Plans Protecting Wetland or Botanical Resources	Primary Study Area	No Action Alternative	NI	None Required BOT-6: Implement Mitigation Measures BOT-1, BOT-2, and BOT-3	NI
		Alternative Plan 1	S		LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
BOT-7: Conflict with Provisions of an Adopted Habitat Conservation Plan Protecting Wetland or Botanical Resources	Primary Study Area	No Action Alternative	NI		NI
		Alternative Plan 1	NI	None Required	NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 4	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
WLD-1: Substantial Impact on Special-Status Invertebrates	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	WLD-1a: Mitigate Impacts on VELB, WLD-1b: Mitigate Impacts on Pipevine Swallowtail, WLD-1c: Mitigate Impacts on Listed Vernal Pool Branchiopods	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
WLD-2: Substantial Impact on Special-Status Amphibians and Reptiles	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	WLD-2a: Mitigate Impacts on California Tiger Salamander and Western Spadefoot, WLD-2b: Mitigate Impacts on Foothill Yellow-Legged Frog and California Red-Legged Frog, WLD-2c: Mitigate Impacts on Western Pond Turtle, WLD-2d: Mitigate Impacts on Coast Horned Lizard	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
WLD-3: Substantial Impact on Special-Status Raptors	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	WLD-3a: Mitigate Impacts on Bald Eagle and Golden Eagle, WLD-3b: Mitigate Impacts on California Spotted Owl, WLD-3c: Mitigate Impacts on Burrowing Owl WLD-3d: Mitigate Impacts on American Peregrine Falcon and Prairie Falcon, WLD-3e: Mitigate Impacts on Cooper's Hawk and Sharp-Shinned Hawk, WLD-3f Mitigate Impacts on Osprey, WLD-3g: Mitigate Impacts on Northern Harrier	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
WLD-4: Substantial Impact on Special-Status Passerines or Birds Protected by the Migratory Bird Treaty Act	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	WLD-4a: Mitigate Impacts on Yellow Warbler, WLD-4b: Mitigate Impacts on Grasshopper Sparrow and California Horned Lark, WLD-4c: Mitigate Impacts on Loggerhead Shrike, WLD-4d: Mitigate Impacts on Bird Species Protected by the Migratory Bird Treaty Act	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
WLD-5: Substantial Impact on Ringtail	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	WLD-5: Mitigate Impacts on Ringtail	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
WLD-6: Substantial Impact on American Badger	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	WLD-6: Mitigate Impacts on American Badger	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
WLD-7: Substantial Impact on San Joaquin Pocket Mouse	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	WLD-7: Mitigate Impacts on San Joaquin Pocket Mouse	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
WLD-8: Substantial Impact on Special-Status Bat Species	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	WLD-8: Mitigate Impacts on Special-Status Bat Species	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
WLD-9: Substantial Impact on Migratory and Wintering Deer Herds	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	WLD-9: Mitigate Impacts on Migratory and Wintering Deer Herds	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
WLD-10: Potential Conflict with Fresno County and Madera County General Plan Objectives and Guidelines	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	None Available	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
WLD-11: Potential Reduction in Habitat or Populations of Special-Status Invertebrates	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
WLD-12: Potential Reduction in Habitat or Populations of Special-Status Amphibians and Reptiles	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
WLD-13: Potential Reduction in Habitat or Populations of Special-Status Bird Species	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
WLD-14: Potential Reduction in Habitat or Populations of Special-Status Mammal Species	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
WLD-15: Potential Interference with Migratory Corridors or Nursery Sites	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
WLD-16: Potential Impact on Riparian Habitat for Special-Status Bird Species	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	WLD-16: Monitor and Manage Riparian Vegetation Structure Within Extended Study Area	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
WLD-17: Conflict with Local or Regional Policies Protecting Wildlife Resources	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
WLD-18: Potential Conflict with Adopted Conservation Plans	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
CUL-1: Disturbance or Destruction of Known or Previously Undiscovered Prehistoric Resources Due to Construction, Inundation, and Project Operation	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	S	CUL-1:Precautions for Limiting Post-Construction Vandalism to Cultural Resources	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
CUL-2: Disturbance or Destruction of Known or Previously Undiscovered Historic-Era Resources Due to Construction, Inundation, and Project Operation	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	S	CUL 2: Implement Mitigation Measure CUL-1, Precautions for Limiting Post-Construction Vandalism to Cultural Resources	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
CUL-3: Construction and Management of Project Components That would Cause a Substantial Adverse Change in the Significance of a Historical and/or Unique Archaeological Resource, Historic Property, or Historic District	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	S	CUL 3: Implement Mitigation Measure CUL-1, Precautions for Limiting Post-Construction Vandalism to Cultural Resources	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
CUL-4 Destruction or Damage to Traditional Cultural Properties	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	CUL 4: Implement Mitigation Measure CUL-1, Precautions for Limiting Post-Construction Vandalism to Cultural Resources	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
CUL-5 Destruction or Damage to Indian Sacred Sites	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	CUL 5: Implement Mitigation Measure CUL-1, Precautions for Limiting Post-Construction Vandalism to Cultural Resources	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
ENJ-1: Disproportionately High and Adverse Impacts on Minority and Low Income Populations	Primary Study Area	No Action Alternative	NDHA	None Required	NDHA
		Alternative Plan 1	DHA	ENJ-1: Implement Mitigation Measure CUL-1, Precautions for Limiting Post-Construction Vandalism to Cultural Resources	DHA
		Alternative Plan 2	DHA		DHA
		Alternative Plan 3	DHA		DHA
		Alternative Plan 4	DHA		DHA
		Alternative Plan 5	DHA		DHA
	Extended Study Area	No Action Alternative	NDHA	None Required	NDHA
		Alternative Plan 1	NDHA		NDHA
		Alternative Plan 2	NDHA		NDHA
		Alternative Plan 3	NDHA		NDHA
		Alternative Plan 4	NDHA		NDHA
		Alternative Plan 5	NDHA		NDHA

