Public Draft

Program EIR for Small Erosion Repair Program

SCH#2009112088

Prepared for:

AECOM

March 2013

STATE OF CALIFORNIA -- CALIFORNIA NATURAL RESOURCES AGENCY **EDMUND G. BROWN JR.**, *Governor*

DEPARTMENT OF WATER RESOURCES
DIVISION OF FLOOD MANAGEMENT
P.O. BOX 219000
SACRAMENTO, CA 95821-9000

March 19, 2013

NOTICE OF AVAILABILITY: Draft Program Environmental Impact Report for the Department of Water Resources Small Erosion Repair Program

Dear Interested Parties:

Enclosed for your review is the Draft Program Environmental Impact Report (DPEIR) for the Department of Water Resources (DWR) Small Erosion Repair Program (SERP). The document has been prepared in accordance with the requirements of the California Environmental Quality Act (CEQA) and the State CEQA Guidelines.

DWR is proposing to implement SERP, a streamlined regulatory review and authorization process that would facilitate implementation of annual repairs of small erosion sites on levees within the Sacramento River Flood Control Project (SRFCP) area. SERP would use programmatic authorizations, issued by federal and state agencies with regulatory obligations associated with erosion repair projects, to streamline the process for implementing small erosion repairs in accordance with conservation-based design and monitoring standards. Projects that qualify under SERP would be eligible to receive authorization within a shortened time frame because they would be designed to minimize effects on fish and wildlife resources, including listed species, and to protect and enhance the existing aquatic and riparian habitats comprising the riverine corridor.

For the initial 5-year (Phase 1) SERP effort that is covered under this DPEIR, the coverage area would be a subset of SRFCP, representing approximately 300 miles of levees maintained by DWR in Butte, Colusa, Glenn, Placer, Sacramento, Solano, Sutter, Yolo, and Yuba counties. The following waterways would be eligible for inclusion in Phase 1:

- Butte Creek
- Cache Creek from the Yolo Bypass to the upstream limit of the SRFCP levees
- Cherokee Canal
- Colusa Bypass
- Northern portion of Colusa Main Drain
- Portions of Feather River
- Putah Creek
- Sacramento Bypass
- Portions of Sacramento River
- Sutter Bypass Tisdale Bypass
- Wadsworth Canal
- Willow Slough Bypass
- Portions of Yolo Bypass
- East and West Interceptor Canals

Implementation of SERP would begin with DWR's, Flood Maintenance Office staff conducting annual maintenance surveys each spring to identify small erosion sites that need repairs within the Phase 1 SERP coverage area. A maximum of 15 individual repair projects would be implemented annually under SERP during Phase 1 of the program. Potential SERP repair sites would be categorized into two tiers based on the size of the project disturbance area (0.1 acre

or less with a maximum linear foot limit of 264 feet, or 0.5 acre or less with a maximum linear foot limit of 1,000 feet). For each proposed site, DWR would select as a guide, one of seven SERP design templates created by the collaborating agencies and identified in the SERP Manual to apply to the site. DWR would notify the applicable permitting agencies—U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), and the Central Valley Regional Water Quality Control Board (RWQCB)—of the proposed small erosion repair projects each spring. Upon receiving agency verification of SERP authorization, DWR would proceed with the repairs in accordance with the applicable conservation measures in the SERP Manual and any additional terms or conditions for approval that the agencies may require.

Construction activities would take place at individual sites throughout each summer and fall during the 5-year Phase 1 period. Each site would require no more than 1–4 weeks of active construction. The program design templates have been developed with the intent that once repaired the erosion sites would require little or no additional upkeep or maintenance. Phase 1 of SERP has independent utility from potential future SERP phases.

Conservation measures in the SERP Manual, developed in coordination with the permitting agencies, would be applicable to all SERP project sites. These measures include timing restrictions to avoid work during important times for various special-status species, measures to avoid vegetation and habitat disturbance, hazard prevention measures, erosion control measures, and other mandatory construction measures.

Because sites with hazardous materials contamination would not be eligible for inclusion in the SERP, no known hazardous materials contamination sites would be affected.

In addition to the proposed project, the DPEIR evaluates three alternatives: (1) No-Project Alternative; (2) Large-Scale Erosion Repair Program Alternative; and (3) Native Soil Disturbance Minimization Alternative.

The DPEIR identifies impacts of the proposed project in the following areas that would be *potentially significant* or *significant* before mitigation: air quality and climate change, cultural resources, and noise. Mitigation included in the DPEIR would reduce all *potentially significant* or *significant* impacts to a less than significant level. No significant and unavoidable impacts of the proposed project are identified.

The DPEIR is being circulated for public review and comment for a period of 45 days, starting on Wednesday, March 20, 2013 and ending on Friday, May 3, 2013. Written comments must be submitted no later than close of business on Friday, May 3, 2013, to:

Mr. Jeff Schuette, Senior Environmental Scientist
Maintenance Environmental Support Branch
Division of Flood Management
Department of Water Resources
3310 El Camino Ave, Suite 140
Sacramento, CA 95821
Fax: (916) 574-0331

Comments may also be provided via e-mail to Jeff Schuette at jeff.schuette@ca.water.gov. If comments are provided via e-mail, please include the project title in the subject line, attach

comments in Microsoft Word format, and include the commenter's U.S. Postal Service mailing address.

To simplify the distribution process, copies of the DPEIR are being distributed in electronic format and accompanied by paper copies of the executive summary. If you are a reviewer/recipient who received the bulk of the DPEIR in electronic format and you require a paper copy, please contact Danielle Ingrassia at (916) 574-0383 or danielle.ingrassia@water.ca.gov.

Copies of the DPEIR and electronic copies of the reference documents may also be reviewed during normal business hours at the following locations:

Department of Water Resources
Division of Flood Management
3310 El Camino Ave, Suite 100
Sacramento, CA 95821

Sacramento Public Library, Central Library
828 I Street
Sacramento, CA 95814

Chico Branch Library
1108 Sherman Avenue
Chico, CA 95926

Sutter County Free Library
750 Forbes Avenue
Yuba City, CA 95991

Rio Vista Library
44 South Second Street
Rio Vista, CA 94571

The DPEIR is also available for review online at http://www.water.ca.gov/floodmgmt/fmo/msb/smallerosionrepairs.cfm.

DWR also invites you to attend a public meeting on the DPEIR, which has been scheduled for Friday, April 19, 2013. Meeting attendees may provide comments on the DPEIR for the proposed project:

Public Meeting
Friday, April 19, 2013
3:00 p.m.
The Resources Building, Auditorium 1st floor
1416 9th Street
Sacramento, CA 95814

Note: The Resources Building is accessible to persons with disabilities. Individuals needing special services will be accommodated to the best of our ability. For more information, please contact Danielle Ingrassia at (916) 574-0383 at least 48 hours before the meeting.

Public Draft

Program EIR for Small Erosion Repair Program

SCH#2009112088

Prepared for:

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SUMMARY

S.1 INTRODUCTION

The Small Erosion Repair Program (SERP) is a collaborative interagency effort to develop a streamlined regulatory review and authorization process that will facilitate implementation of annual repairs of small erosion sites on levees within the Sacramento River Flood Control Project (SRFCP) area. The SRFCP contains approximately 900 to 1,000 miles of levees. For the initial 5-year (Phase 1) SERP effort, the coverage area is a subset of the SRFCP and represents approximately 300 miles of levees maintained by the California Department of Water Resources (DWR) (see Exhibit S-1).

DWR, as lead agency under the California Environmental Quality Act (CEQA), has prepared this draft program environmental impact report (DEIR) to inform agencies and the public about the potential environmental effects of the SERP. This DEIR has been prepared in accordance with CEQA (Public Resources Code section 21000 et seq.) and State CEQA Guidelines. This DEIR is a “program” EIR intended to provide information at a general (or programmatic) level of detail on the potential impacts of implementing the SERP, as described by section 15168(a) et seq. of the CEQA Guidelines.

S.2 BACKGROUND

Levees that sustain erosion damage during winter periods of high flows may undergo further erosion that over time could lead to levee failure and cause substantial flood damage in both urban and nonurban environments. Such levee failures can also cause significant adverse effects on the surrounding fish and wildlife resources. Erosion sites need to be repaired in a timely manner to maintain the integrity of the existing flood management system. Expedient repairs can also prevent further damage to the environment at these sites. Currently, small erosion repair projects require permits to be issued on a project-by-project basis. The multiple authorizations and level of interagency coordination required for individual repairs (e.g., Clean Water Act permits from U.S. Army Corps of Engineers [USACE], Endangered Species Act compliance with U.S. Fish and Wildlife Service [USFWS] and National Marine Fisheries Service [NMFS], streambed alteration agreements from California Department of Fish and Wildlife [CDFW], and water quality certification with the Regional Water Quality Control Board

[RWQCB]) have often resulted in substantial delays, during which time the eroded areas have been susceptible to further damage, increasing potential public safety hazards and repair costs as repair projects are delayed.

To address this problem, the SERP Subcommittee was formed at the direction of the Interagency Flood Management Collaborative Program Group (Interagency Collaborative

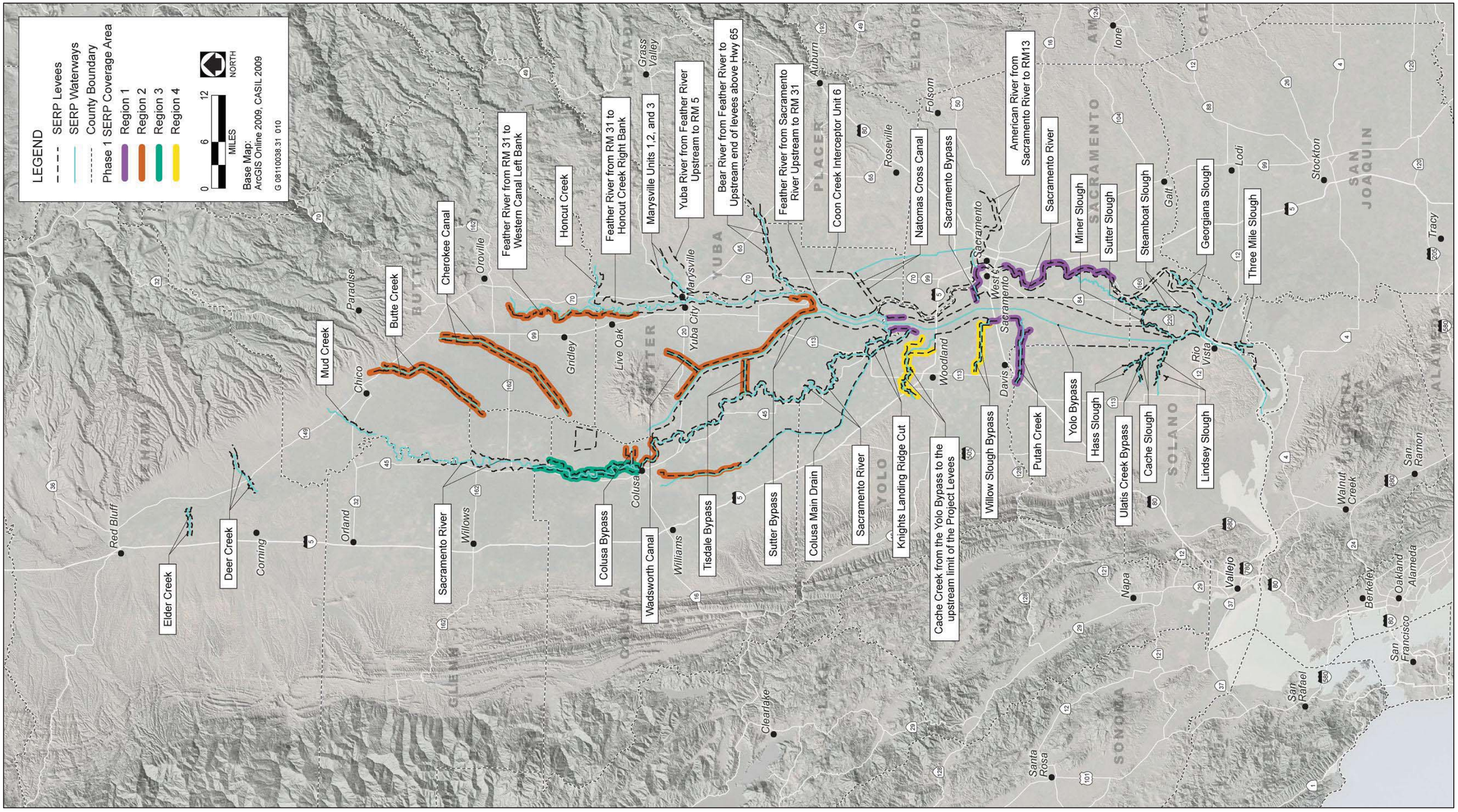
Group) on January 17, 2007. The Subcommittee consists of a group of federal and state resource agency representatives charged with defining what constitutes a small erosion repair and determining appropriate repair designs that will adequately protect the levee system while avoiding substantial adverse effects on environmental resources. The Subcommittee members have worked in concert to craft a program intended to improve current erosion repair practices, and thus to maintain the necessary level of flood risk reduction while seeking to achieve a cumulative net benefit to aquatic and terrestrial fish and wildlife resources, including habitat for sensitive species.

As part of this program, the SERP Subcommittee developed the SERP Manual (Appendix B of this DEIR), which provides the general guidelines under which the program would operate. The SERP Subcommittee has developed guidelines in several areas such as project design, conservation measures, and monitoring and reporting requirements. Additionally, a CEQA Compliance Checklist developed by DWR based on the environmental analysis in this DEIR would be used to ensure that, for each project site, repairs conducted under the SERP would comply with CEQA and to provide substantial information to streamline permitting.

Local maintaining agencies, including DWR's maintenance yards, maintain the levees along the waterways listed below, all of which will be eligible for inclusion in the SERP (see Exhibit S-1):

- Butte Creek
- Cache Creek from the Yolo Bypass to the upstream limit of the SRFCP levees
- Cherokee Canal
- Colusa Bypass
- Northern portion of Colusa Main Drain, as identified in Exhibit S-1
- Portions of Feather River, as identified in Exhibit S-1
- Putah Creek
- Sacramento Bypass
- Portions of Sacramento River, as identified in Exhibit S-1
- Sutter Bypass Tisdale Bypass
- Wadsworth Canal
- Willow Slough Bypass
- Portions of Yolo Bypass, as identified in Exhibit S-1
- East and West Interceptor Canals

Only the waterways identified above are included in the SERP for Phase 1. After Phase 1 is complete, the program's success will be evaluated and the SERP coverage area could be expanded to include the repair of erosion sites along the leveed sections of the remaining waterways.



Source: DWR 2009, Adapted by AECOM 2010

Exhibit S-1 **Phase 1 SERP Coverage Area**

S.3 PROJECT PURPOSE AND OBJECTIVES

The purpose of the SERP is to ensure the continued flood management integrity of the SRFCP levees while protecting environmental resources by providing an efficient method of selecting, evaluating, and permitting small erosion repair projects. The SERP uses programmatic authorizations, issued by federal and state agencies with regulatory obligations associated with erosion repair projects to streamline the process for implementing small erosion repairs in accordance with conservation-based design and monitoring standards established by the SERP Subcommittee. Projects that qualify under the SERP are eligible to receive authorization within a shortened time frame because they are designed to minimize effects on fish and wildlife resources, including listed species, and to protect and enhance the existing aquatic and riparian habitats comprising the riverine corridor.

The program sets apart similar small erosion repair sites and develops a streamlined permitting process for these sites with the following goals:

- provide quicker repairs to small erosion sites, thereby preventing erosion areas from becoming larger,
- foster consistent regulatory compliance efforts for similar repairs, from the standpoint of both environmental protection and operations and maintenance, and
- obtain measurable data to evaluate program success.

The identified objectives of the proposed levee/bank repairs will be to:

- maintain SRFCP integrity,
- prevent further erosion and loss of riparian and nearshore aquatic habitat,
- minimize the loss of riparian vegetation and endangered species habitat resulting from delayed repairs and construction activities, and
- enhance the existing riparian vegetation corridor at the erosion sites, where applicable.

S.4 PROJECT DESCRIPTION

S.4.1 PROJECT CHARACTERISTICS

EROSION REPAIR PROJECT IDENTIFICATION AND CHARACTERIZATION

Implementation of SERP would begin with DWR maintenance staff conducting annual maintenance surveys each spring to identify small erosion sites that need repairs within the Phase 1 SERP coverage area. DWR engineering, environmental, and archaeological staff

members would conduct a baseline assessment at each site and complete a Baseline Assessment Checklist in accordance with the SERP Manual. The completed checklist would include information about existing soil, levee, and vegetation conditions, and potential habitat for special-status species and cultural resources at the site. A maximum of 15 individual repair projects would be implemented annually under the SERP during Phase 1 of the program. Potential SERP repair sites would be categorized into two tiers based on the size of the project disturbance area (0.1 acre or less with a maximum linear foot limit of 264 feet, or 0.5 acre or less with a maximum linear foot limit of 1,000 feet).

For each proposed site, DWR would select as a guide one of seven SERP design templates created by the collaborating agencies and identified in the SERP Manual to apply to the site. The program design templates are described in more detail in Section S.3.2, “Program Elements,” below.

DWR would notify the applicable permitting agencies—USACE, USFWS, NMFS, CDFW, and RWQCB—of the proposed small erosion repair projects by bundling and submitting the required notification materials for up to 15 projects to the agencies as a package each spring (by June 1). The notification package would include a CEQA Compliance Checklist for SERP projects to document that each small erosion repair project and site is consistent with the findings and parameters of this DEIR and the SERP Manual prepared for the SERP. The CEQA Compliance Checklist would be based on the findings of the SERP Final DEIR and used to determine whether the EIR provides adequate CEQA coverage for each of the SERP projects or if further project-level environmental documentation would be required to fully satisfy CEQA requirements. Upon receipt of the annual SERP notification package, the agencies would review the projects and independently respond to DWR, indicating whether the projects are acceptable under their programmatic SERP authorizations, and including any additional terms or conditions for approval in their responses. Upon receiving the agencies’ verification of SERP authorization, DWR may proceed with the repairs in accordance with the applicable conservation measures in the SERP Manual) and any additional terms or conditions for approval that the agencies may require. This process should shorten the permitting time frame for those projects, allowing the necessary repairs to be implemented in a timely manner while fully considering and protecting environmental resources.

SITE REPAIRS

Construction activities would take place at individual sites throughout each summer and fall during the 5-year Phase 1 period. Each site would require no more than 1–4 weeks of active construction. Effective construction and replanting methods, employed in the recent past for similar small erosion control projects, would be used. Bank reconstruction would in most cases incorporate plantings into the revetment in accordance with the bioengineering techniques outlined in the program design templates. The upper bank would be seeded and may be

covered with biodegradable materials to control erosion and stabilize the bank. Willow cuttings and other native vegetation would be installed during placement of the revetment or after construction during the appropriate planting season.

The program design templates have been developed with the intent that once repaired the erosion sites would require little or no additional upkeep or maintenance. During the initial vegetation establishment period, maintenance activities for planted areas may include removing invasive vegetation, pruning planted vegetation for visibility and accessibility on levees, and replacing dead plantings. Once the final success criteria are achieved, the vegetation should be self-maintaining. Maintenance activities that focus on maintaining restoration plantings, in particular woody vegetation plantings, would be conducted for 5 years or longer as necessary until the final success criteria are met by DWR.

S.4.2 Program Elements

Design Alternatives

The SERP Subcommittee discussed 13 repair alternatives and decided that the SERP would use seven design templates:

1. Bank fill rock slope with live pole planting
2. Willow wattle with rock toe
3. Branch layering
4. Rock toe with live pole planting
5. Soil and rock fill at the base of a fallen tree (including root wad revetment option)
6. Bank fill rock slope with native grass planting
7. Bank fill rock slope with emergent vegetation planting

Plans and descriptions of the seven design templates are included in the SERP Manual.

Conservation Measures

Conservation measures in the SERP Manual have been developed in coordination with the agencies represented on the SERP Subcommittee. Measures have been identified that would be applicable to all SERP project sites, including timing restrictions to avoid work during important times for various special-status species, measures to avoid vegetation and habitat disturbance, hazard prevention measures, erosion control measures, and other mandatory construction measures.

S.5 AREAS OF KNOWN CONTROVERSY AND ISSUES TO BE RESOLVED

Several areas of controversy associated with implementation of the SERP have been identified and are described briefly below.

- **The appropriate level of vegetation management on levees**. In the wake of Hurricane Katrina, USACE has revisited its nationwide policies regarding vegetation management. USACE currently requires that all woody vegetation be removed from levees in the absence of a USACE-issued variance, if maintaining agencies such as DWR wish to retain eligibility for federal emergency repair funding under Public Law 84-99. This policy is memorialized in USACE's Engineering Technical Letter 1110-2-571, *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures*, adopted April 10, 2009. DWR does not believe that the presence of properly maintained woody vegetation on "legacy levees" constitutes a degree of risk that necessarily requires removal of vegetation. In fact, in some circumstances, vegetation can help protect levees from erosion and other risk factors, while also providing important habitat values.

- **Coordination with other collaborative processes and local planning efforts.** Multiple ongoing planning efforts in the Central Valley (e.g., the CVFPP, CALFED Bay-Delta Program, Bay Delta Conservation Plan, habitat conservation plans/natural communities conservation plans) overlap with the SERP in both geography and scope. Challenges exist when balancing the needs of these many efforts where jurisdictions and project timing overlap, and where the actions of one program may preclude (or limit) the actions of another.

S.6 ALTERNATIVES TO THE PROPOSED PROJECT

Based on scoping and agency consultation, as well as the alternatives formulation and evaluation process conducted by the SERP Subcommittee, the following program alternatives were identified for evaluation in this DEIR:

- **No-Project Alternative**—CEQA Guidelines section 15126.6(e)(2) states that a discussion of the "No Project" alternative must consider "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans." The No-Project Alternative assumes that the SERP would not be initiated, and no collaborative programmatic repair program would be put in place by DWR. Instead, erosion repairs would continue to be identified by DWR, permitted individually by the applicable regulatory agencies, and implemented when permits were obtained, as is currently done. DWR would continue the status quo, implementing a range of unrelated erosion repairs on a project-by-project basis.

Under this alternative, a number of minor repairs would be conducted by various maintenance yards, and would qualify as categorical exemptions under CEQA. Therefore, by definition, these minor repairs would have less-than-significant impacts on the physical environment. DWR would also typically be able to complete CEQA evaluations and obtain federal and state agency authorizations each year to repair one or two levee sections that meet the size requirements of SERP under this alternative. The agency authorizations obtained through this process would stipulate avoidance, minimization, conservation, and compensation measures to reduce potentially significant impacts on the environment to a less-than-significant level. However, more repairs than these would be needed each year. Because of the lengthy process associated with CEQA compliance and permit acquisition, a number of these sites would be left unrepaired and would likely be further eroded during severe weather patterns. This would result in the need for more emergency repairs each year relative to the proposed project, and emergency repairs would be made using only rock. The No-Project Alternative would not meet most DWR project objectives and was determined to be infeasible. It was included in the analysis, however, as required by CEQA Guidelines section 15126(e).

- **Large-Scale Erosion Repair Program Alternative**—A large-scale programmatic erosion repair program would be developed, similar to the SERP, to permit one to three projects per year, with a combined maximum area or length of disturbance equal to the SERP. Therefore, the Large-Scale Erosion Repair Program in a given year could include one project with up to 7.5 acres or 15,000 linear feet in size, or two to three individual projects of any size, as long as the maximum combined area or length permitted in that year did not exceed 7.5 acres or 15,000 linear feet. The bioengineering designs proposed under the SERP could be used for the Large-Scale Erosion Repair Program Alternative, but at a larger scale. Construction equipment and methods would be similar to the proposed program. This alternative meets most project objectives and is considered to be a feasible alternative.

- **Native Soil Disturbance Minimization Alternative**—This alternative would permit the same number of erosion repair projects as the SERP (up to 15), with the same acreage and linear-foot limitations per site as the SERP, but in areas where disturbance of native soil for site preparation could be avoided, revetment could be installed directly on the native soil with no grading or excavating required, and plantings would be permitted only in the levee fill. Under this alternative, disturbance of native soil would not be precluded where the erosion repair required the disturbance of this soil to ensure efficacy of the design from an engineering standpoint; however, erosion repair methods not requiring disturbance of native soil would be favored. The same number of acres or linear feet of disturbance would occur under this alternative as under the SERP, but some of the repairs would avoid disturbance of native soil. In these cases, because vegetation planting would be restricted

to levee fill, the repairs would generally result in vegetation plantings farther away from the aquatic habitat than would occur under the SERP. Construction equipment and methods would be similar to the proposed program except as described above. This alternative meets most project objectives and is considered to be a feasible alternative.

S.7 SUMMARY OF ENVIRONMENTAL IMPACTS ON THE PROPOSED PROJECT

The PEIR impact analysis examines all potentially significant impacts that would occur with implementation of the SERP. Impacts and mitigation measures are described for proposed activities under SERP.

The impact analysis addresses potential direct and indirect impacts associated with construction and operations and maintenance. Potential environmental impacts of the proposed program and associated mitigation measures are summarized in Table S-2 at the end of this Summary.

S.8 COMPARISON OF ENVIRONMENTAL IMPACTS OF THE PROPOSED PROJECT AND ALTERNATIVES

This section compares the environmental impacts of each of the alternatives (described above) with the impacts of the SERP.

The CEQA Guidelines (section 15126.6[d]) permit evaluation of the alternatives in less detail than for the proposed project. Consistent with section 15126.6(d) of the CEQA Guidelines, the analysis of alternatives to the proposed program generally compares the environmental effects of the alternatives against the effects of the SERP, focusing on whether the alternative would result in effects greater than, less than, or similar to those identified for the SERP.

Table S-1 provides a summary comparison of the impact levels of the proposed program and alternatives. The impact levels listed for the SERP in Table S-1 reflect the most substantial environmental effects identified for each environmental resource area.

Table S-1
Comparison of Impact Levels of the Proposed Program and the Alternatives

Environmental Resource	Proposed Program [1]	No-Project Alternative	Large-Scale Erosion Repair Program Alternative	Native Soil Disturbance Minimization Alternative
Air Quality and Climate Change	Less than significant after mitigation	Greater	Similar	Similar

Table S-1 Comparison of Impact Levels of the Proposed Program and the Alternatives				
Environmental Resource	**Proposed Program [1]**	**No-Project Alternative**	**Large-Scale Erosion Repair Program Alternative**	**Native Soil Disturbance Minimization Alternative**
Biological Resources	Less than significant	Greater	Greater	Greater
Cultural Resources	Less than significant after mitigation	Greater	Greater	Lesser
Geology, Soils, and Paleontological Resources	Less than significant	Greater	Greater	Similar
Hydrology and Water Quality	Less than significant	Greater	Greater	Similar
Noise	Less than significant after mitigation	Greater	Greater	Similar

Notes:
[1] Impact categories listed for the proposed program provide the most severe impact category identified for the environmental issue area.

S.9 NEXT STEPS FOR THE PEIR

This DEIR is being circulated to federal, state, and local agencies involved with the proposed program and made available to interested organizations and individuals who may wish to review and comment on the document. The 45-day public review period begins on March 20, 2013, and ends on May 3, 2013. During that period, written comments on the environmental document may be sent to DWR at the following address:

Jeff Schuette
California Department of Water Resources
Division of Flood Management
3310 El Camino Avenue, Suite 100
Sacramento, CA 95821
E-mail: jschuett@water.ca.gov

Copies of the DEIR can be reviewed at:

California Department of Water Resources
Division of Flood Management
3310 El Camino Avenue, Suite 100
Sacramento, CA 95821
9am-5pm Monday through Friday

Chico Branch Library
1108 Sherman Avenue
Chico, CA 95926
9am-5pm Monday, Friday and Saturday
9am-7pm Tuesday through Thursday

Sutter County Free Library
750 Forbes Avenue
Yuba City, CA 95991
10:00am-7:00pm Monday through Thursday
10:00am-5:00pm Friday & Saturday

Sacramento Public Library, Central Library
828 I Street
Sacramento, CA 95814
12pm-5pm Sunday
10am-8pm Tuesday
10am-6pm Wednesday through Thursday
12pm-6pm Friday
10am-5pm Saturday

Rio Vista Library
44 South Second Street
Rio Vista, CA 94571
10am-6pm Monday and Wednesday
10am-9pm Tuesday and Thursday
10am-5pm Friday and Saturday

Following receipt of comments and the close of the public comment period, DWR will prepare a FEIR that considers and responds to comments on significant environmental issues in the DEIR. The FEIR will be circulated for at least 10 days prior to EIR certification to public agencies that submitted comments.

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
3.2 Air Quality and Climate Change			
Impact 3.2-1: Construction-Related Emissions that Could Exceed Local Thresholds of Significance	Potentially Significant (PS)	**Mitigation Measure 3.2-1: Implement Applicable Air District–Recommended Mitigation Measures for Particulate Matter and Exhaust Emissions** California Department of Water Resources (DWR) will incorporate the following measures to reduce emissions of fugitive dust (PM_{10} and $PM_{2.5}$) during construction activities: • Comply with applicable air district rules and regulations that pertain to construction activities (e.g., asphalt reactive organic gases requirements, administrative requirements, and fugitive dust management practices). As applicable, implement construction-related requirements from air districts or local governments with authority over the project at the commencement of and during each construction activity. • Do not use open burning to dispose of any excess materials generated during site preparation or other project activities. • Schedule construction truck trips during nonpeak traffic hours to reduce peak-hour emissions and traffic congestion to the extent feasible. • Follow air pollution regulations, which includes the use of diesel-powered construction equipment and equipment idle times, that meet	Less than Significant (LTS)

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
		CARB's 1996 or newer certification standard for in-use off-road heavy-duty diesel engines [California Code of Regulations: (article 4.8, chapter 9, division 3 of title 13)] • Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. • Check all tires and maintain for proper inflation.	
Impact 3.2-2: Operations-Related Criteria Pollutants and Precursors that Could Exceed Local Thresholds of Significance	LTS	NA	LTS
Impact 3.2-3: Operations-Related Carbon Monoxide (CO) Emissions that Could Exceed Local Thresholds of Significance	LTS	NA	LTS
Impact 3.2-4: Exposure of Sensitive Receptors to Toxic Air Contaminants (TAC) Emissions	LTS	NA	LTS

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
Impact 3.2-5: Temporary Exposure of Sensitive Receptors to Odors during Construction	LTS	NA	LTS
Cumulative Impact: Construction-Related Greenhouse Gas Emissions (see Section 5.1, "Cumulative Impacts")	PS	**Mitigation Measure 3.2-1: Implement Applicable Air District–Recommended Mitigation Measures for Particulate Matter and Exhaust Emissions** **Mitigation Measure 5-1: Implement Pre-Construction, Final Design, and Construction BMPs** Pre-construction and Final Design BMPs are designed to ensure that individual projects are evaluated and their unique characteristics are taken into consideration when determining whether specific equipment, procedures, or material requirements are feasible and efficacious for reducing GHG emissions from a project. In addition to mitigation measures defined in the various sections of this EIR, the following BMPs will be applied as applicable and appropriate: • **BMP 1**. Evaluate project characteristics, including location, project work flow, site locations, and equipment performance requirements, to determine whether specifications for the use of equipment with repowered engines, electric drive trains, or other high-efficiency technologies are appropriate and feasible for the project or specific elements of the project.	LTS

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
		• **BMP 2**. Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines. • **BMP 3**. Coordinate opportunities to carpool to the construction site. • **BMP 4**. Reduce electricity use in temporary construction offices by using high-efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business. • **BMP 5**. For deliveries to project sites where the haul distance exceeds 100 miles and a heavy-duty class 7 or class 8 semi-truck or 53-foot or longer box-type trailer is used for hauling, a SmartWay certified truck will be used to the maximum extent feasible. • **BMP 6**. Recycle construction debris to reduce construction waste. Construction BMPs would apply to all construction and maintenance projects that DWR completes or for which DWR issues contracts. All the SERP projects are expected to implement all construction BMPs.	

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
3.3 Biological Resources			
Impact 3.3-1: Temporary Effects to Fish and Aquatic Habitat Resulting from Construction	LTS	NA	LTS
Impact 3.3-2: Temporary Construction-Related Disturbance or Loss of Special-Status Fish or Wildlife Species and Habitats	LTS	NA	LTS
Impact 3.3-3: Long-Term Effects to Special-Status and Common Fish and Wildlife and Habitats	Beneficial (B)	NA	B
Impact 3.3-4: Loss or Disturbance of Special-Status Plant Species and Habitats	LTS	NA	LTS
Impact 3.3-5: Discharge of Dredged or Fill Material into Jurisdictional Waters of the United States	LTS	NA	LTS
Impact 3.3-6: Temporary Loss or Degradation of Riparian Habitat/Forest or Other Sensitive Natural Communities	LTS	NA	LTS
Impact 3.3-7: Long-Term Effects on Riparian Habitats/Forests	B	NA	B

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
Impact 3.3-8: Conflict with Tree Preservation Ordinances	LTS	NA	LTS
Impact 3.3-9: Conflict with an Adopted Habitat Conservation Plan	No Impact (NI)	NA	NI
3.4 Cultural Resources			
Impact 3.4-1: Potential Impacts on Identified Cultural Resources	PS	**Mitigation Measure 3.4-1: Comply with the Programmatic Agreement (PA) Prepared by U.S. Army Corps of Engineers (USACE), State Historic Preservation Officer (SHPO), and DWR; Consult with Stakeholders as Required under Section 106 and the PA; Perform Site-specific Technical Studies to Identify and Evaluate Cultural Resources; and Implement Avoidance or Treatment Protocols as Necessary to the Extent Feasible** Management of cultural resources for the SERP would be performed under a PA prepared by USACE. DWR will perform technical studies and treatment required to identify and manage impacts on cultural resources subject to the input of stakeholders and the approval of USACE and the SHPO. Management of cultural resources required under the California Environmental Quality Act (CEQA) would be combined with the management protocols stipulated in the PA. Prior to implementation of individual small erosion repair activities, DWR will perform the following steps:	LTS

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
		• conduct an inventory of the individual small erosion repair site and define an APE as required under section 106; • evaluate identified resources eligible for listing in the National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR); • determine if the proposed activity would result in significant impacts on resources eligible for the CRHR or adverse effects on historic properties within the meaning of section 106; • resolve significant impacts either by developing resource-specific treatment protocols or by selecting and implementing treatment measures from a palette of treatment protocols developed pursuant to the PA; and • consult with stakeholders and consulting parties under the PA such as the SHPO. The inventory, evaluation, and selection of treatment will include a review of relevant local land use policies regarding cultural resources.	
Impact 3.4-2: Potential Impacts on Assumed Historically Significant Levees	LTS	NA	LTS

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
Impact 3.4-3: Impacts on Previously Unidentified Cultural Resources	PS	**Mitigation Measure 3.4-3: Train Construction Workers before Construction Begins, Monitor Construction Activities, Stop Potentially Damaging Activities, Evaluate Discovery(ies), and Resolve Adverse Effects on Significant Resources** DWR will implement the following measures to minimize potential impacts on previously undiscovered cultural resources: • Every 2 years or before construction begins, construction crews will be given a presentation and training session incorporated into the environmental awareness training before performing work in areas sensitive for previously unidentified resources so that they can assist with identifying undiscovered cultural resource materials and avoid them where possible. • A DWR archaeologist, where appropriate, will monitor all ground-disturbing construction activities at locations determined to be sensitive for unidentified cultural resources. If a previously unidentified archaeological resource is uncovered during construction, construction activities will be halted within 100 feet of the find and USACE, and other appropriate parties, will be notified regarding the discovery. • DWR will then consult with USACE and the SHPO to determine the eligibility of the resource for listing in the NRHP or qualification	LTS

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
		as a unique archaeological resource. If DWR and USACE, in consultation with the SHPO, concur that the resource is eligible for listing and the project may result in adverse effects or significant impacts on the resource, DWR either will implement one of the treatment protocols developed under the PA for the resource or will prepare a resource-specific treatment plan. • Work may only resume when either all necessary treatment has been performed under the treatment method selected, or approved by the appropriate entity, or construction in the vicinity of the resource will not result in adverse effects or encroach within an appropriate distance from the known boundaries of the resource or the boundaries of the resource.	
Impact 3.4-4: Impacts on Previously Unidentified Human Remains	PS	**Mitigation Measure 3.4-4: Stop Work in the Event of a Discovery of Human Remains, Notify the Applicable County Coroner and Most Likely Descendant, and Treat Remains in Accordance with State Law and Measures Stipulated in the Programmatic Agreement Prepared by USACE and the SHPO** DWR will ensure that the following measures are implemented to address the potential discovery of human remains during construction: • If human remains are uncovered during ground-disturbing activities, all ground-disturbing	LTS

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
		activities will cease within an appropriate radius of the find. DWR will notify the county coroner of the county in which the remains are uncovered and a professional archaeologist to determine the nature of the remains. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she will contact the NAHC by phone within 24 hours of making that determination (Health and Safety Code section 7050[c]). The NAHC will designate a most likely descendant (MLD) to dispose of the remains with appropriate dignity (California Public Resources Code section 5097.98). • After a determination that the remains are of prehistoric Native American origin, DWR will coordinate with the MLD for reburial of the remains and associated grave goods in an appropriate location. If, within 48 hours, the MLD fails to make a recommendation or reinter the remains, DWR will coordinate with the landowner to reinter the remains in a location not subject to further disturbance as provided for in California Public Resources Code section 5097.98.	

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
		• The discovery of prehistoric burials often reveals locations sensitive for the occurrence of additional archaeological material. After the initial discovery and management of human remains, a professional archaeologist working on behalf of DWR will record the site with the Native American Heritage Commission (NAHC) and the appropriate information center and, if possible, use project features to protect the site from future disturbance.	
3.5 Geology, Soils, and Paleontological Resources			
Impact 3.5-1: Risks to People or Structures Caused by Surface Fault Rupture	LTS	NA	LTS
Impact 3.5-2: Possible Risks to People and Structures Caused by Strong Seismic Ground Shaking	LTS	NA	LTS
Impact 3.5-3: Geologic Hazards from Liquefaction, Unstable Soils, and Shrink-Swell Potential	LTS	NA	LTS
Impact 3.5-4: Potential for Substantial Erosion	B	NA	B

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
Impact 3.5-5: Potential Damage to Unknown, Unique Paleontological Resources during Earthmoving Activities	LTS	NA	LTS
3.6 Hydrology and Water Quality			
Impact 3.6-1: Temporary Water Quality Effects from Stormwater Runoff, Erosion, and Spills Associated with Construction	LTS	NA	LTS
Impact 3.6-2: Long-Term Water Quality Effects from the SERP	LTS	NA	LTS
Impact 3.6-3: Potential Increased Risk of Flooding from Increased Stormwater Runoff	LTS	NA	LTS
Impact 3.6-4: Hydraulic Effects of the Proposed SERP	NI	NA	NI
3.7 Noise			
Impact 3.7-1: Increase in Temporary Noise Levels from Construction Activities	PS	**Mitigation Measure 3.7-1: Implement Measures to Reduce Temporary Noise Levels from SERP Construction** DWR will implement the following measures during construction activities: • DWR will require construction contractors, and/or DWR maintenance yard crews to	LTS

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]
		properly maintain and equip construction equipment with noise controls, such as mufflers, in accordance with manufacturers' specifications. • To the greatest extent feasible, construction outside of normal construction hours will be minimized or avoided completely when located in the vicinity of noise-sensitive receptors. Except under extreme circumstances (as in the case where a repair must be completed within a specific work window due to species or flood season requirements), construction activities will be limited to normal construction hours or hours identified in applicable local noise regulations. • In locations where the erosion site would have a direct line of sight to sensitive receptors, on-site equipment and stockpiles will be strategically placed where feasible to block the line of sight (and thus the direct transmission of noise) from noise source to receptor.	
Impact 3.7-2: Increase in Temporary Noise Levels Related to Construction Traffic	LTS	NA	LTS

Note:
NA No mitigation is needed.
[a] Impact Significance before Mitigation
B Beneficial

Table S-2
Environmental Impacts and Mitigation Measures for the Proposed Project

EIR Section and Impact(s)	Level of Significance before Mitigation[a]	Mitigation Measure	Level of Significance after Mitigation[b]

NI No impact
LTS Less than significant
PS Potentially significant
[b] Impact Significance after Mitigation
B The impact would be beneficial and no mitigation is required; therefore, the impact would remain beneficial.
NI No impact
LTS The impact would be less than significant and no mitigation is required; therefore, the impact would remain less than significant, whether or not mitigation has been provided to further reduce the impact.

1 INTRODUCTION

1.1 OVERVIEW

The Small Erosion Repair Program (SERP) is a collaborative interagency effort to develop a streamlined regulatory review and authorization process that will facilitate implementation of annual repairs of small erosion sites on levees within the Sacramento River Flood Control Project (SRFCP) area. The SRFCP contains approximately 900 to 1,000 miles of levees. For the initial 5-year (Phase 1) SERP effort, the coverage area is a subset of the SRFCP and represents approximately 300 miles of levees maintained by the California Department of Water Resources (DWR) (see Exhibit 2-1).

The term “levees” as used in this document is broadly defined to include levees and associated waterside slopes within the levee prism that are part of the SRFCP and addressed in operations and maintenance (O&M) manuals for identified flood management facilities maintained by DWR or other local maintaining agencies (LMAs).

To maintain the design integrity of the existing flood management system and to maintain or enhance fish and wildlife resources, levees with erosion damage that may lead to further loss of soil or potential failure should be repaired in a timely manner. Currently, small erosion repair projects require issuance of permits on a project-by-project basis. The multiple layers of agency authorizations and level of interagency coordination required for individual site repairs has generally resulted in long-term project delays up to several years, posing a potential public safety hazard and often leaving the eroded areas susceptible to further damage, greater repair costs, and loss of riparian vegetation.

To address this problem, the SERP Subcommittee was formed at the direction of the Interagency Flood Management Collaborative Program Group (Interagency Collaborative Group) on January 17, 2007. The subcommittee consists of a group of federal and state resource agency representatives charged with defining what constitutes a small erosion repair and determining appropriate repair designs that will adequately protect the levee system while avoiding substantial adverse effects on environmental resources. The subcommittee members have worked in concert to craft a program intended to improve current erosion repair practices, and thus to maintain the necessary level of flood risk reduction while seeking to achieve a cumulative net benefit to aquatic and terrestrial fish and wildlife resources, including habitat for sensitive species.

1.2 PURPOSE OF THE EIR AND PROGRAM-LEVEL ANALYSIS

DWR has prepared this draft program environmental impact report (DEIR) to inform agencies and the public about the potential environmental effects of the SERP. This DEIR has been

prepared in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code section 21000 et seq.) and State CEQA Guidelines.

This DEIR is a “program” EIR intended to provide information at a general (or programmatic) level of detail on the potential impacts of implementing the SERP. As described by section 15168(a) et seq. of the CEQA Guidelines, a program EIR is one that may be prepared on a series of actions that can be characterized as one large project and that are related (1) geographically; (2) as logical parts in a chain of contemplated actions; (3) in connection with the issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program; or (4) as individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar effects that can be mitigated in similar ways. Because Phase 1 of the SERP involves the implementation of small erosion repairs at up to 15 unidentified sites each year for 5 years, a program-level EIR is the appropriate framework in which to address the project’s environmental impacts. The SERP Manual (included as Appendix B of this DEIR) includes a baseline assessment form, a notification form, and an implementation checklist that would assist DWR and the SERP permitting agencies in evaluating whether work at each individual site is fully covered by the environmental analysis in this DEIR. Any individual site repair that is not fully covered by the DEIR and programmatic permits would not be implemented under the SERP and would require independent environmental review or approval, although applicable portions of this DEIR could still be incorporated by reference in that individual site repair’s CEQA document as needed. Many repairs would be considered categorically exempt from CEQA under exemption classes 1, 2, and/or 4. For exempt projects, an EIR is only triggered where significant effects would occur due to unusual circumstances or in other situations specified in Guidelines Section 15300.2. Given the range of potential projects occurring in a variety of situations, a program EIR has conservatively been prepared to ensure full disclosure and analysis of the potential impacts.

Section 21151(a) of CEQA specifies that an agency must prepare an EIR for any project that it proposes to carry out or approve that may have a significant impact on the environment. The overall purpose of this DEIR is to fulfill the following CEQA objectives:

- identify significant effects on the physical environment,
- indicate the manner in which these significant effects can be mitigated to a less-than-significant level or avoided,
- identify alternatives to the proposed project that would avoid or reduce significant effects,
- disclose agency decision making,
- facilitate public involvement, and
- foster coordination among various governmental agencies.

An EIR provides information for use in the planning and decision-making process. The purpose of an EIR is not to recommend either approval or denial of a project. CEQA requires decision makers to balance the benefits of a proposed program against its unavoidable effects on the physical environment in deciding whether to carry out a program. If environmental effects are identified as significant and unavoidable, the proposed program still may be approved by the lead agency if it believes that the social, economic, or other benefits outweigh the significant and unavoidable impacts. The lead agency would then prepare findings of fact addressing means of reducing significant and unavoidable environmental effects and a statement of overriding considerations discussing the specific reasons for approving the program, based on information in the EIR and consideration of all other information in the administrative record.

1.3 LEAD AGENCY

Under CEQA, the lead agency is the public agency with primary responsibility over the proposed program. In accordance with CEQA Guidelines section 15051(b)(1), “the lead agency will normally be the agency with general governmental powers, such as a city or county, rather than an agency with a single or limited purpose.”

DWR is serving as the lead agency for CEQA compliance on this proposed program and has coordinated with responsible and trustee agencies as appropriate. As lead agency under CEQA, DWR is principally responsible for conducting the environmental review process, including scoping, preparing appropriate environmental documentation, and obtaining required permits and other regulatory approvals. Following completion of the final EIR (FEIR), DWR will decide whether to certify the FEIR and whether to approve the program.

1.4 RESPONSIBLE, INTERESTED, AND TRUSTEE AGENCIES

1.4.1 RESPONSIBLE AND INTERESTED AGENCIES

Responsible agencies are state and local public agencies other than the lead agency that have authority to carry out or approve a project, or that are required to approve a portion of the project for which a lead agency is preparing or has prepared an EIR. Other agencies, such as federal agencies, may be interested in the project because of possible environmental impacts that would affect their jurisdiction, but do not meet the definition of a responsible agency under CEQA. The following agencies are identified either as responsible agencies under CEQA for the proposed project or as interested agencies with whom DWR is coordinating:

- California Department of Fish and Wildlife (CDFW) (Responsible Agency)
- Central Valley Flood Protection Board (CVFPB) (Responsible Agency)
- Central Valley Regional Water Quality Control Board (RWQCB) (Responsible Agency)
- State Lands Commission (Responsible Agency)
- National Marine Fisheries Service (NMFS) (Interested Agency)

- U.S. Army Corps of Engineers (USACE) (Interested Agency)
- U.S. Fish and Wildlife Service (USFWS) (Interested Agency)

Agencies and their corresponding permits/approvals that may be required for the proposed project are identified in Table 1-1.

Table 1-1
SERP Authorizing Agencies, Authority, and Permits/Agreements

Agency	Authority	Permit/Agreement
U.S. Army Corps of Engineers	Clean Water Act section 404 Rivers and Harbors Act section 10	Regional General Permit (RGP)
U.S. Fish and Wildlife Service	Federal Endangered Species Act section 7 Fish and Wildlife Coordination Act Migratory Bird Treaty Act	Programmatic Biological Opinion Programmatic Not Likely to Adversely Affect Concurrence Letter
National Marine Fisheries Service	Federal Endangered Species Act Section 7 Magnuson-Stevens Fishery Conservation and Management Act Marine Mammal Protection Act	Programmatic Biological Opinion/Essential Fish Habitat Determination Programmatic Not Likely to Adversely Affect Concurrence Letter
State Historic Preservation Officer	National Historic Preservation Act section 106	Programmatic Agreement
Central Valley Regional Water Quality Control Board	Clean Water Act section 401	Section 401 Programmatic Water Quality Certification for RGP
California Department of Fish and Wildlife	California Fish and Game Code section 1600 et seq. California Endangered Species Act	Streambed Alteration Agreement for routine maintenance Agreement on avoidance and mitigation measures
State Lands Commission	State CEQA Guidelines section 15386(c)	Project review as trustee agency; may require lease to conduct work on state-owned sovereign lands such as the beds of navigable waters
Central Valley Flood Protection Board	California Water Code sections 8361 and 12878. California Code of Regulations Title 23 Division 1	SERP activities are operations and maintenance activities not requiring Board encroachment permits

Source: Compiled by AECOM in 2010

1.4.2 TRUSTEE AGENCIES

Trustee agencies under CEQA are designated public agencies with legal jurisdiction over natural resources that are held in trust for the people of the State of California. Trustee agencies may be involved in a project whether or not they have authority to approve or implement the project. CDFW is the trustee agency responsible for protecting fish and wildlife resources in the state. The State Lands Commission is the trustee agency with regard to state-owned "sovereign" lands such as the beds of navigable waters. Trustee agencies involved in reviewing or approving portions of this program are included in Table 1-1.

1.5 DOCUMENTS INCORPORATED BY REFERENCE

Incorporation by reference is encouraged by CEQA (CEQA Guidelines, section 15150). CEQA requires a brief citation (below) and summary of the referenced material, as well as the public availability of this material. CEQA also requires citation of the state identification number of the previous EIRs cited (CEQA Guidelines, section 15150).