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
GEO-1: Exposure of Structures and People to Geologic Hazards Resulting from Seismic Conditions and Slope Instability	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	GEO-1: Develop and Implement a Seismic Action Plan	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
GEO-2: Alteration of Fluvial Geomorphology that would Adversely Affect Aquatic Habitat	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	None Available	PSU
		Alternative Plan 2	PS		PSU
		Alternative Plan 3	PS		PSU
		Alternative Plan 4	PS		PSU
		Alternative Plan 5	PS		PSU
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
GEO-3: Loss or Diminished Availability of Known Mineral Resources that Would Be of Future Value to the Region or the State	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
GEO-4: Substantial Soil Erosion or Loss of Topsoil Due to Construction and Operations	Primary Study Area	No Action Alternative	NI	None Available	NI
		Alternative Plan 1	PS		PSU
		Alternative Plan 2	PS		PSU
		Alternative Plan 3	PS		PSU
		Alternative Plan 4	PS		PSU
		Alternative Plan 5	PS		PSU
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
GEO-5: Failure of Septic Tanks or Alternative Wastewater Disposal Systems Due to Soils that Are Unsuited to Land Application of Waste	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FLD-1: Exposure of People or Structures to a Significant Risk of Loss, Injury or Death Involving Flooding, Including Flooding as a Result of the Failure of a Levee or Dam	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial
FLD-2: Substantially Alter 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 Onsite or Offsite Flooding	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
FLD-3: Place Within a 100-Year Flood Hazard Area Structures which would Impede or Redirect Flood Flows	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
GRW-1: Change in Groundwater Levels	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	PS	None Required	PSU
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS		LTS
GRW-2: Change in Groundwater Quality	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	PS	None Required	PSU
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
SWS-1: Changes in Ability to Divert Water from Friant Dam	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
SWS-2: Changes in Ability to Divert Water from San Joaquin River	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
SWS-3: Change in Water Levels in the Old River near the Tracy Road Bridge	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
SWS-4: Change in Water Levels in the Grant Line Canal Above the Grant Line Canal Barrier	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
SWS-5: Change in Water Levels in the Middle River near the Howard Road Bridge	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
Impact SWQ-1: Temporary Construction-Related Sediment Effects that would Violate Water Quality Standards or Adversely Affect Beneficial Uses	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
Impact SWQ-2: Temporary Construction-Related Water Temperature Effects that would Violate Water Quality Standards or Adversely Affect Beneficial Uses	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
Impact SWQ-3: Temporary Construction-Related Water Quality Effects that would Violate Water Quality Standards or Adversely Affect Beneficial Uses	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
Impact SWQ-4: Long-Term Water Quality Effects that would Violate Water Quality Standards or Adversely Affect Beneficial Uses within the Primary Study Area and San Joaquin River	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	SWQ-4: Prepare and Implement a Site-Specific Remediation Plan for Historic Mine Features Subject to Inundation	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	San Joaquin River from Friant Dam to the Merced River Confluence	No Action Alternative	LTS and Beneficial	None Required	LTS and Beneficial
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	San Joaquin River from the Merced River Confluence to the Delta	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
Impact SWQ-5: Long-Term Water Temperature Effects that would Violate Water Quality Standards or Adversely Affect Beneficial Uses	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial
Impact SWQ-6: Long-Term Effects on Delta Salinity that would Violate D-1641 Salinity Objectives	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
Impact SWQ-7: Long-Term Effects on Delta Salinity that would Violate the X2 Standard	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
Impact SWQ-8: Long-Term Effects on Water Quality that would Violate Existing Water Quality Standards or Adversely Affect Beneficial Uses in the CVP/SWP Water Service Areas	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
ITA-1: Interfere with the Exercise of a Federally Reserved Water Right, or Degrade Water Quality Where There is a Federally Reserved Water Right	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
ITA-2: Interfere with the Use, Value, Occupancy, Character or Enjoyment of an ITA	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
ITA-3: Failure to Protect ITAs from Loss, Damage, Waste, Depletion, or Other Negative Effects	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
LUP-1: Disruption of Existing Land Uses	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	LUP-1: Implement Mitigation Measure TRN-2, Implement a Traffic Management Plan	PSU
		Alternative Plan 2	PS		PSU
		Alternative Plan 3	PS		PSU
		Alternative Plan 4	PS		PSU
		Alternative Plan 5	PS		PSU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
LUP-2: Conflict with Adopted Plans	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	LUP-2: Conduct Conflict Resolution with Land Managers	PSU
		Alternative Plan 2	PS		PSU
		Alternative Plan 3	PS		PSU
		Alternative Plan 4	PS		PSU
		Alternative Plan 5	PS		PSU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
LUP-3: Conversion of Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	LUP-3: Protect Agricultural Land Productivity	PSU
		Alternative Plan 2	PS		PSU
		Alternative Plan 3	PS		PSU
		Alternative Plan 4	PS		PSU
		Alternative Plan 5	PS		PSU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
LUP-4: Conversion of Forest Land	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	None Available	PSU
		Alternative Plan 2	PS		PSU
		Alternative Plan 3	PS		PSU
		Alternative Plan 4	PS		PSU
		Alternative Plan 5	PS		PSU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
NOI-1: Exposure of Sensitive Receptors to Noise Generated by Facility Construction	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	NOI-1: Implement Measures to Prevent Exposure of Sensitive Receptors to Temporary Construction Noise at Project Construction Sites	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
NOI-2: Construction-Generated Ground Vibration	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
NOI-3: Exposure of Sensitive Receptors in the Primary Study Area to Construction-Related Traffic Noise	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	NOI-3: Install Sound Barriers along County Road 211 and County Road 210, and Restrict Truck Hauling on Public Roads to the Less-Sensitive Daytime Hours	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
NOI-4: Long-Term Operational Stationary- and Area-Source Noise	Primary Study Area	No Action Alternative	NI		NI
		Alternative Plan 1	LTS	None Required	LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
NOI-5: Long-Term Increases in Traffic Noise	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	NOI-5: Implement Measures to Reduce Exposure to Operational Traffic Noise along Wellbarn Road and Smalley Road	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
PAL-1: Potential for Damage to or Destruction of Unique Paleontological Resources	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	PAL-1: Implement a Recovery Plan	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
PWR-1: Decrease in Kerckhoff Hydroelectric Project Energy Generation and Ancillary Services	Primary Study Area	No Action Alternative	PS	None Available	PSU
		Alternative Plan 1	S		SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
PWR-2: Change in Energy Generation at Friant Dam Powerhouses	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	Beneficial		Beneficial
		Alternative Plan 2	Beneficial		Beneficial
		Alternative Plan 3	Beneficial		Beneficial
		Alternative Plan 4	Beneficial		Beneficial
		Alternative Plan 5	Beneficial		Beneficial
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
PWR-3: Change in Energy Generation and Use Within the Friant Division of the CVP Water Service Area	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	PS	None Required	PSU
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
PWR-4: Decrease in CVP System Energy Generation	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
PWR-5: Decrease in SWP System Energy Generation	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
PWR-6: Increase in CVP System Pumping Energy Use	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
PWR-7: Increase in SWP System Pumping Energy Use	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
HAZ-1: Potential for Exposure to Hazardous Materials	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS	None Required	LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
HAZ-2: Potential Emission of Hazardous Materials within 0.25 Mile of a School	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	HAZ-2: Reduce Exposure of Hazards to Schools	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
HAZ-3: Increase Hazards from a Known Hazardous Materials Contamination Site	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	HAZ-3: Reduce Hazards from Hazardous Material Sites	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
HAZ-4: Interfere with Evacuation Routes and Emergency Vehicle Access	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	PS	HAZ-4: Implement Mitigation Measure TRN-2, Implement a Traffic Management Plan	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
HAZ-5: Locate Electrical Transmission Facilities Near a School	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
HAZ-6: Increase Hazards of Wildland Fires	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
HAZ-7: Increase Hazards of West Nile Virus	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	PS	HAZ-7: Reduce Hazards of West Nile Virus	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
HAZ-8: Increase Hazards of Valley Fever	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	HAZ-8: Reduce Hazards of Valley Fever	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
HAZ-9: Increase Exposure to Damage from Acts of Terrorism	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
HAZ-10: Increase Exposure to Hazards Associated with Abandoned Mine Sites	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
HAZ-11: Increase Potential for Blast-Related Injury during Construction	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	HAZ-11: Reduce Hazards from Blasting	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
REC-1: Permanent Loss or Closure of a Recreation Facility	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	REC-1a: Allow On- Boat Camping, REC-1b: Create New Shoreline Access Site	LTS
		Alternative Plan 2	S		LTS
		Alternative Plan 3	S		LTS
		Alternative Plan 4	S		LTS
		Alternative Plan 5	S		LTS
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
REC-2: Permanent Loss of a Resource Used for Recreation	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	REC-2: Preserve Fine Gold Creek Watershed Cave System	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
REC-3: Substantial or Long-Term Reduction or Elimination of Recreation Opportunities or Experiences	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	S	REC-3a: Limit Construction Activities near Recreation Areas, REC-3b:Instream Whitewater Boating Improvements, REC-3c: Extend the San Joaquin River Trail through the SJRG SRMA	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
REC-4: Loss of Access to a Locally Important Recreation Site or Area	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	REC-4: Maintain Public Access	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
REC-5: Increased Use of Existing Neighborhood and Regional Parks or Other Recreation Facilities such that Substantial Physical Deterioration of the Facilities Would Occur or Be Accelerated	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
REC-6: Impacts Associated with New or Expanded Recreation Facilities	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	Beneficial		Beneficial
		Alternative Plan 2	Beneficial		Beneficial
		Alternative Plan 3	Beneficial		Beneficial
		Alternative Plan 4	Beneficial		Beneficial
		Alternative Plan 5	Beneficial		Beneficial
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation	Level of Significance After Mitigation
SOC-1: Temporary Increases in Employment and Personal Income Resulting from Construction	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
SOC-2: Temporary Increases in Population and Housing Demand Resulting from Construction	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation	Level of Significance After Mitigation
SOC-3: Temporary Increases in Business Income and Local Sales Tax Revenue Resulting from Construction	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
SOC-4: Increases in Employment and Personal Income Resulting from Operations and Maintenance	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation	Level of Significance After Mitigation
SOC-5: Increases in Spending, Employment, and Personal Income from Increased Recreational Visitation	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
SOC-6: Increases in Population and Housing Demand Resulting from Operations and Maintenance	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation	Level of Significance After Mitigation
SOC-7: Increases in Business Income and Local Sales Tax Revenue Associated with O&M and Recreation Visitation	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
SOC-8: Decreases in Property Tax Revenue from Acquisition of Privately Owned Land	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation	Level of Significance After Mitigation
SOC-9: Impacts on Agricultural Economics in the CVP and SWP Water Service Areas	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	S	None Required	SU
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial
SOC-10: Increases in Population and Housing Demand Within the CVP and SWP Water Service Areas	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation	Level of Significance After Mitigation
SOC-11: Increases in Business Income and Local Sales Tax Revenue Within the CVP and SWP Water Service Areas	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	S	None Required	SU
		Alternative Plan 1	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 2	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 3	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 4	LTS and Beneficial		LTS and Beneficial
		Alternative Plan 5	LTS and Beneficial		LTS and Beneficial

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
TRN-1: Reduce Level of Service For Designated Roads	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
TRN-2: Increase Traffic Hazards on Local Roads	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	TRN-2: Implement a Traffic Management Plan	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
TRN-3: Interfere With Emergency Access	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	TRN-3: Implement Mitigation Measure TRN-2, Implement a Traffic Management Plan	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance after Mitigation
TRN-4: Decrease Performance of Bicycle Or Pedestrian Facilities	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	TRN-4: Implement Mitigation Measure TRN-2, Implement a Traffic Management Plan	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
UTL-1: Result in Exceeding Wastewater Treatment Requirements or Requiring New or Expanded Wastewater Treatment Facilities	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	PS	UTL-1: Prepare and Implement a Wastewater Management Plan	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
UTL-2: Result in Exceeding Stormwater Drainage Infrastructure Capacity or Requiring New or Expanded Stormwater Drainage Facilities	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
UTL-3: Increase in Solid Waste Generation That Exceeds Permitted Landfill Capacity	Primary Study Area	No Action Alternative	LTS	None Required	LTS
		Alternative Plan 1	PS	UTL-3: Prepare and Implement a Solid Waste Management Plan	LTS
		Alternative Plan 2	PS		LTS
		Alternative Plan 3	PS		LTS
		Alternative Plan 4	PS		LTS
		Alternative Plan 5	PS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
UTL-4: Damage to or Disruption of Utility or Service Systems	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	LTS		LTS
		Alternative Plan 2	LTS		LTS
		Alternative Plan 3	LTS		LTS
		Alternative Plan 4	LTS		LTS
		Alternative Plan 5	LTS		LTS
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
VIS-1: Consistency With Applicable Plans	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	None Available	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
VIS-2: Degradation and/or Obstruction of a Scenic View	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	VIS-2: Minimize Construction-Related Visual Impact on Scenic Views from KOPs	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Table ES-3. Summary of Impacts and Mitigation Measures (contd.)