This PEIR incorporates by reference the environmental analysis and other information contained in the CALFED Bay-Delta Program Final Programmatic Environmental Impact Statement/Environmental Impact Report, July 2000, State Clearinghouse #96032083 (CALFED FEIS/R) (CALFED 2000). The CALFED FEIS/R addresses a broad range of ecosystem quality, water supply, water quality, and levee system integrity issues, with a focus on the San Francisco Bay/Delta system but also with broader consideration of upstream areas in the Sacramento and San Joaquin River drainages. It is referenced in this PEIR to provide additional information about CALFED's broad-scale issues and planning efforts, cumulative activities, alternatives, and the associated direct, indirect, and cumulative environmental effects (both beneficial and potentially adverse). In particular, the CALFED Bay-Delta Program includes a Levee System Integrity Program Plan (CALFED 2008) that evaluates a range of levee integrity issues and solutions, and analyzes the potential environmental effects of those solutions. Mitigation strategies described in the CALFED FEIS/R have been adapted for purposes of this PEIR as appropriate. The executive summary of the CALFED FEIS/R is included as Appendix F, "CALFED Bay-Delta Program Final Programmatic Environmental Impact Statement/Environmental Impact Report: Executive Summary." The full text of the CALFED FEIS/R is available online at http://calwater.ca.gov/calfed/library/Archive_EIS.html, and in hard copy at the CALFED Bay-Delta Program Office at 1416 Ninth Street, Suite 1155, Sacramento, CA 95814.

This PEIR also incorporates by reference the environmental analysis and other information contained in the 2012 Central Valley Flood Protection Plan Consolidated Final Program Environmental Impact Report, June, 2012, State Clearinghouse #2010102044 (CVFPP FPEIR). The CVFPP FPEIR addresses a broad range of flood protection activities throughout

the Central Valley, including those areas that will be addressed by the SERP. It is referenced in this PEIR to provide additional information about the CVFPP's broad-scale issues and planning efforts, near- and long-term management actions, and the associated direct, indirect, and cumulative environmental effects (both beneficial and potentially adverse). Mitigation strategies described in the CVFPP FPEIR have been adapted for purposes of this PEIR as appropriate. The executive summary of the CVFPP FPEIR is included as Appendix G, "Central Valley Flood Protection Plan Consolidated Final Program Environmental Impact Report: Executive Summary." The full text of the CVFPP FPEIR is available online at http://www.water.ca.gov/cvfmp/documents.cfm.

1.6 EIR SCOPE AND CONTENT

As provided in CEQA Guidelines section 15126.2, "[a]n EIR shall identify and focus on the significant environmental effects of the proposed project." A notice of preparation (NOP) for the DEIR and an initial study (Appendix A) for the proposed program were circulated to agencies and the public beginning on November 25, 2009, for a 30-day review period that was extended because of the holiday season and ended on December 28, 2009. A scoping meeting was held on December 15, 2009.

In accordance with CEQA Guidelines section 15126.2, this DEIR focuses on the following issue areas for which the proposed program may have significant adverse impacts on the environment:

- air quality and climate change,
- biological resources,
- cultural resources,
- geology, soils, and paleontological resources,
- hydrology and water quality,
- noise, and
- cumulative impacts (including greenhouse gas emissions).

Alternatives to the proposed program, including the No-Project Alternative and alternatives considered and rejected, are also evaluated.

The scope of the DEIR was developed based on the SERP's initial study (Appendix A of this DEIR), which was based on the CEQA Guidelines Appendix G, "Environmental Checklist"; previous environmental documents on similar projects; conversations with DWR staff; and identified agency concerns and input received during public scoping. These considerations support the conclusion that the remaining issue areas need not be addressed in the DEIR, with the exception of any potentially significant cumulative effects, because the proposed program can reasonably be determined not to have a potentially significant or significant direct or indirect environmental impact in the following areas:

- aesthetics,
- agricultural resources,
- hazards and hazardous materials,
- land use,
- public services,
- recreation,
- traffic/transportation, and
- utilities and service systems.

Since preparation of the initial study for SERP, Appendix G of the CEQA Guidelines has been revised to include thresholds for potential impacts on forestry resources: Section II, “Agriculture and Forestry Resources”. As described in Section 3.3, “Biological Resources,” the vegetation types within the Phase 1 SERP coverage area include riparian forest, riparian scrub/shrub, riparian herbaceous, emergent marsh, agricultural, ruderal vegetation, and bare ground. The only vegetation type within the Phase 1 SERP coverage area that would be considered as forestry resources would be riparian forest. Potential impacts to riparian forest are addressed in Section 3.2, “Biological Resources.” No other forestry or timber resources would be affected by implementation of Phase 1 of SERP. Therefore, in addition to the topics listed above, other forestry and timber resources (other than riparian forest) are not addressed in the DEIR.

1.7 EIR REVIEW PROCESS

This DEIR is being circulated to federal, state, and local agencies involved with the proposed program and made available to interested organizations and individuals who may wish to review and comment on the document. The 45-day public review period begins on March 20, 2013, and ends on May 3, 2013. During that period, written comments on the environmental document may be sent to DWR at the following physical address or email address:

Jeff Schuette
California Department of Water Resources
Division of Flood Management
3310 El Camino Avenue, Suite 100
Sacramento, CA 95821
E-mail: jschuett@water.ca.gov

Copies of the DEIR can be reviewed at
http://www.water.ca.gov/floodmgmt/fmo/msb/smallerosionrepairs.cfm.

California Department of Water Resources
Division of Flood Management
3310 El Camino Avenue, Suite 100
Sacramento, CA 95821
9am-5pm Monday through Friday

Chico Branch Library
1108 Sherman Avenue
Chico, CA 95926
9am-5pm Monday, Friday and Saturday
9am-7pm Tuesday through Thursday

Sacramento Public Library, Central Library
828 I Street
Sacramento, CA 95814
12pm-5pm Sunday
10am-8pm Tuesday
10am-6pm Wednesday through Thursday
12pm-6pm Friday
10am-5pm Saturday

Sutter County Free Library
750 Forbes Avenue
Yuba City, CA 95991
10:00am-7:00pm Monday through Thursday
10:00am-5:00pm Friday & Saturday

Rio Vista Library
44 South Second Street
Rio Vista, CA 94571
10am-6pm Monday and Wednesday
10am-9pm Tuesday and Thursday
10am-5pm Friday and Saturday

Following receipt of comments and the close of the public comment period, DWR will prepare a FEIR that considers and responds to comments on significant environmental issues in the DEIR. The FEIR will be circulated for at least 10 days prior to EIR certification to public agencies that submitted comments.

1.8 EIR ORGANIZATION

This DEIR is organized into the following chapters:

- The **Summary** summarizes the EIR process and the objectives of the proposed program; provides a brief overview of the program description; describes the program alternatives; identifies areas of controversy; and summarizes the next steps in the public review process. The Summary contains a table that summarizes the significance of the environmental impacts that would result from the proposed program. The table details the significance findings before and after implementing mitigation measures. It also details the mitigation measures proposed to avoid, minimize, rectify, reduce or eliminate, or compensate for identified significant impacts.

- **Chapter 1, "Introduction,"** provides an overview of the proposed program; describes the purpose of the EIR; identifies lead, responsible, trustee, and interested agencies; lists potentially required permits and approvals; discusses the focus of the EIR; details the public review process for the EIR; and outlines the organization of the EIR.

- **Chapter 2, "Description of the Proposed Program,"** identifies the program coverage area and setting; describes the background of and need for the proposed program; provides context relating to previous environmental documents and their relationship to this DEIR; identifies the objectives of the proposed program; and describes the program characteristics, including elements of the design templates, construction process, and permit coverage.

- **Chapter 3, "Environmental Impact Analysis,"** is divided into six sections by environmental issue area (i.e., air quality and climate change, biological resources; cultural resources; geology, soils, and paleontological resources; hydrology and water quality; and noise). For each environmental issue area, the section describes the existing environmental setting (i.e., baseline conditions) and regulatory framework, presents significance criteria or thresholds for determining the significance of impacts, evaluates environmental impacts on the physical environment associated with the proposed program, identifies mitigation for any potentially significant and significant impacts, and identifies the level of significance following implementation of the mitigation.

- **Chapter 4, "Alternatives,"** describes alternatives to the proposed program, including the No-Project Alternative and potentially feasible alternatives that would avoid, reduce, or eliminate significant impacts identified in Chapter 3, and identifies the environmentally superior alternative. Alternatives that have been proposed and rejected from further consideration are also identified, along with an explanation of the reasons for their rejection. Alternatives are not analyzed at the same level of detail as the proposed program, consistent with the provisions of CEQA Guidelines section 15126.6(d).

- **Chapter 5, "Other CEQA-Required Sections,"** discusses cumulative impacts (including impacts of greenhouse gas emissions) that could result from implementing the proposed program in combination with other past, present, and reasonably foreseeable future projects in the area; discusses the potential for the proposed program to induce growth; discloses any significant and unavoidable impacts identified in the environmental impact analysis; and describes the potential for the proposed program to result in a significant and irreversible commitment of resources.

- **Chapter 6, "References,"** lists published references and other sources of information used to prepare the EIR, including the CVFPP PEIR, Web sites, agencies, and individuals consulted during EIR preparation.

- **Chapter 7, "List of Preparers,"** identifies the persons involved with preparation of this EIR.

- **Chapter 8, "Acronyms and Abbreviations,"** provides the reader with an easy source of definitions for all the acronyms and abbreviations used in the EIR.

- **Appendices** include the NOP and initial study (Appendix A), the SERP Manual (Appendix B), air quality modeling analyses (Appendix C), Section 106 of the National Historic Preservation Act process under the proposed programmatic agreement (Appendix D), noise modeling analyses (Appendix E), the Executive Summary of the CALFED FEIS/R (Appendix F), and the Executive Summary of the CVFPP PEIR (Appendix G).

2 PROJECT DESCRIPTION

2.1 INTRODUCTION

DWR is proposing to establish the SERP, which would develop a streamlined regulatory review and authorization process to facilitate implementation of annual repairs of small erosion sites on levees within the SRFCP area. The focus of the SERP is on public safety and enhancement of the environment where feasible. The SERP program is described in detail in the SERP manual contained in Appendix B, which provides the definitive description of the program. The following is a summary of the principal features of the program.

2.2 PROJECT LOCATION AND SETTING

The SRFCP is located within the Sacramento River watershed, which drains California's northern Central Valley into the middle and lower reaches of the Sacramento River and encompasses 27,000 square miles. On average, over 22 million acre-feet of water flows through the Sacramento River watershed each year (SVWQC 2004:2). The flows consist of approximately one-third of the total runoff in California and annually average 19,000 cubic feet per second (cfs) (SVWQC 2004:2). The Sacramento River is the longest river (447 miles) entirely within California. The Sacramento River is also the state's largest river by discharge, rising in the Klamath Mountains and flowing south for over 400 miles before reaching Suisun Bay, an arm of San Francisco Bay, and then to the Pacific Ocean.

The Sacramento River's hydrology has been altered by dam, weir, and levee construction. The flood management facilities that DWR maintains are located within the valley floor of the watershed. The valley drainages include the Feather River watershed, American River watershed, Sutter Bypass watershed, Yolo Bypass watershed, and Sacramento River watershed. Local Maintaining Agencies (LMAs), including DWR's maintenance yards, maintain the levees along the waterways listed below, all of which will be eligible for inclusion in the SERP (see Exhibit 2-1). However, only the waterways identified below are included in the SERP for Phase 1. After Phase 1 is complete, the Interagency Collaborative Group intends to evaluate the program's success and consider expanding the SERP coverage area to include the repair of erosion sites along the leveed sections of the remaining waterways.

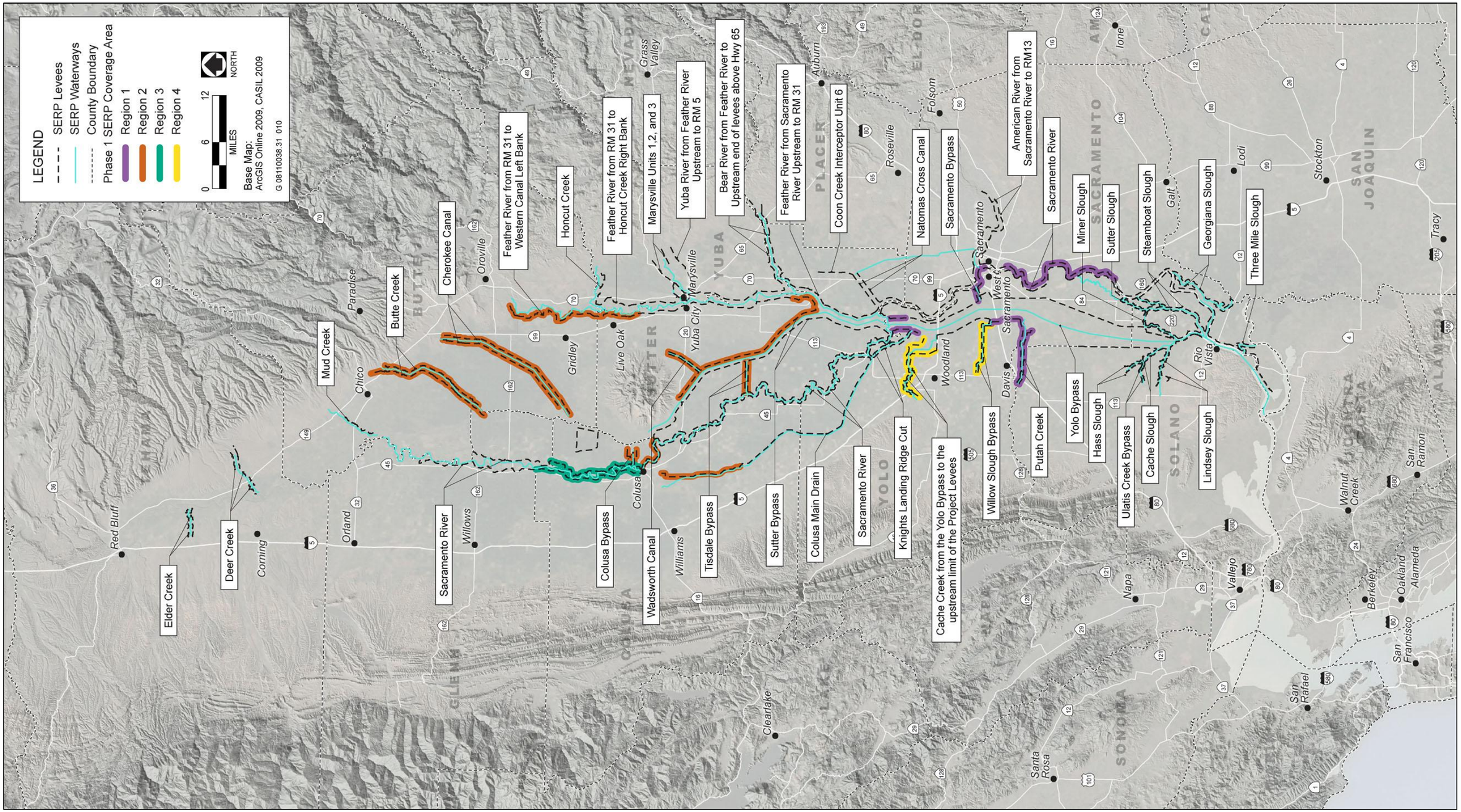
PHASE 1 WATERWAYS

- Butte Creek
- Cache Creek from the Yolo Bypass to the upstream limit of the SRFCP levees
- Cherokee Canal
- Colusa Bypass
- Northern portion of Colusa Main Drain, as identified in Exhibit 2-1
- Portions of Feather River, as identified in Exhibit 2-1

- Putah Creek
- Sacramento Bypass
- Portions of Sacramento River, as identified in Exhibit 2-1
- Sutter Bypass
- Tisdale Bypass
- Wadsworth Canal
- Willow Slough Bypass
- Portions of Yolo Bypass, as identified in Exhibit 2-1
- East and West Interceptor Canals

POTENTIAL FUTURE SERP WATERWAYS

- American River from Sacramento River to River Mile (RM) 13
- Bear River from the Feather River to the upstream end of the levees above State Route 65
- Cache Slough
- Southern Portion of Colusa Main Drain, as identified in Exhibit 2-1
- Coon Creek Group Interceptor Unit 6
- Deer Creek
- Elder Creek
- Remaining portions of Feather River, as identified in Exhibit 2-1
- Georgiana Slough
- Hass Slough
- Honcut Creek
- Lindsey Slough
- Marysville Units 1, 2, and 3
- Miner Slough
- Mud Creek
- Natomas Cross Canal
- Remaining portions of Sacramento River, as identified in Exhibit 2-1
- Steamboat Slough
- Sutter Slough
- Knights Landing Ridge Cut
- Three Mile Slough
- Ulatis Creek Bypass
- Remaining portions of Yolo Bypass, as identified in Exhibit 2-1
- Yuba River from Feather River, upstream to RM 5



Source: Adapted by AECOM in 2011

Exhibit 2-1 **Phase 1 SERP Coverage Area**

2.3 BACKGROUND AND NEED FOR THE PROJECT

Levees that sustain erosion damage during winter periods of high flows may undergo further erosion that over time could lead to levee failure and cause substantial flood damage in both urban and nonurban environments. Such levee failures can also cause significant adverse effects on the surrounding fish and wildlife resources. Erosion sites need to be repaired in a timely manner to maintain the integrity of the existing flood management system. Expedient repairs can also prevent further damage to the environment at these sites. Currently, small erosion repair projects require permits to be issued on a project-by-project basis. The multiple authorizations and level of interagency coordination required for individual repairs (e.g., Clean Water Act permits from USACE, Endangered Species Act compliance with USFWS and NMFS, streambed alteration agreements from CDFW, and water quality certification with the RWQCB) have often resulted in substantial delays, during which time the eroded areas have been susceptible to further damage, increasing potential public safety hazards and repair costs as repair projects are delayed.

To address this problem, the SERP Subcommittee was formed at the direction of the Interagency Flood Management Collaborative Program Group (Interagency Collaborative Group) on January 17, 2007. The subcommittee consists of a group of federal and state resource agency representatives charged with defining what constitutes a small erosion repair and determining appropriate repair designs that will adequately protect the levee system while avoiding substantial adverse effects on environmental resources. The subcommittee members have worked in concert to craft a program intended to improve current erosion repair practices, and thus to maintain the necessary level of flood risk reduction while seeking to achieve a cumulative net benefit to aquatic and terrestrial fish and wildlife resources, including habitat for sensitive species.

As part of this program, the SERP Subcommittee developed the SERP Manual (Appendix B of this DEIR), which provides the general guidelines under which the program would operate. The SERP Subcommittee has developed guidelines in several areas such as project design, conservation measures, and monitoring and reporting requirements. Additionally, a CEQA Compliance Checklist developed by DWR based on the environmental analysis in this DEIR would be used to ensure that, for each project site, repairs conducted under the SERP would comply with CEQA and to provide substantial information to streamline permitting.

2.4 PROJECT PURPOSE, GOALS, AND OBJECTIVES

The purpose of the SERP is to ensure the continued flood management integrity of the SRFCP levees while protecting environmental resources by providing an efficient method of selecting, evaluating, and permitting small erosion repair projects. The SERP uses programmatic authorizations, issued by federal and state agencies with regulatory obligations associated with

erosion repair projects to streamline the process for implementing small erosion repairs in accordance with conservation-based design and monitoring standards established by the SERP Subcommittee. Projects that qualify under the SERP are eligible to receive authorization within a shortened time frame because they are designed to minimize effects on fish and wildlife resources, including listed species, and to protect and enhance the existing aquatic and riparian habitats comprising the riverine corridor.

The program sets apart similar small erosion repair sites and develops a streamlined permitting process for these sites with the following goals:

- provide quicker repairs to small erosion sites, thereby preventing erosion areas from becoming larger;
- foster consistent regulatory compliance efforts for similar repairs, from the standpoint of both environmental protection and operations and maintenance; and
- obtain measurable data to evaluate program success.

The identified objectives of the proposed levee/bank repairs will be to:

- maintain SRFCP integrity;
- prevent further erosion and loss of riparian and nearshore aquatic habitat;
- minimize the loss of riparian vegetation and endangered species habitat resulting from delayed repairs and construction activities; and
- enhance the existing riparian vegetation corridor at the erosion sites, where applicable.

2.5 PROJECT CHARACTERISTICS

2.5.1 SERP PROJECT IDENTIFICATION AND IMPLEMENTATION PROCESS

EROSION REPAIR PROJECT IDENTIFICATION AND CHARACTERIZATION

Implementation of SERP would begin with DWR maintenance staff conducting annual maintenance surveys each spring to identify small erosion sites that need repairs within the Phase 1 SERP coverage area. DWR engineering, environmental, and archaeological staff members would conduct a baseline assessment at each site and complete a Baseline Assessment Checklist (see Section B of the SERP Manual in Appendix B). The completed checklist would include information about existing soil, levee, and vegetation conditions, and potential habitat for special-status species and cultural resources at the site. A maximum of 15 individual repair projects would be implemented annually under the SERP during Phase 1 of

the program. Potential SERP repair sites would be categorized into two tiers based on the size of the project disturbance area.

The Tier 1 site definition is as follows:

> *A site can be considered for Tier 1 if the footprint of new bank protection materials and including any additional vegetated area that will be disturbed by equipment during construction is 0.1 acre or less with a maximum linear foot limit of 264 feet. A separation of 500 feet between sites repaired in the same year is required.*[1]

The Tier 2 site definition is as follows:

> *A site can be considered for Tier 2 if the footprint of new bank protection materials and including any additional vegetated area that will be disturbed by equipment during construction is 0.5 acre or less with a maximum linear foot limit of 1,000 feet.*

For each proposed site, DWR would select as a guide one of the seven SERP design templates created by the collaborating agencies (see Section C of the SERP Manual in Appendix B) to apply to the site. The program design templates are described in more detail in Section 2.5.2, “Program Elements,” below.

DWR would notify the applicable permitting agencies—USACE, USFWS, NMFS, CDFW, and RWQCB—of the proposed small erosion repair projects by bundling and submitting the required notification materials for up to 15 projects to the agencies as a package each spring (by June 1). The notification package (see the SERP Project Pre-construction Notification Form in Section C of the SERP Manual in Appendix B) would include a CEQA Compliance Checklist for SERP projects to document that each small erosion repair project and site is consistent with the findings and parameters of this DEIR and the SERP Manual (Appendix B) prepared for the SERP. The CEQA Compliance Checklist would be based on the findings of the SERP Final DEIR and used to determine whether the EIR provides adequate CEQA coverage for each of the SERP projects or if further project-level environmental documentation would be required to fully satisfy CEQA requirements. Upon receipt of the annual SERP notification package, the agencies would review the projects and independently respond to DWR, indicating whether the projects are acceptable under their programmatic SERP authorizations, and including any additional terms or conditions for approval in their responses. Upon receiving the agencies’ verification of SERP authorization, DWR may proceed with the

[1] Assuming the 0.1 acre is a square (2D figure with four straight sides, four interior angles and whose four sides are equal length), the conversion of 0.1 acre to linear feet would be the following: 1 acre = 43,560 square feet; 0.1 acre = 4,356 square feet. By taking the square root of 4,356 square feet, the length of each side is 66 feet. Thus the perimeter would be 264 feet. Note: If 0.1 acre is a circle, the circumference of the circle would be 117 linear feet. So, as a compromise to meet the SERP’s goals, NMFS will agree to the maximum of 264 linear feet (Martinez, pers. comm., 2010).

repairs in accordance with the applicable conservation measures (identified in Section I of the SERP Manual) and any additional terms or conditions for approval that the agencies may require. This process should shorten the permitting time frame for those projects, allowing the necessary repairs to be implemented in a timely manner while fully considering and protecting environmental resources.

To ensure that SERP projects are unconnected single and complete actions and not part of a larger action that would exceed the SERP's size and placement limits, each project must demonstrate independent utility. A SERP project will be considered to have independent utility if it would be constructed absent the construction of other projects in the project area.

Each repair would also be entered into a geographic information system (GIS) database developed by DWR to monitor the progress of the SERP. The database would be made available to the agencies involved in authorizing SERP projects.

SITE REPAIRS

Construction Process and Staging, Sequencing, and Equipment

Construction activities would take place at individual sites throughout each summer and fall during the 5-year Phase 1 period. Each site would require no more than 1–4 weeks of active construction. Effective construction and replanting methods, employed in the recent past for similar small erosion control projects, would be used. Heavy equipment and vehicles used during construction may include the following:

- large bulldozer(s),
- trucks (pick-ups, end dumps, and flatbeds, water truck, hydroseeder),
- small bulldozer(s),
- barge with crane,
- cement mixer(s) with extended arm(s) (for use in depositing soil), and
- excavator(s).

Revetments would be placed by cranes mounted on barges or, in locations where this is not possible, from adjacent landside areas using excavators. A cement mixer with an extended arm can be used as a means to intermix soil with rock in the repair. Waterside construction would occur where it minimizes noise, traffic, and vegetation disturbances. The construction contractor would use adjacent landside areas, maintenance toe roads, or the crown roads for staging of vehicles or other associated construction equipment, and temporary placement of rock, soil, and plant materials, as necessary.

Bank reconstruction would incorporate plantings into the revetment in accordance with the bioengineering techniques outlined in the program design templates (Appendix A). The upper

bank may also be hydroseeded and covered with biodegradable materials to control erosion and stabilize the bank while plantings become established. Willow cuttings and other native vegetation would be installed during placement of the revetment or after construction during the appropriate planting season. Precise planting timelines would be determined upon the availability of planting materials and in coordination with relevant SERP-authorizing agencies.

Maintenance

The program design templates have been developed with the intent that once repaired the erosion sites would require little or no additional upkeep or maintenance. During the initial vegetation establishment period, DWR intends to manage the SERP plantings consistent with the CVFPP's vegetation management strategy, Maintenance activities for planted areas may include removing invasive vegetation, pruning planted vegetation for visibility and accessibility on levees, and replacing dead plantings.. Once the final success criteria are achieved, the vegetation should be self-maintaining. Maintenance activities that focus on maintaining restoration plantings, in particular woody vegetation plantings, would be conducted for 5 years or longer as necessary until the final success criteria are met. DWR will be responsible for establishing and maintaining plants in accordance with the monitoring and success criteria section of the SERP Manual (see Section H of the SERP Manual in Appendix B), including meeting specific success criteria for vegetation establishment (discussed below).

DWR recognizes that woody vegetation on levees must be appropriately managed. The CVFPP's vegetation management strategy is focused on improving public safety by providing for levee integrity, visibility, and accessibility for inspections, maintenance, and flood fight operations. Vegetation will be removed (in coordination with resource agencies) only when it presents an unacceptable threat. Furthermore, flood management actions will protect existing, and promote the development of, appropriate vegetation for erosion control on the waterside slope, outside of the vegetation management zone.

2.5.2 PROGRAM ELEMENTS

DESIGN ALTERNATIVES

To maintain the SRFCP levee system, erosion repairs are needed on a continual basis. The SERP Subcommittee discussed a dozen repair alternatives and decided that the SERP would use seven design templates:

1. Bank fill rock slope with live pole planting
2. Willow wattle with rock toe
3. Branch layering
4. Rock toe with live pole planting
5. Soil and rock fill at the base of a fallen tree (including root wad revetment option)

6. Bank fill rock slope with native grass planting
7. Bank fill rock slope with emergent vegetation planting

Plans and descriptions of the seven design templates are included in Section C of the SERP Manual (see Appendix B of this DEIR).

A site-specific cross-section, plan view, and planting plan/species list would be developed for each SERP project based on the design template selected for the repair. This information would be provided to the agencies along with the project notification materials in the annual SERP notification packages. The site-specific design plans would be prepared as a coordinated effort by DWR maintenance, engineering, and environmental staff and would show plan view details (e.g., spacing, location, depth). Minor changes to the program design templates may be recommended for specific projects based on detailed knowledge of the sites.

MONITORING AND SUCCESS CRITERIA

Through application of the seven design templates and associated bioengineering erosion control methodologies, SERP projects are intended to achieve “self-mitigation” for unavoidable impacts to biological resources. SERP project sites would be considered “self-mitigating” if the successful establishment of vegetation plantings incorporated into the project design would restore or enhance the biological function of the existing conditions at the erosion sites. To ensure that SERP project vegetation plantings are successful and aquatic and riparian resource functions are enhanced or restored with SERP project implementation, the program would include monitoring and reporting requirements and success criteria. These monitoring and reporting requirements and success criteria for SERP projects are presented in Sections G and H of the SERP Manual (see Appendix B of this DEIR). Monitoring of individual sites is anticipated to extend for 5 years after site construction is completed, or longer as necessary until the final success criteria are achieved and the appropriate agencies have provided written approval.

The annual monitoring reports would include an evaluation of project success in meeting the established annual performance goals and if needed a plan for implementing remedial actions to help ensure that the final success criteria are met.

Annual monitoring reports that evaluate whether the site meets annual performance goals and is progressing toward achieving the final success criteria would be submitted to the SERP agencies by November 30th of each year. Pre- and post-construction site visits from regulatory agency personnel may occur at any time to determine the effectiveness of this program and whether contingency actions and/or adjustments to the established success criteria should be made. Success of the self-mitigating aspect of the design templates would be a key factor in determining whether the SERP is extended beyond the first 5-year phase.

CONSERVATION MEASURES

Conservation measures for the SERP have been developed in coordination with the agencies represented on the SERP Subcommittee (see Section I of the SERP Manual). Measures have been identified that would be applicable to all SERP project sites, including timing restrictions to avoid work during important times for various special-status species, measures to avoid vegetation and habitat disturbance, hazard prevention measures, erosion control measures, and other mandatory construction measures.

Resource-specific conservation measures have also been developed by the SERP Subcommittee for the following species, habitats, and resources:

- sensitive biological resources,
- giant garter snake,
- valley elderberry longhorn beetle,
- delta smelt,
- Swainson's hawk,
- burrowing owl,
- bank swallow,
- nesting birds/migratory birds,
- raptors,
- woody shaded riverine habitat, and
- cultural resources.

In distributing the project notification materials to SERP agencies, DWR would select and include a list of those resource-specific and, if appropriate, supplemental conservation measures that are applicable to a specific site, and the permitting agencies would have an opportunity to revise the list for each project.

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3 ENVIRONMENTAL IMPACT ANALYSIS

This chapter describes the approach to the SERP environmental analysis and, for each environmental resource area, details the environmental setting in the Phase 1 SERP coverage area, analyzes the environmental impacts of the SERP, and presents feasible mitigation measures for significant and potentially significant impacts.

3.1 APPROACH TO ENVIRONMENTAL ANALYSIS

An environmental impact report (EIR) must identify the significant environmental effects of a proposed project. A "[s]ignificant effect on the environment" means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project (CEQA Guidelines, California Code of Regulations [CCR] Title 14, Section 15382). This EIR is a "program" EIR, intended to provide information at a general (or programmatic) level of detail on the potential impacts of implementing the SERP. The SERP CEQA Compliance Checklist would be used to determine whether the existing SERP EIR met CEQA requirements for each of the SERP projects or if further project-level environmental documentation would be required.

3.1.1 SECTION CONTENTS

Sections 3.2 through 3.7 of this DEIR follow the same general format and are each organized into the major components described below.

REGULATORY SETTING

The "Regulatory Setting" section describes the federal, state, regional, and local laws, regulations, plans, and ordinances relevant to the SERP.

ENVIRONMENTAL SETTING

The "Environmental Setting" section describes the existing physical environmental conditions without the proposed project and provides baseline conditions for analyzing the environmental effects of the SERP. The existing conditions generally consist of the existing physical environment as of November 25, 2009, the date when DWR published the notice of preparation (NOP) to prepare an EIR for the SERP and filed it with the State Clearinghouse. Under CEQA, baseline environmental conditions are typically set at the time the NOP is published (CEQA Guidelines, Section 15125[a]). However, baseline information may also describe conditions leading up to the time that the NOP was published.

Thresholds of Significance and Analysis Methodology

This section presents the significance criteria (or "thresholds of significance") used to define the level at which an impact would be considered significant under CEQA. Thresholds may be quantitative or qualitative; they may be based on agency or professional standards or on legislative or regulatory requirements relevant to the impact analysis. Generally, the thresholds of significance are derived from Appendix G of the CEQA Guidelines, as amended; factual or scientific information and data; and regulatory standards. This section also describes the methods, process, procedures, and/or assumptions used to formulate and conduct the impact analysis.

Impacts Analysis

This analysis examines all potentially significant impacts that may occur with implementation of the SERP. The impacts and mitigation measures are numbered sequentially in each resource section, and each mitigation measure corresponds to the impact being addressed (e.g., the first impact in Section 3.2, "Air Quality and Climate Change," is numbered Impact 3.2-1, and Mitigation Measure 3.2-1 corresponds with Impact 3.2-1). An impact title precedes the analysis of the impact. The discussion that follows the impact title includes information to support the significance conclusion that is stated in boldface at the end of the impact discussion.

Following each discussion of a significant or potentially significant impact, any available and feasible mitigation measures are provided to avoid, minimize, rectify, reduce or eliminate, or compensate the significant or potentially significant impacts to a less-than-significant level. In accordance with California Public Resources Code (PRC) Section 21081.6(b), mitigation measures must be fully enforceable through permit conditions, agreements, other legally binding instruments, or by incorporating the measures into the project design. The SERP Manual includes a number of program features that help mitigate potentially significant effects and are included as requirements and conditions of the SERP. These program features will be monitored and reported on using the procedures described in the SERP Manual.

Section 15370 of the CEQA Guidelines defines mitigation as any of the following:

- avoiding the impact altogether by not taking a certain action or parts of an action;
- minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- rectifying the impact by repairing, rehabilitating, or restoring the impacted environment;

- reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or
- compensating for the impacts by replacing or providing substitute resources or environments.

3.1.2 APPROACH TO IMPACTS AND MITIGATION MEASURES

For each impact discussion, the environmental effect is determined to be either no impact, less than significant, significant, potentially significant, or beneficial, when compared to existing conditions and relative to the thresholds of significance. Definitions for each impact category are provided below.

Feasible mitigation measures are identified to address impacts identified as significant or potentially significant. The specificity of the mitigation measures is consistent with the broad, program-level nature of the SERP and the parallel program-level analysis in this EIR. Mitigation measures identified in this EIR would be applied as appropriate to specific future projects implemented under the SERP. If project-specific CEQA analyses are needed for future projects, mitigation measures in this EIR would be incorporated as applicable into future CEQA documents and would be used to guide the development of project-specific mitigation measures. Implementation, monitoring, and reporting of the EIR mitigation measures would be carried out by DWR.

TERMINOLOGY USED TO DESCRIBE IMPACTS

The EIR uses the following CEQA terminology to denote the significance of environmental impacts:

- **No impact** indicates that the construction, operations, and maintenance of the SERP would not have any direct or indirect impacts on the physical environment. It means that no change from existing conditions would result. This impact level does not require mitigation.
- A **less-than-significant impact** is one that would not result in a substantial or potentially substantial change in the physical environment. This impact level does not require mitigation, even if applicable measures are available; however, measures may be recommended to further reduce less-than-significant impacts.
- A **significant impact** is defined by PRC Section 21068 as one that would cause “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project.” Under CEQA, mitigation measures and alternatives must be identified, where applicable and feasible, to avoid, minimize, rectify, reduce or eliminate, or compensate significant impacts to a less-than-significant level. Alternatives to the SERP are discussed in Chapter 4, “Alternatives Analysis.”

- A **potentially significant impact** is one that, if it were to occur, would be considered a significant impact as described above; however, the occurrence of the impact cannot be immediately determined with certainty. For CEQA purposes, a potentially significant impact is treated as if it were a significant impact. Therefore, under CEQA, mitigation measures and alternatives must be identified, where feasible, to avoid, minimize, rectify, reduce or eliminate, or compensate significant impacts to a less-than-significant level.

- A **significant and unavoidable impact** is one that, if it were to occur, would result in a substantial adverse effect on the physical environment and could not be reduced to a less-than-significant level even with implementation of any applicable feasible mitigation. Under CEQA, a project with significant and unavoidable impacts may proceed, but the CEQA lead agency (DWR) would be required to (1) conclude in findings that no feasible means of substantially lessening or avoiding the significant impact existed, in accordance with the CEQA Guidelines (14 CCR Sections 15091[a][3]); and (2) prepare a statement of overriding considerations, in accordance with the CEQA Guidelines (14 CCR Section 15093), explaining why the CEQA lead agency had chosen to proceed with the project in spite of the potential for significant impacts on the physical environment.

- A **potentially significant and unavoidable impact** is one that, if it were to occur, would be considered a significant and unavoidable impact as described above; however, uncertainty exists regarding the occurrence or severity of the impact and/or the inability of mitigation measures to reduce the impact to a less-than-significant level. For CEQA purposes, a potentially significant and unavoidable impact is treated as if it were significant and unavoidable, and findings and a statement of overriding considerations must be prepared as described above.

- A **beneficial effect** is one that would result in a positive change in any of the physical conditions within the Phase 1 SERP coverage area.

IMPACT MECHANISMS

Mechanisms that could cause impacts are discussed for each resource area. General categories of impact mechanisms are project construction and activities related to future operations and maintenance, as described in Chapter 2, “Project Description.”

Project impacts are effects that are categorized, pursuant to CEQA, to describe their context and intensity. They fall into the following categories:

- A **temporary impact** would occur only during construction.

- A **short-term impact** would last from the time construction ceases to within 3 years after construction.

- A **long-term impact** would last longer than 3 years after construction. In some cases, a long-term impact could be considered a permanent impact.
- A **direct impact** is an impact that would be caused by an action and would occur at the same time and place as the action.
- An **indirect impact** is an impact that would be caused by an action but would occur later in time or at a distance that was removed from the impact area, but one that is reasonably foreseeable, such as growth-inducing effects and other changes related to changes in land use patterns and related effects on the physical environment.
- A **residual impact** is an impact that would remain after implementation of mitigation. This type of impact is not defined in the CEQA Guidelines.
- A **cumulative impact** refers to two or more individual effects that, when considered together, are considerable or that compound or increase other environmental impacts. “Cumulatively considerable” means that the incremental effects of an individual project, even if individually limited, are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. Cumulative impacts are discussed in Chapter 5, “Other CEQA-Required Sections.”

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3.2 AIR QUALITY AND CLIMATE CHANGE

3.2.1 INTRODUCTION

This section describes the proposed program's impacts on air quality and climate change. Specifically, it includes a description of the existing air quality, a summary of applicable regulations, and analyses of potential temporary and long-term impacts of the SERP on air quality. The methods of analysis for the SERP's emissions from temporary construction, long-term operations, odors, and toxic air contaminants (TACs) are consistent with the recommendations of the applicable air quality management districts or air pollution control districts (air districts). Mitigation measures are recommended as necessary to reduce significant air quality impacts.

The regulatory setting and environmental setting for climate change are presented in this section, but impacts are addressed in Chapter 5, "Other CEQA-Required Sections," as a part of the cumulative impact analysis. This is because it is unlikely that any single project by itself could have a significant impact on climate change related to its greenhouse gas (GHG) emissions alone. Likewise, even the totality of DWR's activities would not be likely to have any measurable effect on global or local climate. However, the cumulative effect of human activities has clearly been linked to quantifiable changes in the composition of the atmosphere, which in turn have been shown to be the main cause of global climate change (IPCC 2007).

3.2.2 REGULATORY SETTING

AIR QUALITY

Federal Plans, Policies, Regulations, and Laws

Clean Air Act

The Federal Environmental Protection Agency (EPA) has been charged with implementing federal air quality programs. EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1970. The most recent major amendments were made by Congress in 1990.

The CAA required EPA to establish national ambient air quality standards (NAAQS). EPA has established primary and secondary NAAQS for ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}), fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$), and lead. The primary standards protect the public health and the secondary standards protect public welfare.

The CAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The federal Clean Air Act Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and applicable rules and regulations. EPA must review all SIPs to determine whether they conform to the mandates of the CAA and its amendments and to determine whether their implementation will achieve air quality goals. If EPA determines a SIP to be inadequate, a federal implementation plan that imposes additional control measures may be prepared for the nonattainment area. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may cause sanctions to be applied to transportation funding and stationary air pollution sources in the air basin.

EPA also has programs for identifying and regulating TACs, or hazardous air pollutants (HAPs) in federal terms. Title III of the CAAA of 1990 directed EPA to issue national emissions standards for HAPs. The CAAA also required EPA to issue vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum addressing benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene. In addition, section 219 of the CAAA required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.

State Plans, Policies, Regulations, and Laws

California Clean Air Act

The California Air Resources Board (ARB) is responsible for coordinating and overseeing state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required ARB to establish California ambient air quality standards (CAAQS). ARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above-mentioned criteria air pollutants. In most cases the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The CCAA requires that all local air districts in the state strive to achieve and maintain the CAAQS by the earliest practicable date. The CCAA specifies that local air districts should focus particular attention on reducing the emissions from transportation and areawide emission sources and provides air districts with the authority to regulate indirect sources.

Among ARB's other responsibilities are overseeing local air districts' compliance with federal and California laws, approving local air quality plans, submitting SIPs to EPA, monitoring air

quality, determining and updating area designations, and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels. The ozone SIP and $PM_{2.5}$ SIP were due to EPA by June 2007 and April 2008, respectively. ARB and local air districts are currently developing plans for meeting new national air quality standards for ozone and $PM_{2.5}$. The draft statewide air quality plan was released in April 2007 (ARB 2008a). The SIP must show how each area will attain the federal standards. To do this, the SIP identifies the amount of pollution emissions that must be reduced in each area to meet the standard and the emission controls needed to reduce the necessary emissions.

Tanner Air Toxics Act

TACs in California are primarily regulated through the Tanner Air Toxics Act (Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). AB 1807 sets forth a formal procedure for ARB to designate substances as TACs. Research, public participation, and scientific peer review must occur before ARB can designate a substance as a TAC. To date, ARB has identified more than 21 TACs and adopted EPA's list of HAPs as TACs. Most recently, particulate matter from diesel-fueled engines (diesel PM) was added to the ARB list of TACs. ARB published the *Air Quality and Land Use Handbook: A Community Health Perspective*, which provides guidance concerning land use compatibility with TAC sources (ARB 2005).

Regional and Local Plans, Policies, Regulations, and Ordinances

Regional Air District Plans and Rules

The SERP encompasses six California counties (Sacramento, Yolo, Solano, Sutter, Colusa, and Butte) overseen by five air districts. Each air district attains and maintains air quality conditions through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. Strategies include preparing plans for the attainment of ambient air quality standards, adopting and enforcing rules and regulations concerning sources of air pollution, and issuing permits for stationary sources of air pollution. Each air district also inspects stationary sources of air pollution and responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements programs and regulations required by the CAA and amendments thereof, and the CCAA.

Table 3.2-1 presents local rules and regulations applicable to the SERP. The rules outlined in Table 3.2-1 relate to the restriction of visible dust, fugitive dust, and nuisance emissions.

Table 3.2-1 Applicable Air District Rules and Regulations		
Air District	**Counties**	**Rule**
Butte County AQMD	Butte	Rules 200, 201, 202, and 205
Feather River AQMD	Sutter	Rules 3.0, 3.2, and 3.3
Colusa County APCD	Colusa	Rules 2.10, 2.13, 2.15, and 2.16
Yolo-Solano AQMD	Yolo and Solano	Rules 2-5 and 2-11
Sacramento Metropolitan AQMD	Sacramento	Rules 402, 403, 404, and 405
Notes: AQMD = Air Quality Management District, APCD = Air Pollution Control District Source: ARB 2009		

Northern Sacramento Valley Planning Area

The air pollution control and air quality management districts for Shasta, Tehama, Glenn, Butte, Colusa, Sutter, and Yuba counties located in the northern portion of the Sacramento Valley together comprise the Northern Sacramento Valley Planning Area (NSVPA). These NSVPA districts have jointly prepared and submitted the 2006 *Air Quality Attainment Plan* (AQAP) in compliance with the requirements set forth in the CCAA, which specifically addressed the nonattainment status for ozone. The CCAA also requires a triennial assessment of the extent of air quality improvements and emissions reductions achieved through the use of control measures. As part of the assessment, the AQAP must be reviewed and, if necessary, revised to correct for deficiencies in progress and to incorporate new data or projections. The NSVPA districts anticipate submitting an ozone attainment plan (OAP) in 2013, as required by the CCAA.

This triennial update of the NSVPA AQAP addresses the progress made in implementing the 2003 plan and proposes strategy modifications for attaining the 1-hour ozone CAAQS at the earliest practicable date. The 2006 AQAP identifies those portions of the NSVPA designated as “nonattainment” for the CAAQS and discusses the health effects related to the various air pollutants. The AQAP identifies the air pollution problems that are to be cooperatively addressed on as many fronts as possible to make the region a healthier place to live now and in the future. As with the 1994, 1997, 2000, and 2003 AQAPs, the 2006 AQAP focuses on the adoption and implementation of control measures for stationary sources, areawide sources, and indirect sources, and addresses public education and information programs. The 2006 AQAP also addresses the effect that pollutant transport has on the ability of the NSVPA to meet and attain the CAAQS (NSVPA 2006).

Sacramento Metropolitan Planning Area

The Sacramento Metropolitan Air Quality Management District (SMAQMD), in coordination with the air quality management districts and air pollution control districts of El Dorado, Placer, Solano, Sutter, and Yolo counties, prepared and submitted the 1994 AQAP for the Sacramento Metropolitan Planning Area in compliance with the requirements set forth in the CCAA, which specifically addressed the nonattainment status for ozone and, to a lesser extent, CO and PM_{10}.

The CCAA also requires a triennial assessment of the extent of air quality improvements and emission reductions achieved through the use of control measures. As part of the assessment, the attainment plan must be reviewed and, if necessary, revised to correct for deficiencies in progress and to incorporate new data or projections. The requirement of the CCAA for a first triennial progress report and revision of the 1991 AQAP was fulfilled with the preparation and adoption of the 1994 OAP. The OAP stresses attainment of ozone standards and focuses on strategies for reducing ozone precursors, reactive organic gases (ROG) and oxides of nitrogen (NO_X). It promotes active public involvement, enforcement of SMAQMD rules and regulations, public education in the public and private sectors, development and promotion of transportation and land use programs designed to reduce vehicle miles traveled in the region, and implementation of control measures for stationary and mobile sources. The OAP became part of the SIP in accordance with the requirements of the CAAA and amended the 1991 AQAP. However, at that time, the region could not show that 1-hour ozone NAAQS would be met by 1999. In exchange for moving the deadline to 2005, the region accepted a designation of “severe nonattainment” coupled with additional emissions requirements on stationary sources. Additional triennial reports were also prepared in 1997, 2000, 2003, and 2006 in compliance with the CCAA and act as incremental updates (SMAQMD 2009a).

GLOBAL CLIMATE CHANGE

Federal Plans, Policies, Regulations, and Laws

Supreme Court Ruling on California Clean Air Act Waiver

EPA is the federal agency responsible for implementing the CAA. The U.S. Supreme Court ruled on April 2, 2007, that CO_2 is an air pollutant as defined under the CAA, and that EPA has the authority to regulate GHG emissions. See the discussion of Assembly Bill (AB) 1493 in Table 3.2-2, presented below in the discussion of State regulations, for further information on California’s CAA waiver.

Mandatory Greenhouse Gas Reporting Rule

On September 22, 2009, EPA released its final Greenhouse Gas Reporting Rule (Reporting Rule). The Reporting Rule is a response to the fiscal year (FY) 2008 Consolidated Appropriations Act (H.R. 2764; Public Law 110-161), that required EPA to develop “…

mandatory reporting of greenhouse gases above appropriate thresholds in all sectors of the economy….” The Reporting Rule would apply to most entities that emit 25,000 metric tons of carbon dioxide equivalents (CO_2e) or more per year. Starting in 2010, facility owners are required to submit an annual GHG emissions report with detailed calculations of facility GHG emissions. The Reporting Rule would also mandate recordkeeping and administrative requirements for EPA to verify annual GHG emissions reports.

Environmental Protection Agency Endangerment and Cause and Contribute Findings

On December 7, 2009, the Administrator signed two distinct findings regarding greenhouse gases under section 202(a) of the Clean Air Act:

- **Endangerment Finding:** The current and projected concentrations of the six key well-mixed greenhouse gases—carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6)—in the atmosphere threaten the public health and welfare of current and future generations.
- **Cause or Contribute Finding:** The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

State Plans, Policies, Regulations, and Laws

Table 3.2-2 summarizes the current State laws and Executive Orders within California that address climate change. Any item shown below with an asterisk is explained in further detail because it represents the most significant laws and orders to date.

California Environmental Quality Act and SB 97

The California Environmental Quality Act (CEQA) requires lead agencies to consider the reasonably foreseeable adverse environmental effects of projects they are considering for approval. GHG emissions have the potential to adversely affect the environment because they contribute to global climate change. In turn, global climate change has the potential to raise sea levels, affect rainfall and snowfall, and affect habitat.