Impact	Study Area	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
VIS-3: Generation of Increased Daytime Glare and/or Nighttime Lighting	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	S	VIS-3: Minimize or Avoid Visual Impact of Daytime Glare and Nighttime Lighting	SU
		Alternative Plan 2	S		SU
		Alternative Plan 3	S		SU
		Alternative Plan 4	S		SU
		Alternative Plan 5	S		SU
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
VIS-4: Impacts on a Designated Scenic Highway	Primary Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI
	Extended Study Area	No Action Alternative	NI	None Required	NI
		Alternative Plan 1	NI		NI
		Alternative Plan 2	NI		NI
		Alternative Plan 3	NI		NI
		Alternative Plan 4	NI		NI
		Alternative Plan 5	NI		NI

Key:
- = Not Applicable
B = beneficial
LTS = less than significant
NDHA = not disproportionately high and adverse
NI = no impact
O&M = operation and maintenance
DHA = disproportionately high and adverse
PS = potentially significant
PSU = potentially significant and unavoidable
S = significant
SU = significant and unavoidable
TBD = to be determined

Table ES-4. Impacts of Alternative Plans with Potential to Result in a Cumulatively Considerable Incremental Contribution to a Significant Cumulative Impact

Resource Area	Impact
Air Quality and Greenhouse Gas Emissions	AQ-1: Project-Generated Construction-Related Criteria Air Pollutant and Precursor Emissions that would Violate or Contribute Substantially to an Existing or Projected Violation, or Expose Sensitive Receptors to Substantial Pollutant Concentrations AQ-4: Generation of Greenhouse Gas Emissions that Would Significantly Impact the Environment
Biological Resources – Fisheries and Aquatic Ecosystems	FSH-1: Loss of Riverine Habitat for Lotic Fish Species FSH-9: Loss of Spawning Habitat of American Shad and Striped Bass FSH-11: Change in Water Temperature Conditions Supporting Juvenile Salmon and Steelhead Migration FSH-18: Effects on Delta Fish Habitat from Changes in Water Temperatures and DO Concentrations
Biological Resources – Botanical and Wetlands	BOT-1: Loss of Special-Status Plants and Loss or Degradation of Special-Status Plant Habitat BOT-2: Loss of Riparian Habitat and Other Sensitive Communities BOT-6: Conflict with Local or Regional Policies and Plans Protecting Wetland or Botanical Resources
Biological Resources – Wildlife	WLD-1: Substantial Impact on Special-Status Invertebrates WLD-2: Substantial Impact on Special-Status Amphibians and Reptiles WLD-3: Substantial Impact on Special-Status Raptors WLD-4: Substantial Impact on Special-Status Passerines or Birds Protected by the Migratory Bird Treaty Act WLD-5: Substantial Impact on Ringtail WLD-6: Substantial Impact on American Badger WLD-7: Substantial Impact on San Joaquin Pocket Mouse WLD-8: Substantial Impact on Special-Status Bat Species WLD-9: Substantial Impact on Migratory and Wintering Deer Herds WLD-10: Potential Conflict with Fresno County and Madera County General Plan Objectives and Guidelines
Cultural Resources	CUL-1: Disturbance or Destruction of Known or Previously Undiscovered Prehistoric Resources Due to Construction, Inundation, and Project Operation CUL-2: Disturbance or Destruction of Known or Previously Undiscovered Historic-Era Resources Due to Construction, Inundation, and Project Operation CUL-3: Construction and Management of Project Components That would Cause a Substantial Adverse Change in the Significance of a Historical and/or Unique Archaeological Resource, Historic Property, or Historic District CUL-4 Destruction or Damage to Traditional Cultural Properties CUL-5 Destruction or Damage to Indian Sacred Sites
Environmental Justice	ENJ-1: Disproportionately High and Adverse Impacts on Minority and Low Income Populations
Geology and Soils	GEO-2: Alteration of Fluvial Geomorphology that would Adversely Affect Aquatic Habitat GEO-4: Substantial Soil Erosion or Loss of Topsoil Due to Construction and Operations
Hydrology – Groundwater	GRW-1: Change in Groundwater Levels GRW-2: Change in Groundwater Quality
Hydrology – Surface Water Quality	SWQ-4: Long-Term Water Quality Effects that would Violate Water Quality Standards or Adversely Affect Beneficial Uses within the Primary Study Area and San Joaquin River
Land Use Planning and Agricultural Resources	LUP-1: Disruption of Existing Land Uses LUP-2: Conflict with Adopted Plans LUP-3: Conversion of Farmland to Nonagricultural Uses and Cancellation of Williamson Act Contracts LUP-4: Conversion of Forest Land

Table ES-4. Impacts of Alternative Plans with Potential to Result in a Cumulatively Considerable Incremental Contribution to a Significant Cumulative Impact (contd.)

Resource Area	Impact
Noise and Vibration	NOI-1: Exposure of Sensitive Receptors to Noise Generated by Facility Construction NOI-3: Exposure of Sensitive Receptors in the Primary Study Area to Construction-Related Traffic Noise NOI-5: Long-Term Increases in Traffic Noise
Power and Energy	PWR-1: Decrease in Kerckhoff Hydroelectric Project Energy Generation and Ancillary Services
Socioeconomics, Population, and Housing	SOC-9: Impacts on Agricultural Economics in the CVP and SWP Water Service Areas
Visual Resources	VIS-1: Consistency with Applicable Plans VIS-2: Degradation and/or Obstruction of a Scenic View VIS-3: Generation of Increased Daytime Glare and/or Nighttime Lighting

Key:
CVP = Central Valley Project
DO = Dissolved Oxygen
SWP = State Water Project

Draft
Environmental Impact Statement

Upper San Joaquin River Basin Storage Investigation

Prepared by:

United States Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

U.S. Department of the Interior
Bureau of Reclamation

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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.

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Abbreviations and Acronyms

°C	degrees Celsius
°F	degrees Fahrenheit
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
µS/cm	microsiemens per centimeter
AB	Assembly Bill
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ACWD	Alameda County Water District
AIA	Air Impact Assessment
ANN	artificial neural network model
AP	Air Pollution
APCO	Air Pollution Control Officer
APE	area of potential effect
AQAP	air quality attainment plans
ARB	California Air Resources Board
Banks Pumping Plant	Harvey O. Banks Pumping Plant
BAU	Business as Usual
Bay-Delta	San Francisco Bay/Sacramento–San Joaquin Delta
Berkeley case	*Berkeley Keep Jets Over the Bay Committee v. Board of Port Commissioners of the City of Oakland, 2001*
BIA	U.S. Department of the Interior, Bureau of Indian Affairs
BLM	U.S. Department of the Interior, Bureau of Land Management
BMP	best management practice
BNSF	Burlington Northern Santa Fe
BO	biological opinion
BPS	Best Performance Standards
BST	Benchmark Study Team
CAA	Fish and Wildlife Coordination Act, Clean Air Act
CAAA	Federal Clean Air Act Amendments of 1990
CaCO3	calcium carbonate
Cal EMA 2010	*2010 State of California Multi-Hazard Mitigation Plan*

Cal/EPA	California Environmental Protection Agency
CAL FIRE	California Department of Forestry and Fire Protection
Cal-IPC	California Invasive Plant Council
Cal/OSHA	California Occupational Safety and Health Administration
CalEEMod	California Emissions Estimator Model
CALFED	CALFED Bay-Delta Program
CalSim	California Water Resources Simulation Model
Caltrans	California Department of a Transportation
CAT	Climate Action Team
CCAA	California Clean Air Act
CCD	Census-County Division
CCID	Central California Irrigation District
CCP	comprehensive conservation plan
CCR	California Code of Regulations
CCWD	Contra Costa Water District
CDC	Centers for Disease Control and Prevention
CDEC	California Data Exchange Center
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CDP	Census-Designated Place
CDPH	California Department of Public Health
Central Valley Water Board	Central Valley Regional Water Quality Control Board
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CEVA	Cumulative Environmental Vulnerability Assessment
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH4	methane
CHP	California Highway Patrol
CI/KR	critical infrastructure and key resources
CMS	comprehensive mitigation strategy
CNDDB	California Natural Diversity Database

CNEL	community noise equivalent level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COA	Coordinated Operation Agreement
CPUC	California Public Utilities Commission
CRPR	California Rare Plant Rank
CSA	Community Service Area
CSBA	California Striped Bass Association
CSLC	California State Lands Commission
CT	Current Trend
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CVHM	Central Valley Hydrologic Model
CVP	Central Valley Project
CWA	Federal Clean Water Act
CWC	California Water Code
CWHR	California Wildlife Habitat Relationship
D-1422	State Water Board Decision 1422
D-1641	State Water Board Water Right Decision 1641
dBA	A-weighted decibel
dBA/DD	dBA per doubling of distance
DBCP	dibromochloropropane
DCTRA	Deer Creek & Tule River Authority
DDT	dichloro-diphenyltrichloroethane
DEET	diethyl-meta-toulamide
Delta	Sacramento-San Joaquin Delta
DHS	U.S. Department of Homeland Security
diesel PM	diesel particulate matter
DMC	Delta-Mendota Canal
DO	dissolved oxygen
DOC	California Department of Conservation
DOF	California Department of Finance
DSM2	Delta Simulation Model 2
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources

E. coli	*Escherichia coli*
EA	Environmental Assessment
EBMUD	East Bay Municipal Utility District
EC	electrical conductivity
EDD	California Employment Development Department
EDT	Ecosystem Diagnosis and Treatment
EG	Expansive Growth
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMF	electromagnetic fields
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERP	Ecosystem Restoration Program
ESA	Federal Endangered Species Act
Exchange Contractors	Madera-Chowchilla Water and Power Authority; San Luis & Delta-Mendota Water Authority; San Joaquin River Exchange Contractors Water Authority
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FICAN	Federal Interagency Committee on Aviation Noise
FMMP	Farmland Mapping and Monitoring Program
FPA	Friant Power Authority
FPP	Friant Power Project
FR	Federal Register
FRAP	California Fire and Resource Assessment Program
FSZ	Farmland Security Zone
FTA	Federal Transit Administration
FWA	Friant Water Authority
GAMA	Groundwater Ambient Monitoring Assessment
GCM	Global Climate Model
GGS	giant garter snake
GHG	greenhouse gas
GIS	Geographic Information System
GLO	General Land Office

GPS	Global Positioning System
GSM	Central Valley Ground-Surface Water Model
GWh	gigawatt-hours
GWh/year	gigawatt-hours per year
HCP	habitat conservation plan
HDP	Heritage Documentation Program
hp	horsepower
I:E	inflow:export
I-5	Interstate 5
ID	irrigation district
IDC	interest during construction
IEP	Interagency Ecological Program
IFIM	incremental methodology
IMPLAN	IMpact analysis for PLANning model
in/year	inch per year
Investigation	Upper San Joaquin River Basin Storage Investigation
IPCC	Intergovernmental Panel on Climate Change
IRWMP	Integrated Regional Water Management Plan
IS	Initial Study
ISR	Indirect Source Review
ITA	Indian Trust Assets
ITP	Incidental Take Permit
Jones Pumping Plant	C.W. “Bill” Jones Pumping Plant
JPOD	Joint Point of Diversion
KCWA	Kern County Water Agency
km	kilometers
KOP	key observation point
kV	kilovolt
kW	kilowatt
LCP	land conservation plan
LCPSIM	Least Cost Planning Simulation Model
L_{dn}	day-night noise level
L_{eq}	equivalent noise level
LIM	Land Inventory and Monitoring
LLIS	low-level intake structure
L_{max}	maximum noise level

L_{min}	minimum noise level
LOD	level of development
LOPP	lease of power privilege
LOS	level of service
LPP	locally preferred plan
LSJLD	Lower San Joaquin Levee District
LSJRTP	Lower San Joaquin River and Tributaries Project
LSZ	low salinity zone
LTGen	LongTermGen
L_X	statistical descriptor
M&I	municipal and industrial
MAF	million acre-feet
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant level
mg/L	milligrams per liter
MMP	mitigation and monitoring plan
MOU	memorandum of understanding
mph	miles per hour
MPO	Metropolitan Planning Organization
msl	mean sea level
MT	metric ton
$mtCO_2e$/year	metric tons of CO2 equivalents per year
MW	megawatt
MWh	megawatt-hours
N_2O	nitrous oxide
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NAVD 1988	North American Vertical Datum 1988
NED	national economic development
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIPP	National Infrastructure Protection Plan
NL	notification limit
NMFS	National Marine Fisheries Service
NO2	nitrogen dioxide
NOA	naturally occurring asbestos
NoCC	No Climate Change

NOD	North-of-Delta
NOI	Notice of Intent
NOP	Notice of Prepration
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NRCS	National Resource Conservation Service
NRDC	Natural Resources Defense Council
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NWSRS	National Wild and Scenic Rivers System
O&M	operations and maintenance
OEHHA	Office of Environmental Health Hazard Assessment
OES	California Office of Emergency Services
OHP	Office of Historic Preservation's
OHWM	ordinary high-water mark
OMP	operations and management plan
OMWEM	Other Municipal Water Economics Model
OPR	Office of Planning and Research
ORV	outstandingly remarkable values
OSHA	U.S. Department of Labor, Occupational Safety and Health Administration
P&G	*Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*
PA	programmatic agreement
Parkway	San Joaquin River Parkway
PCB	polychlorinated biphenyl
PCE	passenger car equivalent
pCi/L	picocuries per liter
PEIS/R	Programmatic Environmental Impact Statement/Environmental Impact Report
PG&E	Pacific Gas and Electric Company
PM_{10}	respirable particulate matter with an aerodynamic diameter of 10 micrometers or less
$PM_{2.5}$	particulate matter standards of 2.5 microns in aerometric diameter or less

PMF	Probable Maximum Flood
Porter-Cologne Act	Porter-Cologne Water Quality Control Act
ppm	parts per million
ppt	parts per thousand
PPV	peak particle velocity
PRC	Public Resources Code
PRPA	Paleontological Resources Preservation Act
PWC	personal watercraft
RBDD	Red Bluff Diversion Dam
RCC	roller-compacted concrete
RCRA	Resource Conservation and Recovery Act
RD	Reclamation District
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RM	River Mile
RMP	Resource Management Plan
RMS	root mean squared
RMZ	resource management zone
ROD	Record of Decision
ROG	reactive organic gas
ROW	right of way
RPA	Reasonable and Prudent Alternative
rpm	revolutions per minute
RTS	reservoir triggered seismicity
RV	recreational vehicle
RWA	Recovered Water Account
SALMOD	Salmonid Population Model
SAR	smolt-to-adult return rate
SB	Senate Bill
SBWQM	South Bay Water Quality Model
SCE	Southern California Edison Company
SCVWD	Santa Clara Valley Water District
SDWA	South Delta Water Agency
SEL	single-event (impulsive) noise level)
Settlement	*NRDC et al. v. Kirk Rodgers et al., Stipulation of Settlement*
SG	Slow Growth
SHPO	State Historic Preservation Office
SIP	State implementation plan

SJAFCA	San Joaquin Area Flood Control Agency
SJR5Q	San Joaquin River Temperature Model
SJRA	San Joaquin River Agreement
SJRG	San Joaquin River Gorge
SJRRP	San Joaquin River Restoration Program
SJTSP	San Joaquin Tributary Settlement Process
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District
SJVDP	San Joaquin Valley Drainage Program
SLCC	San Luis Canal Company
SLIS	selective-level intake structure
SLLPIP	San Luis Low Point Improvement Project
SLWRI	Shasta Lake Water Resources Investigation
SMARA	California Surface Mining and Reclamation Act of 1975
SMT	Study Management Team
SO2	sulfur dioxide
SOD	South-of-Delta
SPFC	State Plan of Flood Control
SQRU	Scenic Quality Rating Unit
SR	State Route
SRA	State Recreation Area
SRMA	Special Recreation Management Area
SRWQM	Sacramento River Water Quality Model
SSJVIC	Southern San Joaquin Valley Information Center
State	State of California
State Parks	California Department of Parks and Recreation
State Water Board	State Water Resources Control Board
SVP	Society of Vertebrate Paleontology
SWAP	Statewide Agricultural Production Model
SWE	Snow Water Equivalent
SWP	State Water Project
SWP Power	SWP Power California
TAC	toxic air contaminant
TAF	thousand acre-feet
TCD	temperature control device

TCR	transportation concept report
TDS	total dissolved solid
TMDL	Total Maximum Daily Loads
TMP	traffic management plan
TNW	Traditional Navigable Water
tpd	tons per day
UCMP	University of California Museum of Paleontology
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended
UP	Union Pacific
URBEMIS	2007 Urban Emissions model
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Department of the Interior, Fish and Wildlife Service
USGS	U.S. Geological Survey
v	volt
VAMP	Vernalis Adaptive Management Program
VdB	vibration decibel
VOC	volatile organic compound
VRM	Visual Resource Management
WD	Water District
WDR	Waste Discharge Requirement
WMA	Wildlife Management Area
WNV	West Nile virus
WOMT	Water Operations Management Team
WRIMS	Water Resources Integrated Modeling System
WROS	Water Recreation Opportunity Spectrum
WSD	Water Storage District
WSMP 2040	Water Supply Management Program 2040
WWD	Waterworks Districts

Chapter 1
Introduction

This Draft Environmental Impact Statement (EIS) has been prepared as part of the Upper San Joaquin River Basin Storage Investigation (Investigation) to document potential physical, biological, cultural, and socioeconomic effects of alternatives to expand water storage capacity in the upper San Joaquin River watershed. The Investigation is led by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), in cooperation with the California Department of Water Resources (DWR). The purpose of the Investigation is to determine the type and extent of Federal, State of California (State), and regional interest in a potential project to expand water storage capacity in the upper San Joaquin River watershed to (1) improve water supply reliability and flexibility of the water management system for agricultural, municipal and industrial (M&I), and environmental uses; and (2) enhance water temperature and flow conditions in the San Joaquin River downstream from Friant Dam for salmon and other native fish.

This document, pursuant to the National Environmental Policy Act (NEPA), tiers from the CALFED Bay-Delta Program (CALFED) Final Programmatic Environmental Impact Statement/Environmental Impact Report (PEIS/R) and Record of Decision (ROD) (CALFED 2000a and 2000b) for developing the project purpose and a range of reasonable alternatives. This document also supports the Draft Feasibility Report (Reclamation 2014) prepared for the Investigation and confirms the draft findings of environmental feasibility.

Reclamation, as the Federal Lead Agency under NEPA, has prepared this Draft EIS to disclose the potential direct, indirect, and cumulative impacts of alternatives. Cooperating agencies pursuant to NEPA are those that have jurisdiction by law or special expertise in a resource area affected. Cooperating agencies for this Investigation include the California Department of Parks and Recreation (State Parks); Friant Water Authority (FWA); Madera-Chowchilla Water and Power Authority; San Luis & Delta-Mendota Water Authority; San Joaquin River Exchange Contractors Water Authority (Exchange Contractors); U.S. Army Corps of Engineers (USACE); U.S. Department of Commerce, National Marine

Fisheries Service (NMFS); U.S. Department of the Interior, Bureau of Indian Affairs (BIA); U.S. Department of the Interior, Bureau of Land Management (BLM); U.S. Department of the Interior, Fish and Wildlife Service (USFWS); and U.S. Environmental Protection Agency (EPA). Agencies consulted under NEPA (consistent with Section 1501.2 of the CEQ guidelines) include the California Department of Fish and Wildlife (CDFW), Central Valley Regional Water Quality Control Board (Central Valley Water Board), San Joaquin Valley Air Pollution Control District (SJVAPCD), and Federal Energy Regulatory Commission (FERC).