Senate Bill 97

The provisions of Senate Bill 97, enacted in August 2007 as part of the State Budget negotiations and codified at section 21083.05 of the Public Resources Code, direct the Office of Planning and Research (OPR) to propose CEQA Guidelines “for the mitigation of GHG emissions or the effects of GHG emissions.” SB 97 directs OPR to develop such Guidelines by July 2009, and directs the State Resources Agency (now Natural Resources Agency), the agency charged with adopting the CEQA Guidelines, to certify and adopt such Guidelines by

Table 3.2-2 Summary of State Laws and Executive Orders that Address Climate Change			
Legislation Name	**Signed into Law/ Ordered**	**Description**	**CEQA Relevance**
SB 1771	09/2000	Established California Climate Registry to develop protocols for voluntary accounting and tracking of GHG emissions.	In 2007, DWR began tracking GHG emissions for all departmental operations.
AB 1493	07/2002	Directed ARB to establish fuel standards for noncommercial vehicles that would provide the maximum feasible reduction of GHGs.	Reduction of GHG emissions from noncommercial vehicle travel.
SB 1078, SB 107, EO S-14-08, EO-S-21-09, and SBX1-2	09/2002, 09/2006, 11/2008, 9/2009, and 4/2011	Established renewable energy goals as a percentage of total energy supplied in the State. ARB approved a Renewable Electricity Standard regulation on September 23, 2010. SBX1-2 set the renewables portfolio standard target to 33 percent by December 31, 2020.	Reduction of GHG emissions from purchased electrical power.
EO S-3-05, AB 32*	06/2005, 09/2006	Established statewide GHG reduction targets and biennial science assessment reporting on climate change impacts and adaptation and progress toward meeting GHG reduction goals.	Projects must be consistent with statewide GHG reduction plan and reports will provide information for climate change adaptation analysis.
SB 1368	9/2006	Established GHG emission performance standards for base load electrical power generation.	Reduction of GHG emissions from purchased electrical power.
EO S-1-07	01/2007	Established Low Carbon Fuel Standard.	Reduction of GHG emissions from transportation activities.
SB 97*	08/2007	Directed the Governor's Office of Planning and Research to develop guideline amendments for the analysis of climate change in CEQA documents.	Requires climate change analysis in all CEQA documents.
SB 375	09/2008	Required metropolitan planning organizations to include sustainable communities' strategies in their regional transportation plans.	Reduction of GHG emissions associated with housing and transportation.

Table 3.2-2 Summary of State Laws and Executive Orders that Address Climate Change			
Legislation Name	**Signed into Law/ Ordered**	**Description**	**CEQA Relevance**
EO S-13-08*	11/2008	Directed the Natural Resources Agency to work with the National Academy of Sciences to produce a California Sea Level Rise Assessment Report and directs CAT to develop a California Climate Adaptation Strategy.	Information in the reports will provide information for climate change adaptation analysis.
Source: Data compiled by AECOM 2011			

January 2010. In April 2009, OPR prepared draft CEQA Guidelines and submitted them to the Natural Resources Agency (see below). On July 3, 2009, the Natural Resources Agency began the rulemaking process established under the Administrative Procedure Act. The Natural Resources Agency adopted those guidelines on December 30, 2009, and the guidelines became effective March 18, 2010.

The Natural Resources Agency-adopted amendments for GHGs fit within the existing CEQA framework for environmental analysis, which calls for lead agencies to determine baseline conditions and levels of significance, and to evaluate mitigation measures. The guideline amendments do not identify a threshold of significance for GHG emissions nor do they prescribe assessment methodologies or specific mitigation measures. The guideline amendments encourage lead agencies to consider many factors in performing a CEQA analysis, but preserve the discretion that CEQA grants lead agencies to make their own determinations based on substantial evidence.

CEQA Guidelines section 15064.4, *Determining the Significance of Impacts from Greenhouse Gas Emissions*, encourages lead agencies to consider three factors to assess the significance of GHG emissions: (1) will the project increase or reduce GHGs as compared to baseline; (2) will the project's GHG emissions exceed the lead agency's threshold of significance; and (3) does the project comply with regulations or requirements to implement a statewide, regional, or local GHG reduction or mitigation plan. CEQA Guidelines section 15064.4 also recommends that lead agencies make a good-faith effort, based on available information, to describe, calculate or estimate the amount of GHG emissions associated with a project.

CEQA Guidelines section 15126.4, *Consideration and Discussion of Mitigation Measures Proposed to Minimize Significant Effects*, includes considerations for lead agencies related to feasible mitigation measures to reduce GHG emissions, including but not limited to project

features, project design, or other measures which are incorporated into the project to substantially reduce energy consumption or GHG emissions; compliance with the requirements in a previously approved plan or mitigation program for the reduction or sequestration of GHG emissions, which plan or program provides specific requirements that will avoid or substantially lessen the potential impacts of the project; and measures that sequester carbon or carbon-equivalent emissions. In addition, amended CEQA Guidelines section 15126.4 includes a requirement that where mitigation measures are proposed for reduction of GHG emissions through off-site measures or purchase of carbon offsets, these mitigation measures must be part of a reasonable plan of mitigation that the relevant agency commits itself to implementing.

In addition, as part of the CEQA Guideline amendments and additions, a new set of environmental checklist questions (VII. *Greenhouse Gas Emissions*) was added to the CEQA Guidelines Appendix G. The new set asks whether a project would:

a) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

Preliminary Draft Staff Proposal: Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under CEQA

CEQA gives discretion to lead agencies to establish thresholds of significance based on individual circumstances. To assist in that exercise, and because OPR believes the unique nature of GHGs warrants investigating a statewide threshold of significance for GHG emissions, OPR engaged the ARB technical staff to recommend a methodology for setting thresholds of significance. In October 2008, ARB released *Preliminary Draft Staff Proposal: Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act* (ARB 2008b). This draft proposal included a conceptual approach for thresholds associated with industrial, commercial, and residential projects. For nonindustrial projects, the steps to concluding that an impact related to climate change would be less than significant generally include analyzing whether the project is exempt under existing statutory or categorical exemptions; complies with a previously approved plan or target; meets specified minimum performance standards; and falls below an as-yet-unspecified annual emissions level (ARB 2008c). The performance standards focus on construction activities, energy and water consumption, generation of solid waste, and transportation. For industrial projects, the draft proposal recommends a tiered analysis procedure similar to the procedure for nonindustrial projects. However, for industrial projects a quantitative annual emissions limit for less-than-significant impacts is established at

~7,000 metric tons of CO_2e. To date, these standards have not been adopted or finalized as a basis to evaluate the significance of a project's contribution to climate change.

Executive Order S-3-05

Executive Order (EO) S-3-05 made California the first state to formally establish GHG emissions reduction goals. EO S-3-05 includes the following GHG emissions reduction targets for California:

- by 2010, reduce GHG emissions to 2000 levels;
- by 2020, reduce GHG emissions to 1990 levels; and
- by 2050, reduce GHG emissions to 80 percent below 1990 levels.

The final emission target of 80 percent below 1990 levels would put the state's emissions in line with estimates of the required worldwide reductions needed to bring about long-term climate stabilization and avoidance of the most severe impacts of climate change (IPCC 2007).

EO S-3-05 also dictated that the Secretary of the California Environmental Protection Agency coordinate oversight of efforts to meet these targets with the Secretary of the Business, Transportation and Housing Agency; Secretary of the Department of Food and Agriculture; Secretary of the Resources Agency; Chairperson of the Air Resources Board; Chairperson of the Energy Commission; and the President of the Public Utilities Commission. This group was subsequently named the Climate Action Team (CAT).

As laid out in the EO, the CAT has submitted biannual reports to the governor and State legislature describing progress made toward reaching the targets. The CAT is in the process of finalizing their second biannual report on the effects of climate change on California's resources.

Assembly Bill 32

In 2006, California passed the California Global Warming Solutions Act of 2006 (Assembly Bill No. 32; California Health and Safety Code Division 25.5, sections 38500, et seq., or AB 32). AB 32 further details and puts into law the mid-term GHG reduction target established in EO S-3-05—reduce GHG emissions to 1990 levels by 2020. AB 32 also identifies ARB as the state agency responsible for the design and implementation of emissions limits, regulations, and other measures to meet the target.

The statute lays out the schedule for each step of the regulatory development and implementation.

- By June 30, 2007, ARB had to publish a list of early-action GHG emission reduction measures.

- Prior to January 1, 2008, ARB had to: identify the current level of GHG emissions by requiring statewide reporting and verification of GHG emissions from emitters and identify the 1990 levels of California GHG emissions.
- By January 1, 2010, ARB had to adopt regulations to implement the early-action measures.

In December 2007, ARB approved the 2020 emission limit (1990 level) of 427 million metric tons of CO_2 equivalents of GHGs. The 2020 target requires the reduction of 169 million metric tons of CO_2e, or approximately 30 percent below the state's projected "business-as-usual" 2020 emissions of 596 million metric tons of CO_2e. ARB updated 2020 estimates of GHG emissions to account for new estimates for future fuel and energy demand, the effects of the recent economic recession, and other factors (ARB 2010). The 2020 "business as usual" (no action is taken) scenario would need to be reduced by 15.75 percent to get to 1990 levels, according to analysis provided by ARB. Also in December 2007, ARB adopted mandatory reporting and verification regulations pursuant to AB 32. The regulations became effective January 1, 2009, with the first reports covering 2008 emissions. The mandatory reporting regulations require reporting for major facilities, those that generate more than 25,000 metric tons/year of CO_2e. To date ARB has met all of the statutorily mandated deadlines for promulgation and adoption of regulations.

Climate Change Scoping Plan

On December 11, 2008, pursuant to AB 32, ARB adopted the Climate Change Scoping Plan. This plan outlines how emissions reductions will be achieved from significant sources of GHGs via regulations, market mechanisms, and other actions. Six key elements, outlined in the scoping plan, are identified to achieve emissions reduction targets:

- expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- achieving a statewide renewable energy mix of 33 percent;
- developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- establishing targets for transportation-related GHG emissions for regions throughout California, and pursuing policies and incentives to achieve those targets;
- adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and

- creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the state's long-term commitment to AB 32 implementation.

The Climate Change Scoping Plan also included recommended 39 measures that were developed to reduce GHG emissions from key sources and activities while improving public health, promoting a cleaner environment, preserving our natural resources, and ensuring that the impacts of the reductions are equitable and do not disproportionately impact low-income and minority communities. These measures also put the state on a path to meet the long-term 2050 goal of reducing California's GHG emissions to 80 percent below 1990 levels. The measures in the approved Climate Change Scoping Plan will be developed over the next two years and be in place by 2012.

Executive Order S-13-08

EO S-13-08, issued November 14, 2008, directs DWR, the California Natural Resources Agency, Office of Planning and Research, Energy Commission, State Water Resources Control Board, State Parks Department, and California's coastal management agencies to participate in a number of planning and research activities to advance California's ability to adapt to the impacts of climate change. The order specifically directs agencies to work with the National Academy of Sciences to initiate the first California Sea Level Rise Assessment and to review and update the assessment every 2 years after completion; immediately assess the vulnerability of the California transportation system to sea level rise; and to develop a California Climate Change Adaptation Strategy.

California Climate Change Adaptation Strategy

In cooperation and partnership with multiple state agencies, the 2009 California Climate Adaptation Strategy summarizes the best known science on climate change impacts in seven specific sectors (public health, biodiversity and habitat, ocean and coastal resources, water management, agriculture; forestry, and transportation and energy infrastructure) and provides recommendations on how to manage against those threats.

Regional and Local Plans, Policies, Regulations, and Ordinances

The ARB Scoping Plan (January 2009) ("The Scoping Plan") states that local governments are "essential partners" in the effort to reduce GHG emissions. The Scoping Plan also acknowledges that local governments have "broad influence and, in some cases, exclusive jurisdiction" over activities that contribute to significant direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. Many of the proposed measures to reduce GHG emissions

rely on local government actions. The Scoping Plan encourages local governments to reduce GHG emissions by approximately 15 percent from current levels by 2020 (ARB 2008d).

In December 2009, SMAQMD adopted a revised *Guide to Air Quality Assessment* that requires quantification of GHG emissions and requires that each project comply with the intent of AB 32 (SMAQMD 2009b).

3.2.3 ENVIRONMENTAL SETTING

The Phase 1 SERP coverage area is located in the Sacramento Valley Air Basin (SVAB). The SVAB comprises all of Butte, Colusa, Glenn, Western Placer, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba counties and the eastern portion of Solano County. The air districts in these jurisdictions work together to develop plans to bring the current ozone nonattainment designation for the area into compliance, as discussed above.

The nonattainment-transitional designation is given to nonattainment areas that are progressing and nearing attainment. The most recent attainment designations with respect to the SVAB are shown in Table 3.2-3 for each criteria air pollutant.

GLOBAL CLIMATE CHANGE

Global warming is the name given to the increase in the average temperature of the Earth's near-surface air and oceans since the mid-20th century and its projected continuation. Warming of the climate system is now considered to by unequivocal (IPCC 2007) with global surface temperature increasing approximately 1.33°F over the last 100 years. Continued warming is projected to increase global average temperature between 2 and 11°F over the next 100 years.

The causes of this warming have been identified as both natural processes and as the result of human actions. The Intergovernmental Panel on Climate Change (IPCC) concludes that variations in natural phenomena such as solar radiation and volcanoes produced most of the warming from pre-industrial times to 1950 and had a small cooling effect afterward. However, after 1950, increasing greenhouse gas concentrations resulting from human activity such as fossil fuel burning and deforestation have been responsible for most of the observed temperature increase. These basic conclusions have been endorsed by more than 45 scientific societies and academies of science, including all of the national academies of science of the major industrialized countries. Since 2007, no scientific body of national or international standing has maintained a dissenting opinion.

Table 3.2-3 Summary of Ambient Air Quality Standards for the Sacramento Valley Air Basin						
Pollutant	**Averaging Time**	**California**		**National Standards [1]**		
		Standards[2,3]	**Attainment Status[4]**	**Primary[3,5]**	**Secondary[3,6]**	**Attainment Status[7]**
Ozone	1-hour	0.09 ppm (180 µg/m^3)	N (Moderate /Serious)	–	–	–
	8-hour	0.070 ppm (137 µg/m^3)	–	0.075 ppm (147 µg/m^3)	Same as Primary Standard	N (Butte, S. Sutter, Sac, Solano, Yolo)/ U SVAB)
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	U/A	35 ppm (40 mg/m^3)	–	U/A
	8-hour	9 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)		
Nitrogen Dioxide (NO_2)[8]	Annual Arithmetic Mean	0.030 ppm (56 µg/m^3)	–	0.053 ppm (100 µg/m^3)	Same as Primary Standard	U/A
	1-hour	0.18 ppm (338 µg/m^3)	A	–		–
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	–	0.030 ppm (80 µg/m^3)	–	U
	24-hour	0.04 ppm (105 µg/m^3)	A	0.14 ppm (365 µg/m^3)	–	
	3-hour	–	–	–	0.5 ppm (1,300 µg/m^3)	
	1-hour	0.25 ppm (655 µg/m^3)	A	–	–	–
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	N	-	Same as Primary Standard	N (Sac Co) /U (SVAB)
	24-hour	50 µg/m^3		150		

Table 3.2-3 Summary of Ambient Air Quality Standards for the Sacramento Valley Air Basin						
Pollutant	**Averaging Time**	**California**		**National Standards [1]**		
		Standards[2,3]	**Attainment Status[4]**	**Primary[3,5]**	**Secondary[3,6]**	**Attainment Status[7]**
				µg/m^3		
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	U/A/N	15 µg/m^3	Same as Primary Standard	U
	24-hour	–	–	35 µg/m^3		
Lead [9]	30-day Average	1.5 µg/m^3	A	–	–	–
	Calendar Quarter	–	–	1.5 µg/m^3	Same as Primary Standard	
Sulfates	24-hour	25 µg/m^3	A	No National Standards		
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m^3)	U			
Vinyl Chloride[9]	24-hour	0.01 ppm (26 µg/m^3)	U/A			
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more (0.07–30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70%.	U	No National Standards		

Table 3.2-3
Summary of Ambient Air Quality Standards for the Sacramento Valley Air Basin

Pollutant	Averaging Time	California		National Standards [1]		
		Standards[2,3]	Attainment Status[4]	Primary[3,5]	Secondary[3,6]	Attainment Status[7]

Notes: $\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million

[1] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current federal policies.

[2] California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in section 70200 of Title 17 of the California Code of Regulations.

[3] Concentration expressed first in units in which it was issued (i.e., ppm or $\mu g/m^3$). Equivalent units given in parentheses are based on a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Unclassified (U): The data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): The state standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): There was at least one violation of a state standard for that pollutant in the area.
Nonattainment/Transitional (NT) (a subcategory of the nonattainment designation): The area is close to attaining the standard for that pollutant.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Nonattainment (N): Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): Any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): Any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

[8] On February 19, 2008, the California Office of Administrative Law approved a new NO_2 ambient air quality standard, which lowers the 1-hour standard to 0.19 ppm and establishes a new annual standard of 0.030 ppm. These changes became effective March 20, 2008.

[9] The California Air Resources Board has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Sources: ARB 2011, EPA 2012

Increases in greenhouse gas concentrations in the Earth's atmosphere are thought to be the main cause of human induced climate change. Greenhouse gases naturally trap heat by impeding the exit of solar radiation that has hit the Earth and is reflected back into space. Some greenhouse gases occur naturally and are necessary for keeping the Earth's surface inhabitable. However, increases in the concentrations of these gases in the atmosphere during the last 100 years have decreased the amount of solar radiation that is reflected back into space, intensifying the natural greenhouse effect and resulting in the increase of global average temperature.

The principal greenhouse gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFC), hydrofluorocarbons (HFC), and water

vapor. Each of the principal greenhouse gases has a long atmospheric lifetime (one year to several thousand years). In addition, the potential heat trapping ability of each of these gases vary significantly from one another. Methane is 23 times as potent as carbon dioxide, while sulfur hexafluoride is 22,200 times more potent than carbon dioxide. Conventionally, greenhouse gases have been reported as carbon dioxide equivalents (CO_2e). CO_2e takes into account the relative potency of non-CO_2 greenhouse gases and converts their quantities to an equivalent amount of CO_2 so that all emissions can be reported as a single quantity.

The primary human-made processes that release these gases include: burning of fossil fuels for transportation, heating and electricity generation; agricultural practices that release methane such as livestock grazing and crop residue decomposition; and industrial processes that release smaller amounts of high global warming potential gases such as SF_6, PFCs, and HFCs. Deforestation and land cover conversion have also been identified as contributing to global warming by reducing the Earth's capacity to remove CO_2 from the air and altering the Earth's albedo or surface reflectance, allowing more solar radiation to be absorbed.

Global Climate Trends and Associated Impacts

The rate of increase in global average surface temperature over the last 100 years has not been consistent; the last three decades have warmed at a much faster rate – on average 0.32°F per decade. Eleven of the 12 years from 1995 to 2006, rank among the 12 warmest years in the instrumental record of global average surface temperature (going back to 1850) (IPCC 2007).

During the same period over which this increased global warming has occurred, many other changes have occurred in other natural systems. Sea levels have risen on average 1.8 mm/yr; precipitation patterns throughout the world have shifted, with some areas becoming wetter and others drier; tropical cyclone activity in the North Atlantic has increased; peak runoff timing of many glacial and snow fed rivers has shifted earlier; as well as numerous other observed conditions. Though it is difficult to prove a definitive cause and effect relationship between global warming and other observed changes to natural systems, there is high confidence in the scientific community that these changes are a direct result of increased global temperatures (IPCC 2007).

California Climate Trends and Associated Impacts

Maximum (daytime) and minimum (nighttime) temperatures are increasing almost everywhere in California, but at different rates. The annual *minimum* temperature averaged over all of California has increased 0.33°F per decade during the period 1920 to 2003, while the average annual *maximum* temperature has increased 0.1°F per decade (Moser et al. 2009).

With respect to California's water resources, the most significant impacts of global warming have been changes to the water cycle and sea level rise. Over the past century, the precipitation mix between snow and rain has shifted in favor of more rainfall and less snow (Mote et al. 2005; Knowles et al. 2006), and snow pack in the Sierra Nevada is melting earlier in spring (Kapnick and Hall 2009). The average early spring snowpack in the Sierra Nevada has decreased by about 10 percent during the last century, a loss of 1.5 million acre-feet of snowpack storage (DWR 2008). These changes have significant implications for water supply, flooding, aquatic ecosystems, energy generation, and recreation throughout the state. During the same period, sea levels along California's coast rose 7 inches (DWR 2008). Sea level rise associated with global warming will continue to threaten coastal lands and infrastructure, increase flooding at the mouths of rivers, place additional stress on levees in the Sacramento-San Joaquin Delta, and intensify the difficulty of managing the Sacramento-San Joaquin Delta as the heart of the state's water supply system.

3.2.4 Environmental Impacts and Mitigation Measures

Thresholds of Significance

Air Quality

Based on Appendix G of the CEQA Guidelines, the SERP would result in a significant impact on air quality if it would:

- conflict with or obstruct implementation of the applicable air quality plan,
- violate any air quality standard or contribute substantially to an existing or projected air quality violation,
- result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors),
- expose sensitive receptors to substantial pollutant concentrations, or
- create objectionable odors affecting a substantial number of people.

As stated in Appendix G of the CEQA Guidelines, the thresholds of significance established by the applicable air quality management or air pollution control district may be relied upon to assess significance under CEQA. Thus, implementation of the SERP would result in significant air quality impacts if:

- local air district-recommended best management practices as required by law are not incorporated into project design or implemented during project construction (see Table 3.2-4);
- temporary construction or long-term operational (regional) emissions would exceed local air district-recommended mass emissions standards as shown in Table 3.2-5;
- long-term operational (local) mobile-source emissions of CO would result in or contribute to CO concentrations that exceed the California 1-hour ambient air quality standard of 20 ppm or the 8-hour standard of 9 ppm; or
- sensitive receptors would be exposed to TAC emissions (e.g., stationary or mobile-source) that exceed 10 chances per million for excess cancer risk and/or a hazard Index of 1 for noncancer risk for the maximally exposed individual.

GLOBAL CLIMATE CHANGE

Based on the 2010 amendments to Appendix G of the CEQA Guidelines, the SERP would result in a significant impact on global climate change if it would:

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

Table 3.2-4
Applicable Air District Rules and Regulations

Air District	Counties	Rule
Butte County AQMD	Butte	Rules 200, 201, 202, and 205
Feather River AQMD	Sutter	Rules 3.0, 3.2, and 3.3
Colusa County APCD	Colusa	Rules 2.10, 2.13, 2.15, and 2.16
Yolo-Solano AQMD	Yolo and Solano	Rules 2-5 and 2-11
Sacramento Metropolitan AQMD	Sacramento	Rules 402, 403, 404, and 405

Notes: AQMD = Air Quality Management District, APCD = Air Pollution Control District
Source: ARB 2009

Table 3.2-5 Air District Criteria Air Pollutant and Precursor Mass Emission Thresholds							
Air District	Counties	Construction Mass Emission Thresholds			Operational Mass Emission Thresholds		
		ROG	NO_X	PM_{10}	ROG	NO_X	PM_{10}
Butte County AQMD	Butte	25 lb/day	25 lb/day	80 lb/day	25 lb/day	25 lb/day	80 lb/day
Feather River AQMD	Sutter	25 lb/day	25 lb/day	80 lb/day	25 lb/day	25 lb/day	80 lb/day
Colusa County APCD	Colusa	-	-	-	-	-	-
Yolo-Solano AQMD	Yolo and Solano	10 TPY	10 TPY	80 lb/day	10 TPY	10 TPY	80 lb/day
Sacramento Metropolitan AQMD	Sacramento	-	85 lb/day	-	65 lb/day	65 lb/day	-

Notes: APCD = Air Pollution Control District; APD = Air Pollution Department; AQMD = Air Quality Management District; lb/day = pounds per day; NO_X = oxides of nitrogen; PM_{10} = respirable particulate matter; ROG = reactive organic gases; TPY = tons per year
Source: BCAQMD, 2008; FRAQMD, 2009; YSAQMD, 2007; SMAQMD, 2009b; Ledbetter pers. comm., 2009; Gomez pers. comm., 2009

None of the relevant local air districts has adopted or proposed GHG emission thresholds. DWR has developed a Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan. This Plan provides analysis of current and historical GHG emissions from DWR activities, GHG reduction targets of Near-Term Goal at 50% below 1990, and Long-Term Goal at 80% below 1990, and strategies to achieve the GHG reduction targets (DWR 2012). DWR intends to use this Plan to streamline the CEQA cumulative impact analysis of GHG emissions consistent with CEQA Guidelines section 15183.5. To streamline analysis, DWR projects must incorporate relevant reduction measures identified in the Greenhouse Gas Emissions Reduction Plan.

Although the emissions of one single project would not cause global climate change, GHG emissions from multiple projects throughout the world could result in the cumulative impact of global climate change. See Section 5.1, “Cumulative Impacts,” for a complete impact discussion on project-generated GHG emissions.

ANALYSIS METHODOLOGY

Regional and local emissions of criteria air pollutants and precursors, TACs, and odors during construction and operations related to the SERP were assessed in accordance with the methodologies described below.

Construction-related emissions of criteria air pollutants (e.g., PM_{10}), ozone precursors (ROG and NO_X), and GHG emissions were assessed in accordance with methodologies recommended by ARB and local air districts. Where quantification was required, emissions were modeled using the Urban Emissions (URBEMIS) 2007 Version 9.2.4 computer model (Rimpo and Associates 2008). Project-specific data (e.g., construction equipment types and number requirements, maximum daily acreage disturbed) were acquired from DWR for modeling purposes. Modeled construction-related emissions were compared with applicable air district thresholds to determine significance.

Regional operational emissions of criteria air pollutants and precursors (e.g., mobile and area sources) and other air quality impacts (i.e., local emissions of CO, odors, and TACs) were assessed qualitatively in accordance with methodologies recommended by ARB and local air districts.

Potential impacts associated with climate change are addressed in Chapter 5, "Other CEQA-Required Sections," as a part of the cumulative impact analysis.

IMPACT ANALYSIS

IMPACT 3.2-1 ***Construction-Related Emissions that Could Exceed Local Thresholds of Significance.*** *The SERP could result in temporary construction-related emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ that could exceed local air district thresholds of significance. This impact would be* ***potentially significant****.*

Construction emissions are described as temporary in duration and have the potential to represent a significant impact with respect to air quality, especially fugitive dust emissions (PM_{10} and $PM_{2.5}$). Fugitive dust emissions are associated primarily with extensive site preparation activities and vary as a function of such parameters as soil silt content, soil moisture, wind speed, acreage of disturbance area, and miles traveled by construction vehicles on- and off-site. ROG and NO_X emissions are associated primarily with gas and diesel equipment exhaust. Emissions from site preparation (e.g., clearing and grading), material transport, bank stabilization, installation of erosion control features, vegetation planting, and other activities associated with repair of small erosion sites would result in the temporary generation of ROG, NO_X, PM_{10}, and $PM_{2.5}$. On-site construction equipment for these types of activities may include dozers, excavators, haul trucks, barges with cranes, cement mixers with extended arms, and water trucks. In addition, for modeling purposes, approximately 18 truck trips per day carrying 3,900 cubic yards of material were assumed to be required for material delivery and removal.

Construction at each erosion repair site would last for no more than 4 weeks, and up to 15 erosion repairs would be made annually. The maximum acreage disturbed per site would be 0.5 acre or 1,000 linear feet for a Tier 2 project, or 0.1 acre or 264 linear feet for a Tier 1 project.

Temporary construction-generated emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ were modeled using the URBEMIS 2007 Version 9.2.4 computer program. Input parameters were based on default model settings and project-specific information where available (e.g., number and type of equipment, amount of material transport, acreage disturbed). The modeled maximum temporary daily construction emissions are summarized in Table 3.2-6 and described in more detail below and in Appendix C, "Air Quality Modeling Calculations." These quantities represent the amount of emissions per site and do not represent the entire SERP as a whole.

Table 3.2-6
Summary of Modeled Maximum Temporary Construction-Generated Emissions Per Single Erosion Repair Site

Source	ROG	NO_X	PM_{10}	$PM_{2.5}$
Erosion Repair Activities—Single Site (2011)				
Mobile Equipment Exhaust[1]	3 lb/day	26 lb/day	1 lb/day	1 lb/day
Fugitive Dust	–	–	3 lb/day	1 lb/day
Total Maximum Unmitigated (lb/day)	3 lb/day	26 lb/day	4 lb/day	2 lb/day
Total Maximum Mitigated (lb/day)[2]	*2 lb/day*	*21 lb/day*	*1 lb/day*	*0 lb/day*
Annual Total Maximum Unmitigated—15 sites (TPY)[3]	0.2 TPY	2.0 TPY	0.3 TPY	0.2 TPY

Notes: lb/day = pounds per day; ROG = reactive organic gases; NO_X = oxides of nitrogen; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; $PM_{2.5}$ = fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less; TPY = tons per year.

[1] Accounts for employee commute trips, on-site heavy-duty construction equipment operations, and material transport (e.g., soil and aggregate base).

[2] Mitigation Measure 3.2-1 would reduce emissions of ROG and NO_X approximately 20 percent and PM_{10} and $PM_{2.5}$ emissions approximately 75 percent below their unmitigated levels.

[3] Summation of emissions from 15 individual repair sites per year.

See Appendix C for modeling results and assumptions.

Source: Data modeled by AECOM in 2009

As shown in Table 3.2-6, construction-related activities in 2011 would generate daily unmitigated ROG, NO_X, PM_{10}, and $PM_{2.5}$ emissions of 3 lb/day, 26 lb/day, 4 lb/day, and 2 lb/day, respectively, per erosion repair site. Annual SERP-generated construction-related emissions for 15 annual repair sites of unmitigated ROG, NO_X, PM_{10}, and $PM_{2.5}$ would be 0.2 TPY, 2.0 TPY, 0.3 TPY, and 0.2 TPY, respectively. Daily emissions of NO_X would exceed Feather River Air Quality Management District (FRAQMD) and Butte County Air Quality Management District (BCAQMD) applicable thresholds of 25 lb/day.

Mandatory conservation measures in the SERP Manual will require water (e.g., trucks, portable pumps with hoses) to control fugitive dust during temporary access road construction (Section I, "Conservation Measures," of the SERP Manual). In addition, several air districts in the Phase 1 SERP coverage area have not adopted mass emission thresholds for

construction-generated criteria air pollutants and precursors. Instead, these air districts require that standard equipment exhaust (i.e., ROG and NO_X) and fugitive dust control measures (i.e., PM_{10} and $PM_{2.5}$) shall be incorporated into project design and implemented during project construction (BCAQMD 2008, SMAQMD 2009b). Not all measures recommended by the affected air districts for controlling equipment exhaust and fugitive dust emissions are currently incorporated as part of the SERP, and emissions in BCAQMD and FRAQMD could exceed applicable thresholds. Thus, SERP-generated construction-related emissions of criteria air pollutants and precursors could exceed the local FRAQMD and BCAQMD thresholds of significance for NO_X. This impact would be potentially significant.

Mitigation Measure 3.2-1: Implement Applicable Air District–Recommended Mitigation Measures for Particulate Matter and Exhaust Emissions.

DWR will incorporate the following measures to reduce emissions of fugitive dust (PM_{10} and $PM_{2.5}$) during construction activities:

- Comply with applicable air district rules and regulations that pertain to construction activities (e.g., asphalt ROG requirements, administrative requirements, and fugitive dust management practices). As applicable, implement construction-related requirements from air districts or local governments with authority over the project at the commencement of and during each construction activity.
- Do not use open burning to dispose of any excess materials generated during site preparation or other project activities.
- Schedule construction truck trips during nonpeak traffic hours to reduce peak-hour emissions and traffic congestion to the extent feasible.
- Follow air pollution regulations, which includes the use of diesel-powered construction equipment and equipment idle times, that meet CARB's 1996 or newer certification standard for in-use off-road heavy-duty diesel engines [California Code of Regulations: (article 4.8, chapter 9, division 3 of title 13)]
- Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition.
- Check all tires and maintain for proper inflation.

Implementation of the applicable dust and exhaust control measures outlined above under Mitigation Measure 3.2-1 would reduce emissions of ROG and NO_X approximately 20 percent

and PM_{10} and $PM_{2.5}$ approximately 75 percent. Thus, Mitigation Measure 3.2-1 would bring the SERP into compliance with local air district thresholds and recommendations for decreasing emissions of criteria air pollutants and precursors and would reduce this impact to a less-than-significant level.

IMPACT 3.2-2 ***Operations-Related Criteria Pollutants and Precursors that Could Exceed Local Thresholds of Significance.*** *The SERP would not result in long-term operations-related emissions of ROG, NO_X, PM_{10}, or $PM_{2.5}$ that could exceed local air district thresholds of significance. This impact would be* ***less than significant****.*

Long-term operations of the SERP would result in nominal regional emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ from mobile and area sources. No stationary sources of emissions would be created as a result of implementing individual erosion repairs.

Occasional maintenance activities could result in area-source emissions from vegetation management equipment such as chainsaws and trimmers. Mobile-source emissions would result from yearly monitoring visits, material removal, and worker commute trips. Project-generated, regional-area, and mobile-source emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ were modeled using the URBEMIS 2007 Version 9.2.4 computer program. This modeling was based on the assumption that maintenance activities would be conducted 1 week per year per erosion repair site in the Phase 1 SERP coverage area. Default URBEMIS model settings were used.

Table 3.2-7 summarizes the modeled emissions from operational emissions that would be generated by the SERP in year 2011. The emissions modeled were criteria air pollutants and ozone precursors. As summarized in Table 3.2-7, maintenance activities during 1 week of 2011 would result in daily unmitigated emissions of less than 1 lb/day of ROG, NO_X, PM_{10}, and $PM_{2.5}$.

Based on the modeling conducted, emissions of ROG, NO_X, PM_{10}, or $PM_{2.5}$ generated from individual erosion repairs would not exceed any local air district significance thresholds. This impact would be less than significant.

No mitigation is required.

IMPACT 3.2-3 ***Operations-Related Carbon Monoxide (CO) Emissions that Could Exceed Local Thresholds of Significance.*** *Operations-related activities would not result in emissions of CO that exceed the CEQA threshold (20-ppm [1-hour] or 9-ppm [8-hour]). Therefore, this impact would be* ***less than significant****.*

CO concentration is directly related to motor vehicle activity (e.g., idling time and traffic flow conditions), particularly during rush hour, and stable weather conditions with low wind. Under

Table 3.2 -7 Summary of Modeled Maximum Long-Term Operations-Generated Emissions Per Single Erosion Repair Site				
Source	**ROG**	**NO_X**	**PM_{10}**	**$PM_{2.5}$**
Maintenance Activities – Single Site (2011)				
Mobile Equipment Exhaust [1]	0.0 lb/day	0.0 lb/day	0.1 lb/day	0.0 lb/day
Area Sources	0.1 lb/day	0.0 lb/day	0.0 lb/day	0.0 lb/day
Total Maximum Unmitigated (lb/day)	0.1 lb/day	0.0 lb/day	0.1 lb/day	0.0 lb/day
Total Maximum Unmitigated (TPY)[2]	0.0 TPY	0.0 TPY	0.0 TPY	0.0 TPY

Notes: lb/day = pounds per day, ROG = reactive organic gases; NO_X = oxides of nitrogen; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; $PM_{2.5}$ = fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less; APCD = Air Pollution Control District; AQMD = Air Quality Management District; TPY = tons per year.

[1] Accounts for employee commute trips, on-site equipment operations, and material transport (e.g., vegetation waste).

[2] Summation of emissions from 15 single-site repair projects per year

See Appendix C for modeling results and assumptions.

Source: Data modeled by AECOM in 2009

these specific weather conditions, CO concentrations may reach unhealthy levels with respect to residential areas, schools, and hospitals. As a result, local air districts recommend analyzing CO emissions at a local rather than regional level.

The *Transportation Project-Level Carbon Monoxide Protocol* (Garza, Graney, and Sperling 1997:4-5 through 4-9) states that signalized intersections that operate at an unacceptable Level of Service (LOS) represent a potential for a CO violation, also known as a “hot spot,” and thus should undergo a quantitative analysis.

According to the transportation analysis prepared for the SERP, SERP operations would not reduce the LOS at any signalized intersections to an unacceptable level (LOS E or F) during any time of the day or substantially worsen LOS at any signalized intersections (see Section XV, “Transportation, Parking, and Circulation,” of Appendix A for additional detail). Thus, quantitative analysis is not recommended and long-term local emissions of CO from mobile sources during operations would not exceed the California 20 ppm (1-hour) or 9 ppm (8-hour) standards. As a result, this impact would be less than significant.

No mitigation is required.

IMPACT 3.2-4 ***Exposure of Sensitive Receptors to TAC Emissions.*** *While the SERP would result in some temporary construction-related and minimal long-term operational emissions of TACs, because the use of off-road heavy-duty diesel equipment would be temporary and DWR would comply with applicable rules and regulations that reduce the risk associated with emissions of TACs from stationary sources, project-generated emissions would not expose sensitive receptors to substantial pollutant concentrations. This impact would be* ***less than significant.***

Diesel PM is identified as a TAC by ARB. Construction-related activities would result in temporary project-generated emissions of diesel PM from the exhaust of off-road heavy-duty diesel equipment during site preparation (e.g., excavation, grading, and clearing), materials transport and handling, installation of bank protection materials, and other miscellaneous activities. At this time, local air district policies do not recommend the completion of health risk assessments for construction-related emissions of TACs (ARB 2005).

The dose of a TAC to which receptors are exposed is the primary factor used to determine health risk (i.e., potential exposure to TAC is compared to applicable standards). Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. Dose is positively correlated with time, meaning that a longer exposure period would result in a higher exposure level for the maximally exposed individual. Thus, the risks estimated for a maximally exposed individual are higher if a fixed exposure occurs over a longer period of time. According to the Office of Environmental Health Hazard Assessment, health risk assessments, which determine the exposure of sensitive receptors to TAC emissions, should be based on a 70-year exposure period; however, such assessments should be limited to the period/duration of activities associated with the proposed program (Salinas, pers. comm. 2004).

The project construction period of 4 weeks per erosion site would be much less than the 70-year period used for risk determination. In addition, diesel PM is highly dispersive and studies have shown that measured concentrations of vehicle-related pollutants, including ultra-fine particles, decrease dramatically within approximately 300 feet of the source (Zhu et al. 2002); while the distance to sensitive receptors is not known at this time, heavy equipment would often likely be located at considerable distance from sensitive receptors (i.e., greater than 300 feet) because the Phase 1 waterways are primarily adjacent to rural areas. Because the use of mobilized equipment would be temporary in combination with the dispersive properties of diesel PM and because primary construction activities would not be active for long periods of time within 300 feet of any sensitive receptors, construction-related TAC emissions would not be anticipated to expose sensitive receptors to substantial pollutant concentrations.

No permanent sources of operational TAC emissions would result from implementation of the SERP. Maintenance activities using heavy-duty equipment could produce diesel exhaust emissions during annual maintenance work. Maintenance and monitoring could occur at each

erosion site for approximately 1 day per year. As during site construction, exposure to TACs from maintenance would be much less than the 70-year period used for risk determination and, although the distance to sensitive receptors is not known at this time, heavy equipment would often likely be located greater than 300 feet from sensitive receptors.

Therefore, because the use of off-road heavy-duty diesel equipment would be temporary and operational activities would be minimal, sensitive receptors would not be exposed to substantial pollutant concentrations. Therefore, this impact would be less than significant.

No mitigation is required.

IMPACT 3.2-5 ***Temporary Exposure of Sensitive Receptors to Odors during Construction.*** *The SERP would not introduce new, permanent sources of substantial objectionable odors or locate sensitive receptors significantly closer to existing permanent sources of odors. Odors generated during construction would be temporary, intermittent, and would dissipate quickly. This impact would be* ***less than significant****.*

The occurrence and severity of odor impacts depend on numerous factors, including the nature, frequency, and intensity of the source; wind speed and direction; and the presence of sensitive receptors. While offensive odors rarely cause physical harm, they still can be very unpleasant, leading to considerable distress and often generating citizen complaints to local governments and regulatory agencies.

Construction of individual erosion repairs would result in odors from exhaust emissions from on-site diesel equipment and possible temporary standing water over a period of no more than 2 weeks. The SERP would not introduce new, long-term odor-generating facilities, nor would it place receptors significantly closer to or cause large exposure periods to existing sources of odors. Temporary construction-related odor sources would be intermittent and would dissipate rapidly from the source. Thus, temporary and long-term odor impacts would be less than significant.

No mitigation is required.

3.2.5 RESIDUAL IMPACTS

Implementation of Mitigation Measure 3.2-1 would reduce significant impacts of the SERP from construction-related criteria pollutant emissions to a less-than-significant level. All other impacts relating to air quality are less than significant. No significant and unavoidable impacts would occur. Climate change impacts are addressed in Chapter 5, “Other CEQA-Required Sections,” as a part of the cumulative impact analysis.

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3.3 BIOLOGICAL RESOURCES

3.3.1 INTRODUCTION

This section describes the terrestrial and aquatic biological resources that are known or have the potential to occur within the Phase 1 SERP coverage area. Biological resources include common vegetation, wildlife, and fisheries resources; sensitive habitats; plant communities; and special-status plant and animal species, all of which are detailed below. Federal, state, regional, and local regulations related to biological resources are summarized. Potential impacts of the SERP are analyzed and mitigation measures are provided for those impacts determined to be significant or potentially significant. Cumulative biological impacts are addressed in Section 5.1, “Cumulative Impacts.”

3.3.2 REGULATORY SETTING

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Clean Water Act (Section 404)

USACE regulates discharges of dredged or fill materials into waters of the United States under Section 404 of the CWA. “Waters of the United States” are lakes, rivers, streams, and relatively permanent tributaries and adjacent wetlands. Wetlands are defined in Section 404 as “areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” Activities that require a permit under Section 404 include but are not limited to placing fill or riprap, grading, mechanized land clearing, and dredging. Any activity that would result in the deposit of dredged or fill material below the ordinary high-water mark of waters of the United States or within a jurisdictional wetland usually requires a Section 404 permit, even if the area is dry at the time the activity takes place.

Endangered Species Act of 1973, as Amended

The federal Endangered Species Act (ESA) protects and promotes recovery of threatened and endangered species, many of which are terrestrial and present in the Extended SPA. Under the ESA, the definition of “take” is to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Under federal regulation, take is further defined to include habitat modification or degradation where it would be expected to result in death or injury to listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

The ESA includes the following provisions:

- Section 4 outlines a process to list species in danger of becoming extinct.
- Section 7 outlines procedures for cooperation among federal agencies to conserve federally listed species and designated critical habitat. Section 7(a)(2) requires federal agencies to consult with U.S. Fish and Wildlife Service (USFWS) for terrestrial and nonanadromous fish species, and with the National Marine Fisheries Service (NMFS) for anadromous fish and other marine fish and mammal species, to ensure that federal agencies do not undertake, fund, permit, or authorize actions likely to jeopardize the continued existence of listed species.
- Section 9 prohibits take of any threatened or endangered species, including harm associated with habitat modifications.
- Section 10 outlines the use of habitat conservation plans (HCPs) when there is no federal involvement in a project and the project is likely to result in take of listed species.

As defined in the ESA, critical habitat is a specific geographic area that is essential for the conservation of a threatened or endangered species and that may require special management and protection. It may include an area that is not currently occupied by the species but that will be needed for its recovery. Critical habitats are designated to ensure that actions authorized by federal agencies will not destroy or adversely modify critical habitat, thereby protecting areas necessary for the conservation of the species.

Fish and Wildlife Coordination Act of 1934, as Amended

The Fish and Wildlife Coordination Act was enacted in 1934, then amended in 1946, to protect fish and wildlife when federal actions result in the control or modification of a natural stream or body of water. The statute requires federal agencies to consider the effect that water-related projects would have on fish and wildlife resources. The agencies must consult and coordinate with USFWS and state fish and game agencies to address ways to conserve wildlife resources by preventing loss of and damage to fish and wildlife resources, and to further develop and improve these resources.

Bald and Golden Eagle Protection Act of 1940

With the delisting of the bald eagle in 2007, the Bald and Golden Eagle Protection Act is the primary federal law protecting bald eagles. This law prohibits, except under certain specified conditions, the taking, possession, and commerce of bald and golden eagles. The Bald and Golden Eagle Protection Act defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb” (16 U.S. Code (USC) 668–668d). USFWS has defined “disturb” under the act as follows (72 FR 31132–31140, June 5, 2007):

> *Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.*

In addition to immediate effects, this definition of "disturb" covers effects caused by human-induced alterations around a previously used nest site when bald or golden eagles are not present. Thus, an eagle has been disturbed if such an alteration sufficiently agitates or bothers a returning eagle to injure it or substantially interfere with normal breeding, feeding, or sheltering habits, and to cause (or be likely to cause) loss of productivity or nest abandonment. USFWS has proposed new permit regulations to authorize the take of bald and golden eagles under the Bald and Golden Eagle Protection Act, generally when the take to be authorized is associated with otherwise lawful activities (72 FR 31141–31155, June 5, 2007).

Migratory Bird Treaty Act

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 Code of Federal Regulations (CFR) Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21). Both direct and indirect actions are prohibited, although harassment and habitat modifications are not prohibited unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA, which can be found in 50 CFR 10.13, includes several hundred species, essentially all native birds. Loss of nonnative species, such as house sparrows, European starlings, and rock pigeons, is not covered by this statute.

Sustainable Fisheries Act (Essential Fish Habitat)

In response to growing concern about the status of fisheries in the United States, Congress passed the Sustainable Fisheries Act of 1996 (Public Law 104-297). This law amended the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265), the primary law governing marine fisheries management in the federal waters of the United States. Under the Sustainable Fisheries Act, consultation is required by NMFS on any activity that might adversely affect Essential Fish Habitat (EFH). EFH consists of those habitats that fish rely on throughout their life cycles. It encompasses habitats necessary to allow sufficient production of commercially valuable aquatic species to support a long-term sustainable fishery and contribute to a healthy ecosystem.

Executive Orders

The executive orders discussed below were issued to provide direction to federal agencies regarding invasive species, floodplain management, and protection of wetlands, and affect related federal flood management actions.

- **Executive Order 13112: Invasive Species**—This executive order directs federal agencies to prevent and control introductions of invasive nonnative species in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health impacts. As directed by Executive Order 13112, a national invasive species management plan guides federal actions to prevent, control, and minimize invasive species and their impacts (NISC 2008). To support implementation of this plan, the U.S. Army Corps of Engineers (USACE) released the *U.S. Army Corps of Engineers Invasive Species Policy* (USACE 2009). This policy calls on agencies to address the effects of invasive species in impact analyses completed for civil works projects.

- **Executive Order 11988: Floodplain Management**—This executive order requires federal agencies to provide leadership and take action to avoid development in the base (100-year) floodplain; reduce the hazards and risk associated with floods; minimize the effect of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values of the base floodplain.

- **Executive Order 11990: Protection of Wetlands**—This executive order directs federal agencies to provide leadership and act to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in implementing civil works.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

Section 401 Water Quality Certification and Porter-Cologne Water Quality Control Act

See Subsection 3.6.2, "Regulatory Setting," in Section 3.6, "Hydrology and Water Quality."

California Endangered Species Act

Under the California Endangered Species Act (CESA), the California Department of Fish and Wildlife (CDFW) has the responsibility for maintaining a list of endangered and threatened species (California Fish and Game Code, Section 2070). In addition, CDFW maintains a list of "candidate species," for which it has issued formal notice that the species are under review for possible addition to the list of endangered or threatened species. CDFW also maintains lists of "species of special concern," which serve as species watch lists.

Pursuant to CESA requirements, an agency reviewing a proposed project within its jurisdiction must determine whether any State-listed endangered or threatened species may be present in the project study area and, if so, whether the proposed project would have a potentially significant impact on any of these species. CDFW also encourages informal consultation on any proposed project that may affect a species that is a candidate for State listing.

Take of protected species incidental to otherwise lawful management activities may be authorized through issuance of either an incidental take permit under Section 2081 of the California Fish and Game Code, or a consistency determination under Section 2080.1(a). Section 2080.1(a) authorizes CDFW to accept a federal biological opinion as the take authorization for a State-listed species when a species is listed under both the ESA and the CESA. Under the CESA, “take” is defined as an activity that would directly or indirectly kill an individual of a species, but the definition does not include “harm” or “harass,” as the federal act does.

California Fish and Game Code Sections 1600–1616—Streambed Alteration Agreement

Diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports fish or wildlife resources are subject to regulation by CDFW, as required by Sections 1600–1616 of the California Fish and Game Code. The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports wildlife, fish, or other aquatic life. This includes watercourses that have a surface or subsurface flow that supports or has supported riparian vegetation. CDFW’s jurisdiction within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A CDFW streambed alteration agreement must be obtained for a project that would result in an impact on a river, stream, or lake.

California Fish and Game Code Sections 1900–1913—Native Plant Protection Act

Sections 1900–1913 of the California Fish and Game Code codify the Native Plant Protection Act, which is intended to preserve, protect, and enhance endangered or rare native plants in California. The act directs CDFW to establish criteria for determining which native plants are rare or endangered. Under Section 1901, a species is endangered when its prospects for survival and reproduction are in immediate jeopardy from one or more causes. A species is rare when, although not threatened with immediate extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens. Under the act, the California Fish and Game Commission may adopt regulations governing the taking, possessing, propagation, or sale of any endangered or rare native plant.

With CDFW participation, CNPS has developed and maintains lists of plants of special concern in California. See the discussion of “California Department of Fish and Wildlife Species Designations” below for more information on CDFW and CNPS coordination.