DWR is the California Environmental Quality Act (CEQA) Lead Agency for the Investigation, but has had limited funding to be an active participant. This Draft EIS has also been prepared in consideration of CEQA and State CEQA Guidelines to support the CEQA Lead Agency and Responsible and Trustee agencies that would be involved in approving a proposed alternative. However, at the time of release of this Draft EIS, DWR was unable to provide CEQA review. When a project (such as the Investigation) requires compliance with CEQA and NEPA, and the NEPA document is ready before the CEQA document – as is the case here – the CEQA Lead Agency (DWR) should use the EIS rather than preparing an EIR when the following two conditions occur:

1. An EIS will be prepared before an EIR would otherwise be completed for the project

2. The EIS complies with the CEQA Guidelines (see CEQA Guidelines section 15221)

Despite the similarities between NEPA and CEQA, there are several differences that require careful coordination between the Federal and State agencies responsible for complying with NEPA and CEQA. For example, CEQA requires discussions of mitigation measures and growth inducing impacts, and more recently a greenhouse gas (GHG) emissions impact analysis. The approach to preparing this Draft EIS, consistent with both NEPA and CEQA requirements, is described where appropriate throughout this Draft EIS, including an overview of the considerations for conducting the impacts analysis provided in Chapter 3, “Considerations for Describing the Affected Environment and Environmental Consequences.”

The Investigation's progress and results have been documented in a series of interim reports. The Investigation will culminate in a Final Feasibility Report and Final EIS, consistent with the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (P&G) (WRC 1983); Reclamation policies, and directives and standards; State policies and guidance, as appropriate; and applicable environmental laws, regulations, and policies. The Draft Feasibility Report (Reclamation 2014) and this Draft EIS document the results of the feasibility study process to date, and build on the results and findings of previous planning documents, including the CALFED PEIS/R and ROD (CALFED 2000a and 2000b), *Phase 1 Investigation Report* (Reclamation and DWR 2003), *Initial Alternatives Information Report* (Reclamation and DWR 2005), and *Plan Formulation Report* (Reclamation and DWR 2008). The plan formulation process and measures evaluations documented in these interim milestone planning reports are incorporated by reference in this Draft EIS.

Extensive alternatives analysis was performed as part of the plan formulation process for the Investigation since 2002, with 22 reservoir sites evaluated for their ability to meet basic project purpose and objectives, and in consideration of environmental effects, cost-effectiveness, and overall feasibility. The number of alternative dam and reservoir sites was reduced through a phased evaluation process. This process resulted in the selection of Temperance Flat River Mile (RM) 274 Reservoir as the site which best meets the objectives, purpose and need, and planning criteria, and which provides the greatest overall and net benefits, as described in the Plan Formulation Appendix.

Draft EIS Purpose

The purpose of this Draft EIS is to disclose the potential direct, indirect, and cumulative impacts of implementing a proposed action and a range of reasonable alternatives including the No Action Alternative, consistent with NEPA and CEQA requirements. This Draft EIS serves as an informational document for decision makers, public agencies, nongovernmental organizations, and the general public regarding the potential environmental consequences of implementing a proposed Federal action and a range of reasonable alternatives. The preferred alternative for implementation will be identified in the Final EIS.

This Draft EIS is being circulated for public review. Comments received during the public review period will be considered by Reclamation, and responses to comments will be included in the Final EIS. Continued public outreach, including public hearings, will be conducted before completion of the Final EIS. For more information on these meetings, please see http://www.usbr.gov/mp/sccao/storage/.

After the Final EIS is published, Reclamation may prepare and adopt a ROD to implement a recommended plan/preferred alternative, if authorized. This Draft EIS has been prepared consistent with CEQA requirements to support required State and/or local agency decisions and permits.

National Environmental Policy Act

NEPA provides an interdisciplinary framework for Federal agencies to take environmental factors into account during a decision making process (42 United States Code [USC] 4321, 40 Code of Federal Regulations [CFR] 1500.1). NEPA requires an EIS whenever a proposed Federal action (e.g., a proposal for legislation or an activity financed, assisted, conducted, or approved by a Federal agency with Federal agency control) may significantly affect the quality of the human environment. Section 1508.14 of the Council on Environmental Quality (CEQ) Regulations defines the human environment to include "the natural and physical environment and the relationship of people with that environment."

The EIS, in conjunction with other relevant material, is used by the Federal Government to plan actions and make decisions. Section 1502.1 of the CEQ Regulations states that an EIS primarily serves as an action-forcing device to infuse the policies and goals defined in NEPA into ongoing programs and actions of the Federal Government. As an informational document, an EIS provides a rigorous and objective evaluation of a range of reasonable alternatives; the full and open disclosure of environmental consequences before an agency takes action; an interdisciplinary approach to project evaluation; identification of measures to mitigate impacts; and an avenue for public and agency participation in decision making (40 CFR 1502.1). NEPA defines mitigation as avoiding, minimizing, rectifying, reducing, or compensating for significant effects of a proposed action (40 CFR 1508.20). NEPA also requires evaluating a proposed action and alternatives at an equal level of detail.

NEPA requires that a Federal Lead Agency "include [in an EIS] appropriate mitigation measures not already included in the proposed action or alternatives" (40 CFR 1502.14(f)). An EIS must also include discussions of "means to mitigate adverse environmental impacts (if not fully covered under Section 1502.14(f))." In preparing a ROD under 40 CFR 1505.2, a Federal Lead Agency must "[s]tate whether all practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not. A monitoring and enforcement program shall be adopted and summarized where applicable for any mitigation."

California Environmental Quality Act

The State CEQA Guidelines (14 California Code of Regulations [CCR] Section 15064(f)(1)) require that an Environmental Impact Report (EIR) be prepared whenever a project may result in a significant environmental impact. Section 15064(d) states that "in evaluating the significance of the environmental effect of a project, the CEQA Lead Agency shall consider direct physical changes in the environment which may be caused by the project and reasonably foreseeable indirect physical changes in the environment which may be caused by the project." An EIR is an informational document used to inform public agency decision makers and the general public of the significant environmental effects of a project, identify possible ways to mitigate or avoid the significant effects, and describe a reasonable range of alternatives to the project that could feasibly attain most of the basic objectives of the project while substantially lessening or avoiding any of the significant environmental impacts. When determining whether to approve a project, State and local public agencies are required by CEQA to consider the information presented in the EIR.

CEQA requires that State and local government agencies consider the potential environmental effects of projects over which they have discretionary authority before taking action on those projects (Public Resources Code [PRC] Section 21000 et seq.). CEQA also requires that each public agency avoid or mitigate to less-than-significant levels, wherever feasible, the significant environmental effects of projects it approves or implements. If a project would result in significant and unavoidable environmental impacts that cannot be feasibly mitigated to less-than-significant levels, the project can still be approved, but the CEQA Lead Agency's decision makers must issue a "statement of overriding considerations" explaining in

writing the specific economic, social, or other considerations that they conclude, based on substantial evidence, make those significant effects acceptable.

Section 15126.6(a) of the State CEQA Guidelines also requires that an EIR describe and evaluate a reasonable range of alternatives that would feasibly attain most of the basic project objectives, and would avoid or substantially lessen any significant adverse impact of the project, as proposed. A reasonable range of alternatives is analyzed to define issues and provide a clear basis for choice among options. CEQA requires that the CEQA Lead Agency consider alternatives that would avoid or reduce one or more of the significant adverse impacts identified for a project in an EIR. The State CEQA Guidelines state that the range of alternatives required to be evaluated in an EIR is governed by the "rule of reason"; the EIR needs to describe and evaluate only those alternatives necessary to permit a reasonable choice and to foster informed decision making and informed public participation (Section 15126.6(f)). Consideration of alternatives focuses on those that can either eliminate significant adverse environmental impacts, or reduce them to less-than-significant levels; alternatives considered in this context may include those that are more costly and those that could impede to some degree the attainment of all project objectives (Section 15126(b)). CEQA does not require alternatives to be evaluated in the same level of detail as the proposed action. The preferred alternative, or proposed action, is not identified in this Draft EIS.

Compliance and Permits Supported by the EIS

This Draft EIS, when finalized, is intended to be used by the Federal Lead Agency when considering approval of a proposed action or an alternative to a proposed action. All Cooperating Agencies and other Federal, State, and local agencies with permitting or approval authority over any aspect of the proposed action are expected to use the information contained in the Final EIS to meet most, if not all, of their information needs, to make decisions and/or issue permits with respect to the proposed action. Table 1-1 presents the permits, petitions, and similar compliance, coordination, and consultation efforts that may be needed for implementing a proposed action, as described in Chapter 28, "Other NEPA and CEQA Considerations," and Chapter 29, "Public Involvement, Consultation, and Coordination."

Table 1-1. Applicable Laws, Regulations, and Permits for This Draft EIS

Resource	Applicable Laws/Regulations/Permits	Regulating Agency/Agencies
Wetlands and Waters of the United States	Clean Water Act, Section 404 – Permit	U.S. Army Corps of Engineers and U.S. Environmental Protection Agency
Wetlands and Waters of the United States	Clean Water Act, Section 401/Porter-Cologne Water Quality Control Act – Water Quality Certification or Waiver	Central Valley Regional Water Quality Control Board
Wetlands and Waters of the United States	Rivers and Harbors Act, Section 9 – Approval	U.S. Army Corps of Engineers
Wetlands and Waters of the United States	Rivers and Harbors Act, Section 10 – Permit	U.S. Army Corps of Engineers
Wetlands and Waters of the United States	Rivers and Harbors Act, Section 13/Clean Water Act Section 402/Porter-Cologne Water Quality Control Act – National Pollutant Discharge Elimination System Permit(s)	Central Valley Regional Water Quality Control Board
Wetlands and Waters of the United States	California Fish and Game Code, Section 1602 – Streambed Alteration Agreement	California Department of Fish and Wildlife
Federally Listed Species	Federal Endangered Species Act, Section 7 – Consultation	U.S. Department of the Interior, Fish and Wildlife Service ; and National Marine Fisheries Service
State-Listed Species	California Endangered Species Act, Section 2081 – Incidental Take Permit	California Department of Fish and Wildlife
Essential Fish Habitat	Magnuson-Stevens Fishery Conservation and Management Act	National Marine Fisheries Service
Fish and Wildlife	Fish and Wildlife Coordination Act – Report	U.S. Department of the Interior, Fish and Wildlife Service
Fish and Wildlife	Bald and Golden Eagle Protection Act	U.S. Department of the Interior, Fish and Wildlife Service
Cultural Resources	National Historic Preservation Act, Section 106 – Consultation	State Historic Preservation Officer
Power and Energy	License Amendment	Federal Energy Regulatory Commission
Water Rights	California Water Code – Water Right Petitions	State Water Resources Control Board
State Lands	Land Use Lease	State Lands Commission
Air Quality	Authority to Construct, Permit to Operate	San Joaquin Valley Air Pollution Control District
Public Roadways	Encroachment Permit	California Department of Transportation and/or local agencies
Surface Mining	California Surface Mining and Reclamation Act – Permit	California Surface Mining and Reclamation Act lead agencies and California Department of Conservation

Key:
EIS = Environmental Impact Statement

Relationship to CALFED and Tiering

CALFED is a collaboration of 25 Federal and State agencies with regulatory and management responsibilities in the San Francisco Bay/Sacramento–San Joaquin Delta (Bay-Delta), originally established to develop a long-term comprehensive plan to restore ecological health and improve water management for beneficial uses of the Bay-Delta system. The objective of the collaborative planning process is to identify comprehensive solutions to the problems of ecosystem quality, water delivery reliability, water quality, and Sacramento-San Joaquin Delta (Delta) levee integrity.

In July 2000, the CALFED agencies released the Final CALFED PEIS/R (CALFED 2000a), which analyzed a range of reasonable alternatives to solve Bay-Delta system problems. Preliminary studies in support of the CALFED PEIS/R considered more than 50 surface water storage sites throughout California and recommended more detailed study of five sites identified in the subsequent ROD, issued in August 2000 (CALFED 2000a, 2000b, 2000c). The CALFED ROD described a Storage Program that included five surface water storage projects in the Central Valley as follows:

> *Expanding water storage capacity is critical to the successful implementation of all aspects of the CALFED Program. Not only is additional storage needed to meet the needs of a growing population but, if strategically located, it will provide much needed flexibility in the system to improve water quality and support fish restoration efforts. Water supply reliability depends on capturing water during peak flows and during wet years.*

The Investigation is one of the five surface water storage studies recommended in the ROD. For the upper San Joaquin River Basin, the CALFED ROD states the following:

> *… 250-700 [thousand acre-feet (TAF)] of additional storage in the upper San Joaquin watershed… would be designed to contribute to restoration of and improve water quality for the San Joaquin River and facilitate conjunctive water management and water exchanges that improve the quality of water deliveries to urban communities. Additional storage could come*

from enlargement of Millerton Lake at Friant Dam or a functionally equivalent storage program in the region.

This document tiers from the CALFED Final PEIS/R (CALFED 2000a) and ROD (including CEQA certification) (CALFED 2000b). The CALFED Final PEIS/R can be reviewed at http://calwater.ca.gov/calfed/library/. Tiering is provided for in CEQ Regulations Section 1502.20 and CEQA Guidelines Section 15152.

Relationship to San Joaquin River Restoration Program

In 1988, a coalition of environmental groups, led by the Natural Resources Defense Council (NRDC), filed a lawsuit challenging the renewal of long-term water service contracts between the United States and Central Valley Project (CVP) Friant Division contractors. After more than 18 years of litigation, the lawsuit, known as *NRDC et al. v. Kirk Rodgers et al.*, reached a Stipulation of Settlement (Settlement). The Settling Parties, including NRDC, Friant Water Users Authority, and the U.S. Departments of the Interior and Commerce, agreed on the terms and conditions of the Settlement, which was subsequently approved on October 23, 2006.

The Settlement establishes two primary goals:

- **Restoration Goal** – To restore and maintain fish populations in "good condition" in the mainstem San Joaquin River below Friant Dam to the confluence with the Merced River, including naturally reproducing and self-sustaining populations of salmon and other fish.

- **Water Management Goal** – To reduce or avoid adverse water supply impacts to all of the Friant Division long-term contractors that may result from the Interim Flows and Restoration Flows provided for in the Settlement.

The San Joaquin River Restoration Program (SJRRP) implements the Settlement, as authorized in 2009 by the San Joaquin River Restoration Settlement Act (Settlement Act).

The actions included in the Selected Alternative described in the SJRRP ROD (Reclamation 2012) are included in the future conditions evaluated in this Draft EIS. Achievement of the Settlement goals is independent of any alternatives evaluated in this Draft EIS.

Purpose and Need for Action, and Objectives

NEPA regulations require a statement of "the underlying purpose and need to which the agency is responding in proposing the alternatives, including the Proposed Action" (40 CFR 1502.13). The State CEQA Guidelines require a clearly written statement of objectives, including the underlying purpose of a project (Section 15124(b)). The purpose and need, and objectives provided below are consistent with CALFED objectives and guidance.

Project Purpose and Need

The purpose of the proposed action is to increase storage of water from the upper San Joaquin River watershed to improve water supply reliability and operational flexibility in CVP San Joaquin Valley areas and other regions of California; and to enhance water temperature and flow conditions in the San Joaquin River downstream from Friant Dam for salmon and other native fish.

The proposed action responds to needs related to water supply reliability and operational flexibility, San Joaquin River ecosystem enhancement opportunities, and other resource needs, as summarized below.

Water Supply Reliability and Operational Flexibility

California's water supply system faces critical challenges with demands exceeding supplies for urban, agricultural, and environmental (fisheries, wildlife refuges) water uses across the State. Without further investment in water management and infrastructure, current statewide shortages are expected to increase to approximately 4.9 million acre-feet (MAF) per year by 2030. Challenges will be greater during drought years, when available surface water for environmental and agricultural purposes is in short supply, resulting in users turning to pumping from an overdrafted groundwater system, and exacerbating overdraft (DWR 2009).

Urban and required environmental water uses have each increased, resulting in increased competition and conflicting demands for limited water supplies. Increasing CVP and State Water Project (SWP) operational constraints have reduced the timing and volume of available water supply for agricultural and urban uses, leading to growing competition for limited water resources. In addition, over time, projected climate change could impact precipitation and runoff, snowpack, flood risk management, water demand, and sea levels, and will further reduce water supply reliability. In light of current and future water supplies and demands and climate change effects, the CVP and SWP systems lack the flexibility in water delivery timing, location, and storage capacity that is needed to fully meet their multiple purposes.

In the Friant Division of the CVP, the 520 thousand acre-feet (TAF) storage capacity of Millerton Lake, located on the upper San Joaquin River, is small relative to the average annual inflow to the lake of approximately 1.8 MAF. The development of additional storage capacity would provide Reclamation with greater operational flexibility and the ability to capture sufficient water in wet years to meet demands in other years.

San Joaquin River Ecosystem

Chinook salmon (*Oncorhynchus tshawytscha*) populations are known to be affected by many factors, including water temperature and flow conditions. The development of additional storage capacity provides opportunities to manage stored water supplies in a way that could enhance temperature and flow conditions in the San Joaquin River downstream from Friant Dam for salmon and other native fish.

Other Resources

Several other needs associated with the San Joaquin River have been identified by various Federal and State agencies. Major storms during the past three decades have demonstrated that Friant Dam has little capacity to store water from large runoff events, resulting in flood releases downstream in almost 50 percent of the years. Demands for hydropower and ancillary services are expected to increase in the future. Demands are also increasing for water-oriented recreation in the Central Valley. San Joaquin River water quality downstream from Mendota Pool is degraded due to low flow and poor quality discharges. Additionally, urban drinking water treatment costs are rising.

Project Objectives

A set of primary and secondary planning objectives was developed for the Investigation to address the purpose and need. Primary objectives are those for which specific alternatives are formulated to address. Secondary planning objectives are actions, operations, or features that should be considered in the plan formulation process, but only to the extent possible through pursuit of the primary objectives.

Primary Objectives

The primary planning objectives are as follows:

- Increase water supply reliability and system operational flexibility for agricultural, M&I, and environmental purposes in the Friant Division of the CVP, other San Joaquin Valley areas, and other regions of California.
- Enhance water temperature and flow conditions in the San Joaquin River downstream from Friant Dam for salmon and other native fish.

Secondary Objectives

The secondary planning objectives are as follows:

- Reduce flood damages downstream from Friant Dam.
- Maintain the value of hydropower attributes in the study area.
- Maintain and increase recreational opportunities in the study area.
- Improve San Joaquin River water quality downstream from Friant Dam.
- Improve the quality of water supplies delivered to urban areas.

Responsibilities of Lead Agencies and Responsible Agencies

As previously described, Reclamation is the lead NEPA agency in preparing this Draft EIS, and DWR is the CEQA Lead Agency for the Investigation. The actions addressed in this Draft EIS include actions to be undertaken by Reclamation, and the effects of these actions are the sole responsibility of

Reclamation. This Draft EIS was also prepared in accordance with CEQA and could be used by State and local permitting agencies that would be involved in reviewing and approving the project. The State is reviewing the need for the State to take discretionary actions, including permitting actions, in association with a Federal action. At the time of release of this Draft EIS, DWR was unable to provide CEQA review for concurrent release as a Draft EIR. The DWR would independently evaluate the content – including alternatives, impact analysis, and proposed mitigation measures – for consistency with CEQA and agency requirements, including needs of any State or local permitting or approving agencies.

As part of the project planning and environmental review process, Reclamation and the CEQA Lead Agency will incorporate certain environmental commitments and best management practices into any alternative plan recommended for implementation to avoid or minimize potential effects. Reclamation has also committed, contingent on congressional authorization, to coordinate the planning, engineering, design phases of the project with applicable resource agencies. Specific actions to avoid, mitigate, and/or compensate for potential adverse environmental effects are identified and addressed in this Draft EIS to the greatest extent practicable.