Sections 3503 and 3513 of the California Fish and Game Code—Protection of Birds of Prey

Under Section 3503 of the California Fish and Game Code, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (birds in the order of Falconiformes or Strigiformes [birds of prey—i.e., eagles, hawks, owls, and falcons]), including their nests or eggs. Section 3513 provides for adoption of the MBTA's provisions. It states that it is unlawful to take or possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame bird. These state codes offer no statutory or regulatory mechanism for obtaining an incidental take permit for the loss of nongame, migratory birds. Typical violations include destruction of active raptor nests resulting from removal of vegetation in which the nests are located. Violation of Sections 3503.5 and 3513 could also include disturbance of nesting pairs that results in failure of an active raptor nest.

California Fish and Game Code—Fully Protected Species

Protection of fully protected species is described in four sections of the California Fish and Game Code (Sections 3511, 4700, 5050, and 5515) that list 37 fully protected species. These statutes prohibit take or possession at any time of fully protected species.

California Department of Fish and Wildlife Species Designations

CDFW maintains an informal list of species called "species of special concern." These are broadly defined as wildlife species that are of concern to CDFW because their populations have declined and distributions have become restricted, and/or because they are associated with habitats that are declining in California. These species are inventoried in the CNDDB regardless of their legal status. Impacts on species of special concern may be considered significant.

CDFW also maintains a list of sensitive plant species. California native plants meeting the rarity or endangerment criteria are assigned a California Rare Plant Rank and inventoried in the CNDDB. CDFW and CNPS assign California Rare Plant Ranks through the collaborative efforts of the Rare Plant Status Review Group composed of more than 300 botanical experts from government, academia, nongovernmental organizations, and the private sector. Species with a California Rare Plant Rank of 1A, 1B, or 2 (formerly known as CNPS Lists 1A, 1B, and 2) generally qualify as endangered, rare, or threatened within the definition of the CEQA Guidelines (California Code of Regulations, Section 15380). In general, species with a California Rare Plant Rank of 3 or 4 do not meet the definition of endangered, rare, or threatened pursuant to CEQA Section 15380; however, these species may be evaluated by the lead agency on a case-by-case basis to determine significance criteria under CEQA.

LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

Habitat Conservation Plans and Natural Community Conservation Plans

Regional HCPs and natural community conservation plans (NCCPs) are currently being developed for various counties in the Phase 1 SERP coverage area. These plans integrate land-use activities with conservation goals to reduce conflicts between sensitive species and economic development. They also create a regional, multispecies approach to planning for the protection and perpetuation of biological diversity.

General Plans

County and city general plans set forth the long-term goals, objectives, and policies that guide local land use decisions, including decisions about development and preservation of natural resources. Often, specific policies or ordinances, such as tree preservation ordinances, are aimed at protecting the biological resources that are considered locally important. Policies related to biological resources are usually found in the agriculture, open space, conservation, and natural resources elements of general plans. These policies often provide general guidance for avoiding and minimizing impacts on these resources when engaging in ground-disturbing activities associated with development.

Sacramento River Watershed Program

The Sacramento River Watershed Program (SRWP), founded in 1996, brings together dozens of groups and thousands of people who are concerned about the health of the Sacramento River and its watershed. As one of the largest watersheds in the United States, the Sacramento River watershed serves as an important source of drinking water and recreation, as well as a vital economic artery for commerce and agriculture. Therefore, preserving and maintaining the water quality of the Sacramento River watershed is crucial. The program is overseen by a 21-member board of trustees and functions through several committees and work groups.

The program provides a network for building a basinwide context to improve watershed health. It operates through consensus-based collaborative partnerships, coordination of research and monitoring, and mutual education among the stakeholders of the Sacramento River watershed. The SRWP works to support and preserve the integrity of local efforts. The program strives to resolve watershed issues with local participation and a watershed-wide perspective. The SRWP also helps disseminate information about the watershed and conducts monitoring activities to continually assess water quality and other indicators of watershed health.

3.3.3 Environmental Setting

The following sections describe the vegetation types, primary terrestrial and aquatic habitat functions, and sensitive biological resources present in the Phase 1 SERP coverage area. Because the Phase 1 SERP coverage area encompasses approximately 300 miles of levees, the area has been divided into regions to assist DWR and the SERP permitting agencies in identifying general conservation measures and timing restrictions to protect various species (see Section I, "Conservation Measures," in the SERP Manual, included in Appendix B of this DEIR). These regions, referred to below in the discussions of wildlife occurrence, are defined as follows:

Region 1: Delta-Sacramento River and major tributaries (River Mile [RM] 0 to RM 60)

- Major tributaries include:
  - Putah Creek
  - Sacramento Bypass
  - Sacramento River (portions below RM 60)
  - Yolo Bypass as identified in Exhibit 2-1

Region 2: Mainstem Sacramento River and major tributaries RM 60 to RM 143

- Major tributaries include:
  - Butte Creek
  - Cherokee Canal
  - Colusa Bypass
  - Colusa Main Drain (northern portion as identified in Exhibit 2-1)
  - Feather River (portions as identified in Exhibit 2-1)
  - Sacramento River (portions between RM 60 and RM 143)
  - Sutter Bypass
  - Tisdale Bypass
  - Wadsworth Canal
  - East and West Interceptor Canals

Region 3: Upper Sacramento and major tributaries (RM 143 to RM 194)

- Major tributaries include:
  - Sacramento River (portions between RM 143 and RM 194)

Region 4: Non-anadromous SERP waterways, including:

- Willow Slough Bypass
- Cache Creek from the Yolo Bypass to the upstream limit of the SRFCP levees

VEGETATION TYPES

Seven categories of vegetation cover, as listed below, are used to describe the existing vegetation in the Phase 1 SERP coverage area. These categories are based on a simplified classification of 12 plant community types delineated in the Phase 1 SERP coverage area by the Sacramento River Riparian Vegetation (SRRV) Project (Nelson et al. 2000). Two other vegetation types, Agricultural Lands and Ruderal Vegetation, have been added to the original SRRV classes. The area that has been classified includes lands between the high-water channel edge (the line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in soil character, destruction of terrestrial vegetation, or the presence of litter and debris) and the levee crest and a 100-foot buffer along the high-water channel edge (for areas with no levees).

Riparian Forest

This category of vegetation cover includes the Great Valley cottonwood riparian forest, Great Valley mixed riparian forest, young cottonwood forest, and valley oak forest plant community types delineated in the SRRV Project (Nelson et al. 2000). Riparian forest habitat is composed of mature native and nonnative trees. Trees and shrubs are interspersed, with heights ranging from a few feet to almost 100 feet above the ground or shoreline. Vegetation in a riparian forest provides habitat with overhead and instream shaded riverine aquatic (SRA) cover (detailed below under “Fisheries and Aquatic Habitats”) for aquatic species. The riparian forest along the Sacramento River consists primarily of a tall overstory of deciduous broadleaf trees, with Fremont cottonwood (*Populus fremontii*) and valley oak (*Quercus lobata*) being the most prevalent species; these species are often covered with California wild grape (*Vitis californica*) and Colorado Desert mistletoe (*Phoradendron macrophyllum*). Nonnative riparian forest species also contribute to the overstory composition in many areas. The most prevalent nonnatives are blue gum (*Eucalyptus* spp.), black locust (*Robinia pseudoacacia*), and English walnut (*Juglans regia*). Shrub species present in the understory of the riparian forest habitat can include native and nonnative species such as California and Himalayan blackberry (*Rubus ursinus* and *R. discolor*), California rose (*Rosa californica*), Pacific poison oak (*Toxicodendron diversilobum*), common buttonbush (*Cephalanthus occidentalis* var. *californicus*), and blue elderberry (*Sambucus mexicana*). Elderberry is a species of concern because it is a host plant for the Valley elderberry longhorn beetle, which is listed as threatened under the ESA. Elderberry is usually found along the upper elevations of the floodplain.

Riparian Scrub/Shrub

This category of vegetation cover includes areas delineated by the SRRV Project as blackberry scrub and Great Valley riparian scrub (Nelson et al. 2000). The riparian scrub/shrub vegetation cover primarily occurs at low-bank and mid-bank elevations and consists of shrub species and riparian tree species that are less than 20 feet tall. Species composition of the riparian scrub/shrub community is similar to that described above for riparian forest.

Riparian Herbaceous

This vegetation cover type includes herbaceous cover and the gravel and sand bar community types delineated in the SRRV Project (Nelson et al. 2000). Areas were designated riparian herbaceous cover only if they were enclosed by riparian vegetation or the stream channel. The gravel and sand bar community type is included in this grouping because these areas support annual and short-lived perennial species, including herbs, grasses, and sub-shrubs that cover less than 50 percent of a given area (Nelson et al. 2000).

The riparian herbaceous vegetation cover type occurs on the waterside of the levees, within gaps in the riparian forest canopy and riparian scrub/shrub communities, at mid-bank and high-bank elevations, and on sand and gravel bars. The riparian herbaceous vegetation cover exists primarily in areas with frequent natural or human-induced disturbance; consequently, the species composition is a mix of native and nonnative plants. Species commonly found in the herbaceous riparian communities include European annual and native perennial grasses; other native perennials such as Douglas' sagewort (*Artemisia douglasiana*), Santa Barbara sedge (*Carex barbarae*), smooth horsetail (*Equisetum laevigatum*), California pea (*Lathyrus jepsonii* var. *californicus*), and cudweed (*Gnaphalium* sp.); nonnative forbs and grasses such as garden asparagus and Bermuda grass (*Cynodon dactylon*); and invasive plants such as yellow star-thistle (*Centaurea solstitialis*). Monospecific stands of the invasive giant reed (*Arundo donax*) are also included in this category for vegetation cover.

Emergent Marsh

This category of vegetation cover includes valley freshwater marsh and common reed, which are plant community types delineated in the SRRV Project (Nelson et al. 2000). Emergent marsh includes valley freshwater marsh that is dominated by cattails (*Typha* spp.) and tule (*Scirpus* spp.) with some sedge or associated broad-leaved aquatic species such as blue vervain (*Verbena hastata*). Common reed (*Phragmites australis*) can grow in inundated areas and forms monocultures along the channel edge. Emergent aquatic vegetation provides refuge for several special-status fish species from predatory fish as well as a base for food production.

Agricultural

Areas within the levee lines that are in active agricultural production, such as alfalfa and rice fields and orchards, are classified as agricultural. Agricultural lands include laneways and hedgerows that provide habitat for various edge species such as hawks, rabbits, mice, ground squirrels, and red foxes.

Ruderal Vegetation

Ruderal vegetation includes areas with sparse to moderate herbaceous plant cover that is likely dominated by weedy upland species such as star-thistle, ox tongue (*Picris echioides*), dandelion (*Taraxacum officinale*), and various European grasses.

Bare Ground

Areas within the levee boundaries are classified as bare ground if they appear to be disturbed and devoid of vegetation. Areas that are undergoing “major disturbance” and are “completely devoid of vegetation” or have very little vegetation are included in this category (Nelson et al. 2000).

WILDLIFE

In general, the Phase 1 SERP coverage area includes levees with a variety of vegetation and habitat conditions as described above. Adjacent waterways are also included in the Phase 1 SERP coverage area. While individual erosion sites could provide suitable habitat for some species, most wildlife would use the less-degraded habitat near the erosion sites. Riparian forest, oak woodland, orchard, and riparian scrub communities provide wildlife with dispersal and migration corridors and foraging, cover, nesting, and breeding habitat (including shade and cover for fish and other aquatic species). Many species of amphibians, reptiles, birds, and mammals are known to use riparian habitats and other woody vegetation communities located near watercourses.

Species that are expected to commonly occur in these habitats near erosion sites in the Phase 1 SERP coverage area include the Pacific treefrog (*Pseudacris regilla*), western fence lizard (*Sceloporus occidentalis*), western scrub-jay (*Aphelocoma californica*), red-shouldered hawk (*Buteo lineatus*), Nuttall’s woodpecker (*Picoides nuttallii*), California towhee (*Pipilo crissalis*), spotted towhee (*Pipilo maculates*), black phoebe (*Sayornis nigricans*), mourning dove (*Zenaida macroura*), beaver (*Castor canadensis*), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), blacktailed deer (*Odocoileus hemionus*), and raccoon (*Procyon lotor*). Despite a lack of native plant species richness and complexity, ruderal vegetation habitats provide wildlife species with food resources (e.g., seeds from annual grasses and forbs) and foraging, cover, and breeding opportunities. Species commonly occurring within ruderal habitats include the western fence lizard, mourning dove, red-tailed

hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), black-tailed hare (*Lepus californicus*), deer mouse (*Peromyscus maniculatus*), California ground squirrel (*Spermophilus beecheyi*), and pocket gopher (*Thomomys bottae*).

Open-water habitat provides foraging, cover, reproductive sites, and drinking water for a variety of wildlife species. Western toads (*Bufo boreas*) and Pacific treefrogs use open water and emergent vegetation along riverbanks for reproduction and foraging. Western pond turtles (*Actinemys marmorata*) and western aquatic garter snakes (*Thamnophis couchii*) use woody debris and boulders for basking and refuge. Many species of birds, including herons, waterfowl, and insectivorous birds, use open-water habitats for foraging and resting. Common bird species include the great blue heron (*Ardea herodias*), great egret (*Ardea alba*), common merganser (*Mergus merganser*), double-crested cormorant (*Phalacrocorax auritus*), mallard (*Anas platyrhynchos*), cinnamon teal (*Anas cyanoptera*), Canada goose (*Branta canadensis*), belted kingfisher (*Megaceryle alcyon*), black phoebe (*Sayornis nigricans*), and osprey (*Pandion haliaetus*). Open-water habitat also provides resources for many species of mammals. Several species of bats forage for insects over open water, black-tailed deer and other terrestrial wildlife drink from rivers and streams, and raccoons forage and wash food in nearshore areas. Aquatic and semiaquatic mammals that use open-water habitats include sea lions (in lower reaches of the Sacramento and American rivers), beaver, river otter (*Lutra canadensis*), mink (*Mustela vison*), and muskrat (*Ondatra zibethicus*).

Fisheries and Aquatic Habitats

Primary open-water habitats within the Phase 1 SERP coverage area include the active channels of the Sacramento River, Feather River, American River, Cache Creek, Deer Creek, and Sutter Bypass. These watercourses provide multiple habitat functions for a diverse assemblage of native and nonnative fish species. Native fish species that may occur in the open-water habitats adjacent to potential erosion sites include Chinook salmon (*Oncorhynchus shawytscha*), steelhead (*Oncorhynchus mykiss*), river lamprey (*Lampetra ayresi*), green sturgeon (*Acipenser medirostris*), delta smelt (*Hypomesus transpacificus*), hardhead (*Mylopharadon conocephalus*), Sacramento pikeminnow (*Ptychocheilus grandis*), Sacramento splittail (*Pogonichthys macrolepidotus*), longfin smelt (*Spirinchus thaleichthys*), California roach (*Lavinia symmetricus*), hitch (*Lavinia exilicauda*), Sacramento blackfish (*Orthodon microlepidotus*), and Sacramento sucker (*Catostomus occidentalis*). Nonnative fish species that may occur in the open-water habitats include mosquitofish (*Gambusia affinis*), striped bass (*Morone saxatilis*), American shad (*Alosa sapidissima*), largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), white catfish (*Ameiurus catus*), channel catfish (*Ictalurus punctatus*), and carp (*Cyprinus carpio*). Many of the nonnative fish species are more tolerant of warm water, low dissolved oxygen, and disturbed environments than native species (Moyle 2002).

The use of different waterways and river reaches by various fish species is influenced by variations in habitat conditions and by the habitat requirements, life history, and daily and seasonal movements and behavior of each species. Importantly, altered flow regimes, flood management, and bank protection efforts throughout much of the Central Valley have isolated channels from their floodplains and have reduced available sediment transport, channel migration and avulsion, large woody debris recruitment, and SRA habitat.

SRA vegetation and instream tree and shrub debris provide important riverine fish habitat. SRA habitat is defined as the nearshore aquatic habitat occurring at the interface between a river and adjacent woody riparian habitat. The principal attributes of this cover type are an adjacent bank composed of natural, eroding substrates supporting riparian vegetation that either overhangs or protrudes into the water, and water that contains variable amounts of woody debris, such as leaves, logs, branches, and roots and has variable depths, velocities, and currents. Riparian habitat provides structure (through SRA habitat) and food for fish species. Shade decreases water temperatures, while low overhanging branches can provide sources of food by attracting terrestrial insects. As riparian areas mature, the vegetation sloughs off into the rivers, creating structurally complex habitat that furnishes refugia from predators, creates variable water velocities, and provides habitat for aquatic invertebrates. For these reasons, many fish species are attracted to SRA habitat.

Historically, seasonal flooding covered various lands adjacent to the river and provided important spawning and rearing habitat for many fish species, including Sacramento splittail and juvenile Chinook salmon and steelhead. Levees have reduced the overall amount of seasonal flooding and shallow-water habitat in the Central Valley river systems. In winter, however, some agricultural fields are allowed to flood (e.g., the Butte Basin, Yolo Bypass, and Sutter Bypass) during high flows and are used by Sacramento splittail for spawning and rearing and by Chinook salmon and steelhead for rearing.

SENSITIVE BIOLOGICAL RESOURCES

Sensitive biological resources addressed in this section include those that are afforded consideration or protection under CEQA, the California Fish and Game Code, CESA, ESA, CWA, and the Porter-Cologne Act.

Special-Status Species

Lists of known and potentially occurring special-status species were developed through review of biological studies previously conducted in the Phase 1 SERP coverage area, USFWS Sacramento office's species lists, and specific information from CNDDB (CNDDB 2012) and California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2012) on previously documented occurrences of special-status species in the U.S. Geological Survey quadrangles that contain the Phase 1 SERP coverage area plus a 5-mile-buffer study area.

Special-Status Plants

CNDDB and CNPS contain records for 77 special-status plant species in the wider study area. Forty-two of these species have the potential to occur within the Phase 1 SERP coverage project area and their regulatory status, habitat, blooming period, and potential for occurrence are discussed in Table 3.3-1. Of these species, seven have moderate to high potential to occur in the Phase 1 SERP coverage area (Woolly rose-mallow, Sanford's arrowhead, Bristly sedge, Delta tule pea, Suisun Marsh aster, and Brazilian watermeal) and 35 have a low potential to occur or are not expected to occur. This determination was based on the types, extent, and quality of habitats in the study area; the proximity of the Phase 1 SERP coverage area to known extant occurrences of the species; and the species regional distribution and abundance. No state-listed or federally listed plant species were identified as being likely to occur in the Phase 1 SERP coverage area, although one species that is state listed as rare, Mason's lilaeopsis, has low potential to occur.

Species with low potential are not likely to be found in the Phase 1 SERP coverage area because, even though some elements of their required habitat are present and occurrences are nearby, specific microhabitat components are lacking in the Phase 1 SERP coverage area. The remaining 35 species are not expected to occur in the Phase 1 SERP coverage area because they are restricted to soils or habitat types that do not exist in the Phase 1 SERP coverage area and are discussed in Table 3.3-2.

Special-Status Fish and Wildlife

The preliminary data review identified 57 special-status wildlife species and 10 special-status fish species that could occur in or near the Phase 1 SERP coverage area. Of these 67 species, 47 are not expected to occur or have a low potential to occur and 20 (10 fish species and 10 wildlife species) have a moderate to high likelihood to occur or are known to occur in the Phase 1 SERP coverage area. This determination was based primarily on the types, extent, and quality of habitats in the wider study area (Phase 1 SERP coverage area with 5-mile buffer area); the proximity of the Phase 1 SERP coverage area to known extant occurrences of the species; and the regional distribution and abundance of the species.

Table 3.3-3 summarizes the potential for occurrence of each special-status fish and wildlife species that was evaluated during this analysis. The 10 fish species with a moderate to high potential to occur or that are known to occur in the Phase 1 SERP coverage area include Central Valley steelhead, Central Valley spring-run Chinook salmon, Sacramento River winter-run Chinook salmon, Central Valley fall-/late fall-run Chinook salmon, green sturgeon, delta smelt, longfin smelt, river lamprey, hardhead, and Sacramento splittail. The 10 wildlife species with a moderate to high potential to occur or that are known to occur in the Phase 1 SERP coverage area include Valley elderberry longhorn beetle, western pond turtle, giant garter

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Species	Status [1]			Habitat and Blooming Period	Potential for Occurrence[2]
	USFWS	CDFW	CNPS Other		
Ferris' milk-vetch *Astragalus tener* var. *ferrisiae*	_	_	1B.1	Vernally mesic grassland habitats, meadows and seeps, subalkaline flats; usually in dry, clay soils in overflow terraces; 15 to 250 feet elevation; blooms April–May	**Low potential to occur.** Habitat within the Phase 1 SERP coverage area is marginal at best. Species has been found in floodplain rice fields and irrigated pastures along the Sacramento River, including at the Sacramento River National Wildlife Refuge Llano Seco Unit.
Subtle orache *Atriplex subtilis*	_	_	1B.2	Valley and **foothill** grassland in sandy alkaline soils; 130 to 330 feet elevation; blooms June–August (rarely to October)	**Not expected to occur.** Although CNPS lists this as a unique species, it is now considered indistinct from *Atriplex miniscula*. No suitable habitat is present in the Phase 1 SERP coverage area and species distribution is primarily in the San Joaquin Valley.
Big-scale balsamroot *Balsamorhiza*	_	_	1B.2	Chaparral, cismontane woodland, valley and foothill grassland, sometimes in serpentinite soils; 295 to 5,100 feet elevation; blooms March–June	**Not expected to occur.** No suitable habitat is present in the Phase 1 SERP coverage area.

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Species	Status [1]			Habitat and Blooming Period	Potential for Occurrence[2]
	USFWS	CDFW	CNPS Other		
Big tarplant *Blepharizonia plumosa*	_	_	1B.1	Valley and foothill grassland, dry hills and plains; 50 to 1,500 feet elevation; blooms July–October	**Not expected to occur.** No suitable habitat is present in the Phase 1 SERP coverage area. The nearest known occurrences are from the Antioch and Pittsburg areas, far south of the Phase 1 coverage area, and these occurrences have not been seen since 1937. Species distribution is primarily restricted to the San Francisco Bay area, San Joaquin Valley, and southern Coast Ranges.
Watershield *Brasenia schreberi*	_	_	2.3	Freshwater marshes and swamps; 98 to 7,200 feet elevation; blooms June–September	**Low potential to occur.** Suitable habitat may be present but the nearest documented occurrences are presumed extirpated.
Round-leaved filaree *California macrophylla*	_	_	1B.1	Clay soils in valley and foothill grassland; 50 to 4,000 feet elevation; blooms March–May	**Not expected to occur.** No suitable grassland habitat is present within the Phase 1 SERP coverage area.

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Species	Status [1]			Habitat and Blooming Period	Potential for Occurrence[2]
	USFWS	CDFW	CNPS Other		
Flagella-like atractylocarpus *Campylopodiella*	_	_	2.2	Cismontane woodland; 330 to 1,640 feet elevation	**Not expected to occur.** No suitable woodland habitat is present within the Phase 1 SERP coverage area.
Bristly sedge *Carex comosa*	_	_	2.1	Freshwater marsh; elevations below sea level to 3,000 feet; blooms May–September	**Moderate potential to occur.** Suitable habitat may be present; there is a record of this species near Snodgrass Slough near the Phase 1 SERP coverage area.
Pappose tarplant *Centromadia parryi* ssp. *parryi*	_	_	1B.2	Coastal salt marshes, meadows and seeps, or vernally wet, often alkaline sites in chaparral, coastal prairie, and valley and foothill grassland; 5 to 1,400 feet elevation; blooms May–November	**Not expected to occur.** No suitable habitat is present in the Phase 1 SERP coverage area for this species.

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Species	Status [1]			Habitat and Blooming Period	Potential for Occurrence[2]
	USFWS	CDFW	CNPS Other		
Stony Creek spurge *Chamaesyce ocellata* ssp. *rattanii*	_	_	1B.2	Chaparral, sandy or rocky soils in valley and foothill grassland; 280 to 2,600 feet elevation; blooms May–October	**Not expected to occur.** No suitable chaparral or grassland habitat is present within the Phase 1 SERP coverage area.
Bolander's water-hemlock *Cicuta maculata* var. *bolanderi*	_	_	2.1	Coastal, freshwater, or brackish marshes; 0 to 700 feet elevation; blooms July–September	**Low potential to occur.** Suitable habitat may be present but the nearest documented occurrences are near Collinsville and Calhoun Cut Slough in the Delta.
Brandegee's clarkia *Clarkia biloba* ssp. *brandegeae*	_	_	1B.2	Chaparral and cismontane woodland, often in road cuts; 700 to 3,000 feet elevation; blooms May–July	**Not expected to occur.** No suitable chaparral or woodland habitat is present within the Phase 1 SERP coverage area and this species is typically found at higher elevations than the coverage area.
White-stemmed clarkia *Clarkia gracilis* ssp. *albicaulis*	_	_	1B.2	Chaparral and cismontane woodland, sometimes on serpentinite soils; 800 to 3,560 feet elevation; blooms May–July	**Not expected to occur.** No suitable chaparral or woodland habitat is present within the Phase 1 SERP coverage area.
Silky cryptantha *Cryptantha crinita*	_	_	1B.2	Gravelly stream beds in cismontane woodland, lower montane coniferous forest, riparian forest, riparian woodland, and valley and foothill grassland; 200 to 4,000 feet elevation; blooms April–May	**Not expected to occur.** Suitable habitat within the Phase 1 SERP coverage area is extremely limited. Species is known only from Shasta and Tehama counties. The nearest known occurrence record is from Singer Creek in Tehama County.