Under CEQA, CDFW and the State Water Resources Control Board (State Water Board) are Responsible Agencies insofar as they have limited roles related to the actions analyzed in this Draft EIS. To allow CDFW and the State Water Board to take action as Responsible Agencies, which involves making findings that the agencies have "considered" the EIR (see State CEQA Guidelines Section 15096(f)), the CEQA Lead Agency will be required to certify the EIS as meeting CEQA requirements; adopt Findings of Fact, a Statement of Overriding Considerations, if needed, and a Mitigation Monitoring and Reporting Program; approve the program; and file a Notice of Determination. To support the CEQA Lead Agency, Reclamation has prepared this Draft EIS to provide sufficient information to allow CDFW and the State Water Board, as Responsible Agencies, to (1) consider the environmental effects of the project-level actions, (2) mitigate or avoid environmental effects of those parts of the project over which those agencies have discretionary authority, and (3) make findings, required by CEQA Guidelines Section 15091, that their respective decision-making bodies reviewed and considered the environmental effects presented in the EIS. As Responsible Agencies, if CDFW and the State Water Board

decide to take action to approve and implement their portions of the project, CDFW and the State Water Board must approve feasible mitigation measures that would reduce the magnitude of, or avoid, any significant impacts.

Study Area

The San Joaquin River is California's second longest river and discharges to the Delta and, ultimately, to the Pacific Ocean through San Francisco Bay. Originating high in the Sierra Nevada Mountains, the San Joaquin River carries snowmelt and rainfall runoff from mountain meadows south of Yosemite National Park to the valley floor near Fresno, then northwest through the valley to the Delta. Tributaries to the San Joaquin River from the east include the Merced, Tuolumne, and Stanislaus rivers; small streams, sloughs, wetlands, and agricultural drainage form the inflow from the west. The upper San Joaquin River Basin encompasses the San Joaquin River and tributary lands from its source high in the Sierra Nevada to its confluence with the Merced River. Friant Dam and Millerton Lake are located on the upper San Joaquin River about 20 miles northeast of Fresno.

The Study Area evaluated in this Draft EIS includes both a primary and an extended study area to reflect the localized effects of a potential new major dam and reservoir upstream from Friant Dam in the upstream portion of Millerton Lake, and the effects of subsequent water deliveries over a larger geographic area. The primary study area was refined as the Investigation progressed and the number and location of feasible storage sites was narrowed. The primary study area presented in this Draft EIS includes the following (Figure 1-1):

- San Joaquin River upstream from Friant Dam to Kerckhoff Dam, including Millerton Lake and the area that would be inundated by the proposed Temperance Flat RM 274 Reservoir (Temperance Flat Reservoir Area)

- Areas that could be directly affected by construction-related activities, including the footprint of proposed temporary and permanent facilities upstream from Friant Dam

The extended study area encompasses the following (Figure 1-2):

- San Joaquin River downstream from Friant Dam, including the Delta
- Lands served by San Joaquin River water rights
- Friant Division of the CVP, including underlying groundwater basins in the eastern San Joaquin Valley
- South-of-Delta (SOD) water service areas of the CVP and SWP

Detailed descriptions of the Study Area and existing conditions of physical, biological, cultural, and socioeconomic resources within the Study Area are included in this Draft EIS.

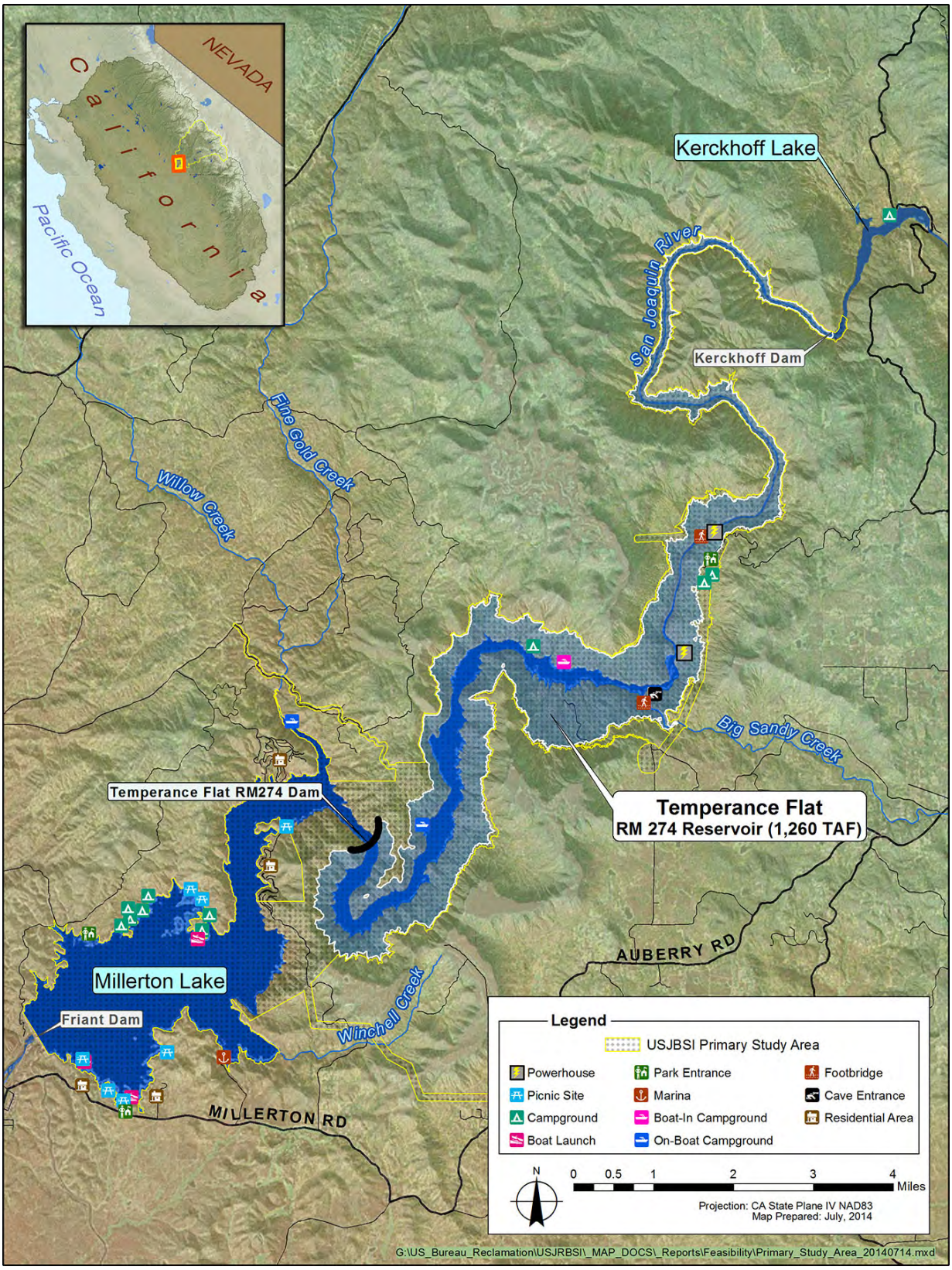

Figure 1-1. Primary Study Area Including Proposed Temperance Flat RM 274 Reservoir and Dam

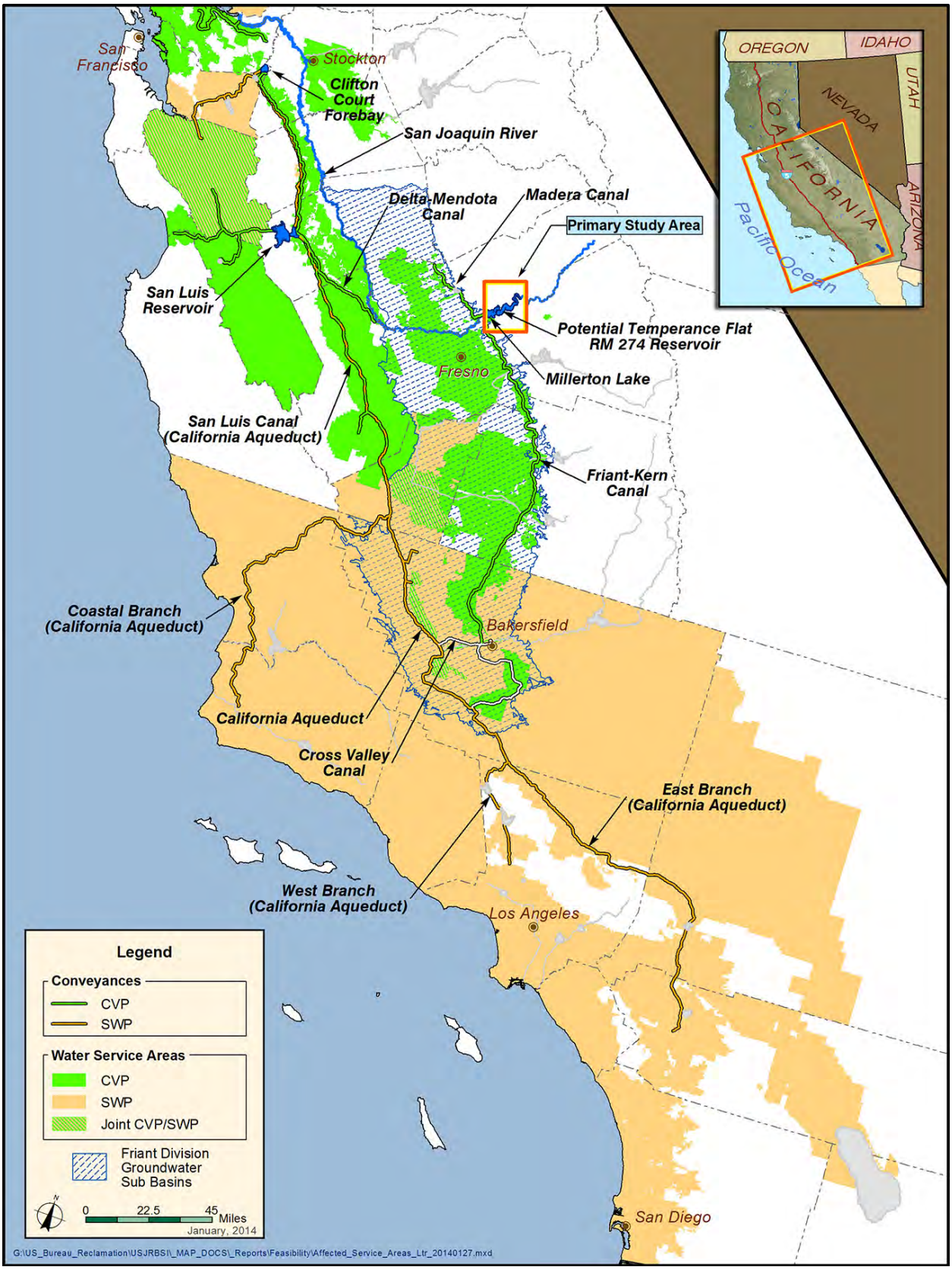

Figure 1-2. Extended Study Area

Areas of Controversy

Federal, State, and local stakeholders identified several areas of controversy during public outreach activities for the Investigation, including public scoping activities, agency meetings, public review and comment on the Draft Feasibility Report, and related ongoing public outreach activities. Major concerns include:

- **Impacts on Air Quality** – Construction activities would adversely affect air quality conditions in the San Joaquin Valley Air Basin, which is classified as a nonattainment basin for ozone and particulate matter standards of 2.5 microns in aerometric diameter or less ($PM_{2.5}$) by the EPA and California Air Resources Board (ARB).

- **Impacts on Biological Resources** – Habitat for aquatic and terrestrial wildlife populations, including oak woodland habitat, riverine habitat, pool and riffles, and rare plant populations, would be inundated.

- **Impacts on Cultural Resources** – Sites of cultural and religious significance, including sacred sites and sites related to historical activities of Native Americans, exist in and around the inundation area.

- **Impacts on Hydropower Generation** – Pacific Gas and Electric Company's (PG&E) Kerckhoff Hydroelectric Project powerhouses would be inundated and require decommissioning of the power generation infrastructure.

- **Impacts on Millerton Lake Cave System** – The Millerton Lake Cave system, an approximately 1 mile long granite cave created by abrasive, river scouring, would be inundated.

- **Impacts on the San Joaquin River Gorge Area** – The San Joaquin River Gorge area encompasses the San Joaquin River between Kerckhoff Dam and Millerton Lake. BLM has determined that this stretch of river is potentially eligible and suitable for designation as a Federal Wild and Scenic River.

- **Potential to Induce Growth** – Water supply reliability of the water management system for existing and

projected agricultural, urban, and environmental uses would be improved. Some comments provided during scoping expressed concerns that increasing storage in the upper San Joaquin River Basin would encourage population growth and increase demand for resources.

Issues to Be Resolved

Efforts are underway to resolve the following issues.

Special Designations

During development of the Draft Bakersfield Resource Management Plan (RMP) (BLM 2011) and EIS (BLM 2012), BLM completed a preliminary suitability determination of river segments located within the RMP area for inclusion under the National Wild and Scenic Rivers System (NWSRS). Based on criteria from the BLM Manual 8351 (BLM 1993) and the Interagency Wild and Scenic Rivers Coordinating Council Guidelines on Wild and Scenic Rivers Suitability (Interagency Wild and Scenic Rivers Coordinating Council 1999), BLM concluded a preliminary determination to suggest that the San Joaquin River segment from Kerckhoff Dam to Kerckhoff Powerhouse is suitable for inclusion in the NWSRS.

The BLM cannot administratively designate a stream via a planning decision or other agency decision into the NWSRS, and the San Joaquin River segment from Kerckhoff Dam to Kerckhoff Powerhouse is not designated or will not be automatically designated as part of the NWSRS. Next steps for inclusion of this segment in the NWSRS would include Congressional determination of suitability or nonsuitability, or Secretary of the Department of Interior determination of suitability or nonsuitability and submittal of reports to the president. The president would then report recommendations to Congress, and propose designation of the San Joaquin River segment from Kerckhoff Dam to Kerckhoff Powerhouse under the NWSRS. Inclusion of the San Joaquin River segment from Kerckhoff Dam to Kerckhoff Powerhouse under the NWSRS may affect the Investigation.

Off-Site Mitigation for Impacts on Biological Resources

Potential mitigation lands containing wetland and special-status species habitat comparable to habitat that would be affected by the action alternatives have been identified near the Study Area. Reclamation is initiating informal consultation with the

USFWS to identify appropriate mitigation requirements. Mitigation strategies for biological impacts will be discussed in more detail in the Final Feasibility Report and Final EIS.

Hydropower Mitigation

The onsite hydropower replacement option (powerhouse connected to the outlet works of Temperance Flat RM 274 Reservoir), combined with additional mitigation as needed, would be cost effective and is Reclamation's preferred power mitigation option for the Investigation. Additional powerhouse refinements may be conducted before completing the feasibility study. Further refinements in unit number, size, and operation could be considered. Additional operational scenarios could be evaluated in the future that may further improve the value of onsite hydropower mitigation. Scenarios that could be considered include integrating operations of Temperance Flat RM 274 Reservoir with other CVP and SWP SOD facilities, which would increase the amount of water stored in Temperance Flat RM 274 Reservoir (and corresponding head for generation) through exchange or changes in carryover storage levels. Additional mitigation components may also be needed and could include a range of onsite and offsite power generation and transmission actions. These actions could potentially replace previous proposed mitigation actions. Hydropower mitigation issues will continue to be coordinated with affected stakeholders during development of the Final Feasibility Report and EIS.

Identification of Preferred Alternative/Recommended Plan

Consistent with the CEQ guidelines, the preferred alternative for implementation will be identified in the Final EIS. Ultimately, the alternative that best meets the stated objectives and maximizes net public benefits will be identified with supporting rationale and documentation. The alternative recommended for implementation, or Recommended Plan in the Final Feasibility Report, may or may not be identified as the Environmentally Preferable Alternative, consistent with NEPA; the National Economic Development Plan, consistent with the P&Gs, the Least Environmentally Damaging Practicable Alternative, consistent with the Clean Water Act; and the Environmentally Superior Alternative, consistent with CEQA. A non-Federal sponsor may prefer another plan (locally preferred plan (LPP)) which may be considered and recommended by the Secretary of the Department of the Interior for approval and authorization by Congress.

Organization of EIS

This Draft EIS is organized as described below.

The **Executive Summary** summarizes this Draft EIS; presents the intended use of this Draft EIS; describes lead agencies, project location, project background and future actions, purpose and need for action, and planning objectives; provides an overview of the alternatives under consideration, and major conclusions of the environmental analysis; documents the known areas of controversy and issues to be resolved; and summarizes the environmental impacts, mitigation measures, and significance conclusions for the alternatives under consideration.

Chapter 1, "Introduction," summarizes project background and context; EIS purpose and uses; relationship to CALFED and the SJRRP; purpose and need for action and objectives; responsibilities of Lead, Responsible, and Cooperating agencies; study area; areas of controversy; issues to be resolved; and EIS organization.

Chapter 2, "Alternatives," summarizes the methods used for selecting the alternatives, describes the alternatives under consideration, and discusses alternatives that have been eliminated from detailed evaluation in this Draft EIS.

Chapter 3, "Considerations for Describing Affected Environment and Environmental Consequences," describes the Study Area, and the approach and terms used to describe the environmental and regulatory setting and environmental consequences for the resource topics presented in Chapters 4 through 26.

Chapters 4 through **7** and **9** through **26** include the affected environment for 22 resource topics, and discussions of methods, significance criteria, environmental impacts, and mitigation measures for potential direct and indirect impacts. **Chapter 8** summarizes existing and potential future climate conditions in the Study Area, the performance of the action alternatives under projected climate conditions, and the potential for the anticipated effects of the action alternatives to change under future climate conditions.

Chapter 27, "Cumulative Impacts," provides an analysis of overall cumulative effects of the alternatives, including the No

Action Alternative, together with other past, present, and reasonably foreseeable future projects.

Chapter 28, "Other NEPA and CEQA Considerations," describes potential significant and unavoidable impacts, the relationship of short-term uses and long-term productivity, irreversible and irretrievable commitments of resources, and growth-inducing impacts of implementing the proposed action. This chapter also describes Federal laws and regulations that apply to project compliance. In addition, this chapter lists potential permits, regulatory approvals, and needed authorizations.

Chapter 29, "Public Involvement, Consultation, and Coordination," summarizes public involvement activities under NEPA and CEQA; Native American consultation and coordination; consultation and coordination with other Federal, State, regional, and local agencies; major topics of public and stakeholder interest; and next steps in the environmental review process.

Chapter 30, "References," provides a bibliography of sources cited throughout this Draft EIS.

Chapter 31, "EIS Distribution List," lists the agencies, organizations, libraries, and individuals receiving a copy of the Draft EIS for review.

Chapter 32, "List of EIS Preparers," lists individuals who participated in preparing this Draft EIS and provides qualifications for those individuals, shown by organization and agency.

Chapter 33, "Index," lists key terms and topics discussed throughout this Draft EIS, and the location of the most relevant discussion or definition of the terms and topics.

Appendices contain background information that supports this Draft EIS. The appendices include Plan Formulation, Modeling, and Physical Resources.