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Species	Status [1]			Habitat and Blooming Period	Potential for Occurrence[2]
	USFWS	CDFW	CNPS Other		
Hoover's cryptantha *Cryptantha hooveri*	–	–	1A	Inland dunes and sandy substrates in valley and foothill grasslands; 30 to 70 feet elevation; blooms April–May	**Not expected to occur.** This species is typically associated with dune habitats that are not present in the Phase 1 SERP coverage area. The nearest known records of this species are from Contra Costa County near Antioch and the species is believed to be extirpated.
Peruvian dodder *Cuscuta obtusiflora* var. *glandulosa*	–	–	2.2	Freshwater marshes and swamps; 50 to 920 feet elevation; blooms July–October	**Low potential to occur.** Suitable habitat may be present but the nearest documented occurrences are very old or uncertain.
Recurved larkspur *Delphinium recurvatum*	–	–	1B.2	Alkaline soils in chenopod scrub, cismontane woodland, and valley and foothill grassland; 10 to 2,500 feet elevation; blooms March–June	**Not expected to occur.** No suitable scrub, woodland, or grassland habitat is present in the Phase 1 SERP coverage area.
Norris' beard moss *Didymodon norrisii*	–	–	2.2	Intermittently mesic and rocky areas in cismontane woodland and lower montane coniferous forest; 1,970 to 6,500 feet elevation	**Not expected to occur.** No suitable habitat is present in the Phase 1 SERP coverage area.
Mt. Diablo buckwheat *Eriogonum truncatum*	–	–	1B.1	Sandy soils in chaparral, coastal scrub, and valley and foothill grassland; 300 to 1,200 feet elevation; blooms April–September	**Not expected to occur.** No suitable habitat is present in the Phase 1 SERP coverage area and this species is currently known only from Mt. Diablo where it was rediscovered in 2005. All other documented occurrences are believed to be extirpated.

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Species	Status [1]			Habitat and Blooming Period	Potential for Occurrence[2]
	USFWS	CDFW	CNPS Other		
Diamond-petaled California poppy *Eschscholzia rhombipetala*	–	_	1B.1	Alkaline, clay substrates in valley and foothill grassland; 0 to 3,000 feet elevation; blooms March–April	**Not expected to occur.** No suitable habitat is present in the Phase 1 SERP coverage area and the species' range is restricted to the San Francisco Bay area and San Joaquin Valley. The nearest documented occurrence is from the Antioch area where it has not been seen since 1889 and is possibly extirpated.
Fragrant fritillary *Fritillaria liliacea*	–	–	1B.2	Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland; often on serpentine soils but not restricted to them; 10 to 1,400 feet elevation; blooms February–April	**Not expected to occur.** No suitable scrub, woodland, or grassland habitat is present in the Phase 1 SERP coverage area.
Adobe lily *Fritillaria pluriflora*	_	_	1B.2	Chaparral, cismontane woodland, valley and foothill grassland; often in adobe clay soils, sometimes on serpentine soils; 180 to 2,300 feet elevation; blooms February–April	**Not expected to occur.** No suitable chaparral, woodland, or grassland habitat is present in the Phase 1 SERP coverage area.
Woolly rose-mallow *Hibiscus lasiocarpus* var. *occidentalis*	–	–	1B.2	Freshwater marshes and swamps, moist riverbanks, and low peat islands in sloughs; below 400 feet elevation; blooms June–September	**High potential to occur.** This species has been identified on levees and there are several documented occurrences near the Phase 1 SERP coverage area.

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Species	Status [1]			Habitat and Blooming Period	Potential for Occurrence[2]
	USFWS	CDFW	CNPS Other		
California satintail *Imperata brevifolia*	–	–	2.1	Mesic sites and alkali seeps in coastal scrub, chaparral, riparian scrub, and creosote bush scrub; below 6,000 feet elevation; blooms September–May	**Low potential to occur.** Habitat in the Phase 1 SERP coverage area is marginal and the nearest documented occurrence is from Mud Creek in Butte County at an elevation of approximately 2,500 feet.
Carquinez goldenbush *Isocoma arguta*	_	_	1B.1	Alkaline soils in valley and foothill grassland; 100 to 5,800 feet elevation; blooms May–October	**Not expected to occur.** There is no suitable habitat in the Phase 1 SERP coverage area.
Northern California black walnut *Juglans hindsii*	_	_	1B.1	Riparian forest and woodland; below 1,500 feet elevation; blooms April–May	**Not expected to occur.** There are only three native stands of this species. Historic occurrences along the Sacramento River between Freeport and Rio Vista, primarily at Walnut Grove, were extirpated by 1949.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	–	–	1B.2	Freshwater and brackish marshes and swamps; below 100 feet elevation; blooms May–July	**Moderate potential to occur.** Species has been documented on levees and there are several records of this species near the Phase 1 SERP coverage area (e.g., Miner, Steamboat, Snodgrass, Cache, and Georgiana sloughs).
Mason's lilaeopsis *Lilaeopsis masonii*	_	R	1B.1	Tidally influenced freshwater and brackish marshes and riparian scrub; 0 to 35 feet elevation; blooms April–November	**Low potential to occur.** Suitable tidal habitat is present in the larger SRFCP area, but not within the Phase 1 SERP coverage area. Species is known from several sloughs in the area, including Cache, Steamboat, and Lindsey sloughs, and from the Sacramento River downstream of the Phase 1 SERP coverage area.

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Species	Status [1]			Habitat and Blooming Period	Potential for Occurrence[2]
	USFWS	CDFW	CNPS Other		
Delta mudwort *Limosella subulata*	_	_	2.1	Tidally influenced freshwater and brackish marshes and riparian scrub; 0 to 10 feet elevation; blooms May–August	**Low potential to occur.** Suitable tidal habitat is present in the larger SRFCP area, but not within the Phase 1 SERP coverage area. Known from several sloughs in the larger SRFCP area, but not within the Phase 1 SERP coverage area.
Showy golden madia *Madia radiata*	_	_	1B.1	Cismontane woodland, valley and foothill grassland; 75 to 3,000 feet elevation; blooms March–May	**Not expected to occur.** Suitable grassland and woodland habitats are not present in the Phase 1 SERP coverage area.
Veiny monardella *Monardella venosa*	_	_	1B.1	Heavy clay soils in cismontane woodland and valley and foothill grassland; 200 to 1,500 feet elevation; blooms May–July	**Not expected to occur.** Suitable grassland and woodland habitats are not present in the Phase 1 SERP coverage area.
Eel-grass pondweed *Potamogeton zosteriformis*	_	_	2.2	Marshes and swamps; below 6,000 feet elevation; blooms June–July	**Low potential to occur.** Only record of this species near the Phase 1 SERP coverage area is from the Sacramento Delta peat lands in the vicinity of Webb Island, Contra Costa County.
Hartweg's golden sunburst *Pseudobahia bahiifolia*	E	E	1B.1	North- to northeast-facing slopes on fine to medium-textured sandy loam soils in valley and foothill grasslands with mima-mound topography; 50 to 500 feet elevation; blooms March–April	**Not expected to occur.** This species is associated with a particular microhabitat that is not present in the Phase 1 SERP coverage area. There is an historic CNDDB record from Yuba River at the Feather River confluence, but that location is extirpated and the species' current distribution is restricted to the San Joaquin Valley and adjacent central Sierra foothills.

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Species	Status [1]			Habitat and Blooming Period	Potential for Occurrence[2]
	USFWS	CDFW	CNPS Other		
California beaked rush *Rhyncospora californica*	_	_	1B.1	Freshwater marshes, seeps, meadows; 150 to 3,000 feet elevation; blooms May–July	**Low potential to occur.** Suitable habitat may be present, but this species' range is restricted to the San Francisco Bay area, Sierra Nevada foothills, North Coast and Klamath Ranges, and the north coast. Nearest known occurrences are from Big Chico Creek in Upper Bidwell Park.
Sanford's arrowhead *Sagittaria sanfordii*	_	_	1B.2	Assorted shallow marshes and swamps; 0 to 2,000 feet elevation; blooms May–October	**High potential to occur.** Suitable habitat is present and species is known to occur at several locations in the vicinity of the Phase 1 SERP coverage area, including locations along the American River in the City of Sacramento and along Morrison Creek near Freeport.
Butte County checkerbloom *Sidalcea robusta*	_	_	1B.2	Chaparral, cismontane woodland; 300 to 5,000 feet elevation; blooms April–June	**Not expected to occur.** No suitable habitat is present in the Phase 1 SERP coverage area.
San Francisco campion *Silene verecunda* ssp. *verecunda*	_	_	1B.2	Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, valley and foothill grassland; 100 to 2,000 feet elevation; blooms March–June	**Not expected to occur.** No suitable habitat is present in the Phase 1 SERP coverage area and the only record of this species in the Central Valley is from the Sutter Buttes. All other records are from the central coast and Mojave Desert.
Slender-leaved pondweed *Stuckenia filiformis*	_	_	2.2	Assorted shallow marshes and swamps; 900 to 7,000 feet elevation; blooms May–July	**Not expected to occur.** This species is typically found at much higher elevations than the Phase 1 SERP coverage area.

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Species	Status [1]			Habitat and Blooming Period	Potential for Occurrence[2]
	USFWS	CDFW	CNPS Other		
Suisun Marsh aster *Symphyotrichum lentum*	_	_	1B.2	Brackish and freshwater marshes and swamps; 0 to 10 feet elevation; blooms May–November	**Moderate potential to occur.** Suitable habitat is present and this species has been documented on levees. Documented occurrences are along the Sacramento River downstream of the Phase 1 SERP coverage area (e.g., Brannan Island near Rio Vista Bridge, east of Van Sickle Island, Marshall Cut, near Decker Island, Threemile Slough, Georgiana Slough, and Sherman Island). Several of these documented occurrences are within the larger SRFCP area.
Side-flowering skullcap *Scutellaria lateriflora*	_	_	2.2	Wet meadows and seeps, marshes and swamps, riparian wetland; below 1,500 feet elevation; blooms May–July	**Moderate potential to occur.** Suitable habitat may be present and the species has been documented near the Sacramento River downstream of the Phase 1 SERP coverage area near the town of Locke.
Saline clover *Trifolium hydrophilum*	_	_	1B.2	Marshes and swamps, mesic areas on alkaline soils in valley and foothill grassland, vernal pools; 0 to 985 feet elevation; blooms April–June	**Not expected to occur.** No suitable habitat is present in the Phase 1 SERP coverage area.
Brazilian watermeal *Wolffia brasiliensis*	_	_	2.3	Assorted shallow freshwater marshes and swamps; 90 to 350 feet elevation; blooms April–December	**Moderate potential to occur.** Suitable habitat is present in the Phase 1 SERP coverage area. Nearest documented occurrence is in a slough along the Sacramento River near Ordbend in Glenn County.

Table 3.3-1
Special-Status Plant Species Known to Occur or with Potential to Occur in the Phase I SERP Coverage Area

Notes: CESA = California Endangered Species Act; CNPS = California Native Plant Society; Delta = Sacramento–San Joaquin Delta; CDFW = California Department of Fish and Wildlife; SERP = Small Erosion Repair Program; SRFCP = Sacramento River Flood Control Project; USFWS = U.S. Fish and Wildlife Service.

[1] Legal Status Definitions

U.S. Fish and Wildlife Service:
E Endangered (legally protected)
T Threatened (legally protected)

California Department of Fish and Wildlife:
E Endangered (legally protected)
R Rare (legally protected)

California Native Plant Society Categories:
1A Plant species presumed extinct in California
1B Plant species considered rare or endangered in California and elsewhere (protected under CEQA, but not legally protected under ESA or CESA)
2 Plant species considered rare or endangered in California but more common elsewhere (protected under CEQA, but not legally protected under ESA or CESA)

CNPS Extensions:
1 Seriously threatened in California (high degree/immediacy of threat)
2 Fairly threatened in California (moderate degree/immediacy of threat)
3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

[2] Potential for Occurrence Definitions:

High potential to occur — Suitable habitat is present in the Phase I SERP coverage area and populations are known to occur in the immediate vicinity.

Moderate potential to occur — Suitable habitat is present in the Phase I SERP coverage area; populations may not be known to occur in the immediate vicinity, but are known to occur in the region.

Low potential to occur — Species not likely to occur because of marginal habitat quality or distance from known occurrences.

Not expected to occur — No suitable habitat is present in the Phase I coverage area and/or the Phase I SERP coverage area is outside of the known distribution for the species. Any occurrence would be very unlikely.

Sources: CNDDB 2012; CNPS 2012; data compiled by AECOM in 2012.

Table 3.3-2 Special-Status Plant Species Not Expected to Occur in the Phase I SERP Coverage Area Due to Lack of Suitable Soils or Habitat Types	
Species	**Justification for Exclusion**
Pink creamsacs (*Castilleja rubicundula* ssp. *rubicundula*) Colusa layia (*Layia septentrionalis*) Keck's checkerbloom (*Sidalcea keckii*)	Typically found on serpentine soils, which are not present in the Phase 1 SERP coverage area.
Alkali milk-vetch (*Astragalus tener* var. *tener*) Vernal pool smallscale (*Atriplex persistens*) Hoover's spurge (*Chamaesyce hooveri*) Dwarf downingia (*Downingia pusilla*) Boggs Lake hedge-hyssop (*Gratiola heterosepala*) Ahart's dwarf rush (*Juncus leiospermus* var. *ahartii*) Red Bluff dwarf rush (*J. leiospermus* var. *leiospermus*) Contra Costa goldfields (*Lasthenia conjugens*) Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*) Legenere (*Legenere limosa*) Heckard's peppergrass (*Lepidium latipes* var. *heckardii*) Butte County meadowfoam (*Limanthes floccosa* ssp. *californica*) Baker's navarretia (*Navarretia leucocephala* spp. *bakeri*) Colusa grass (*Neostapfia colusana*) Hairy orcutt grass (*Orcuttia pilosa*) Slender orcutt grass (*Orcuttia tenuis*) Sacramento orcutt grass (*Orcuttia viscida*) Ahart's paronychia (*Paronychia ahartii*) Bearded popcorn-flower (*Plagiobothrys hystriculus*) Butte County golden clover (*Trifolium jokerstii*) Greene's tuctoria (*Tuctoria greenei*) Crampton's tuctoria (*Tuctoria mucronata*)	Typically occur in playas or vernal pool habitats, which are not present in the Phase 1 SERP coverage area.
Soft bird's-beak (*Chloropyron molle* ssp. *molle*)	Found in coastal salt marsh habitats that are not present in the Phase 1 SERP coverage area
Heartscale (*Atriplex cordulata* var. *cordulata*) Brittlescale (*Atriplex depressa*) San Joaquin spearscale (*Atriplex joaquiniana*) Lesser slatscale (*Atriplex minuscula*) Palmate-bracted bird's-beak (*Chloropyron palmatum*) Wright's trichocoronis (*Trichocoronis wrightii*)	Typically found in alkali sink, alkali meadow, alkali playa, or alkali vernal pool habitats that are not present in the Phase 1 SERP coverage area
Antioch Dunes buckwheat (*Eriogonum nudum* var. *psychicola*) Contra Costa wallflower (*Erysimum capitatum* var. *angustatum*) Antioch Dunes evening primrose (*Oenothera deltoids* ssp. *howellii*)	Found on inland dune habitats that are not present in the Phase 1 SERP coverage area
Source: CNDDB 2012; CNPS 2012; data compiled by AECOM in 2012	

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Fish				
Central Valley steelhead *Oncorhynchus mykiss*	T	T	Spawns in cool, moderately fast-flowing water with gravel bottom. Migrates through streams and rivers throughout the Sacramento Valley.	**Present.** Suitable habitat present in the Sacramento, Feather, and Lower American rivers.
Central Valley spring-run Chinook salmon *Oncorhynchus tshawytscha*	T	T	Spawns and rears in mainstem Sacramento River and suitable perennial tributaries. Requires cool year-round water temperatures and deep pools for over-summering habitat. Spawns in riffles with gravel and cobble substrate.	**Present.** Suitable habitat present in the Sacramento, Feather, and Lower American rivers.
Sacramento River winter-run Chinook salmon *Oncorhynchus tshawytscha*	E	E	Spawns and rears in mainstem Sacramento River. Requires cool year-round water temperatures because spawning occurs during summer. Requires deep pools and riffles and clean gravel and cobble substrate to spawn.	**Present.** Suitable habitat present in the Sacramento, Feather, and Lower American rivers.
Central Valley fall/late fall-run Chinook salmon *Oncorhynchus tshawytscha*	SC	SC	Spawns and rears in mainstem Sacramento River and suitable perennial tributaries. Requires cool year-round water temperatures and deep pools for over-summering habitat. Spawns in riffles with gravel and cobble.	**Present.** Suitable habitat present in the Sacramento, Feather, and Lower American rivers.
Green sturgeon *Acipenser medirostris*	T	SC	Prefers deep, low-gradient reaches (>5 meters) or off-channel covers.	**Present.** Habitat present in the Sacramento, Feather, and Lower American rivers.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Delta smelt *Hypomesus transpacificus*	T	E	Known to occur as far north as the city of Sacramento. Spawns in shallow, fresh, or slightly brackish water.	**Present.** Suitable habitat present in tidally influenced reaches of the Sacramento–San Joaquin Delta (Delta).
Longfin smelt *Spirinchus thaleichthys*	SC	T	Occurs in sloughs of Suisun Bay and Delta. Found close to shore in bays and estuaries. Ascends coastal streams to spawn.	**Present.** Suitable habitat in tidally influenced and brackish waters of the Delta.
River lamprey *Lampetra ayresi*	--	SC	Spawns in freshwater rivers and streams with juveniles found in slow-moving current, silty bottom habitats; metamorphosed juveniles migrate through estuaries to the ocean. Found in the Sacramento River.	**Present.** Suitable habitat present in the Sacramento, Feather, and Lower American rivers and their tributaries.
Hardhead *Mylopharadon conocephalus*	--	SC	Prefers deep, rock- and sand-bottomed pools of small to large rivers. Found throughout the Sacramento and San Joaquin River systems.	**Present.** Suitable habitat present in the Sacramento River and all of its tributaries.
Sacramento splittail *Pogonichthys macrolepidotus*	SC	SC	Occurs in shallow, dead-end sloughs with submerged vegetation and backwater slough areas in the lower Delta. Prefers low-salinity shallow-water areas. Occurs in the Sacramento River north to River Mile (RM) 97.0 and in the Feather River to RM 10.0.	**Present.** Sacramento splittail may be present in the Sacramento River as far north as RM 97.0 and in the Feather River to RM 10.0.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Invertebrates				
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T	–	Elderberry shrubs in the Central Valley and adjacent foothills.	**Present.** Elderberry shrubs are present within the Phase 1 SERP coverage area.
Conservancy fairy shrimp *Branchinecta conservatio*	E	–	Highly turbid, large vernal pools.	**Not expected to occur.** No suitable vernal pool habitat occurs within the Phase 1 SERP coverage area.
Vernal pool fairy shrimp *Branchinecta lynchi*	T	–	Pools with inundation period of more than 2 weeks; distributed throughout California.	**Not expected to occur.** No suitable vernal pool habitat occurs within the Phase 1 SERP coverage area.
Delta green ground beetle *Elaphrus viridis*	T	–	Vernal pools; restricted to Jepson Prairie, Solano County.	**Not expected to occur.** No suitable vernal pool habitat occurs within the Phase 1 SERP coverage area, and the area is outside of this species' known range.
Vernal pool tadpole shrimp *Lepidurus packardi*	E	–	Pools with inundation period of more than 2 weeks; distributed throughout California.	**Not expected to occur.** No suitable vernal pool habitat occurs within the Phase 1 SERP coverage area.
Amphibians				
California tiger salamander *Ambystoma californiense*	T	SC	Vernal or temporary pools in annual grasslands or open stages of woodlands.	**Not expected to occur.** No breeding ponds, vernal pools, or suitable upland habitat occurs within the Phase 1 SERP coverage area.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
California red-legged frog *Rana aurora draytonii*	T	–	Streams, freshwater pools, and ponds with overhanging and emergent vegetation.	**Not expected to occur.** Potentially suitable habitat may exist within the Phase 1 SERP coverage area; however, this species is not currently known to occur in the Central Valley.
Foothill yellow-legged frog *Rana boylii*	–	SC	Rocky streams in a variety of habitats; found in the Coast Ranges.	**Not expected to occur.** Suitable rocky stream habitat is not present in the Phase 1 SERP coverage area.
Western spadefoot toad *Spea hammondii*	–	SC	Grasslands with temporary pools.	**Not expected to occur.** No suitable vernal pool habitat occurs within the Phase 1 SERP coverage area.
Reptiles				
Western pond turtle *Emys marmorata*	–	SC	Slow-water aquatic habitat with available basking sites. Hatchlings require shallow water with dense submergent or short emergent vegetation. Requires upland oviposition site near an aquatic site.	**Present.** Suitable habitat occurs within the Sacramento, Feather, and Lower American rivers and their tributaries.
San Joaquin coachwhip *Masticophis flagellum ruddocki*	–	SC	Occurs in open, dry, treeless areas, including grassland and saltbush scrub.	**Not expected to occur.** Suitable grasslands or saltmarsh scrub habitat is not present within the Phase 1 SERP coverage area.
Coast horned lizard *Phrynosoma blainvillii*	–	SC	Occurs in arid grasslands, woodlands, coniferous forests, and chaparral with patches of sandy soils.	**Not expected to occur.** Suitable habitat, including grasslands or canyons with open arid areas and loose friable soils, is not present within the Phase 1 SERP coverage area.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Giant garter snake *Thamnophis gigas*	T	T	Freshwater marshes and low-gradient streams with emergent vegetation; adapted to drainage canals and irrigation ditches with mud substrate.	**Present.** Suitable habitat is present within the Phase 1 SERP coverage area.
Birds				
Northern goshawk *Accipiter gentilis*	–	SC	Generally requires mature conifer forests with large trees, snags, downed logs, dense canopy cover, and open understories for nesting; aspen stands also are used for nesting. Foraging habitat includes forests with dense to moderately open overstories and open understories interspersed with meadows, brush patches, riparian areas, or other natural or artificial openings. Goshawks reuse old nest structures and maintain alternate nest sites.	**Not expected to occur.** No suitable nesting or foraging habitat for this species is present within the Phase 1 SERP coverage area.
Tricolored blackbird *Agelaius tricolor*	–	SC	Breeds in colonies near fresh water in dense emergent vegetation. Forages in agricultural croplands.	**Low potential to occur.** Some emergent vegetation may be present; however, dense or extensive emergent vegetation stands that could support a breeding population are absent in the vicinity of the erosion sites.
Golden eagle *Aquila chrysaetos*	–	FP	Mountains and foothills throughout California; nests on cliffs and escarpments or in tall trees.	**Low potential to occur.** Suitable nesting habitat is not present within the Phase 1 SERP coverage area; individuals may occasionally use portions of the coverage area for foraging.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Short-eared owl *Asio flammeus*	–	SC	Nests on the ground in dense vegetation in open grassland and marshes.	**Not expected to occur.** No suitable nesting or foraging habitat for this species is present within the Phase 1 SERP coverage area.
Long-eared owl *Asio otus*	–	SC	Found in a variety of habitat types throughout its range. Nests in woodland, forest, and open settings. Occupies wooded and non-wooded areas that support relatively dense vegetation adjacent to or within larger open areas such as grasslands or meadows. Trees and shrubs used for nesting and roosting include oaks, willows, cottonwoods, conifers, and junipers.	**Low potential to occur.** Dense riparian areas and woodlands are uncommon within the Phase 1 SERP coverage area.
Western burrowing owl *Athene cunicularia hypugaea*	–	SC	Grasslands and ruderal habitats.	**Moderate potential to occur.** Potentially suitable habitat occurs in the Phase 1 SERP coverage area.
Swainson's hawk *Buteo swainsonii*	–	T	Breeds in stands with few trees in juniper-sage flats, riparian areas, and oak savannah; forages in adjacent livestock pasture, grassland, or grain fields.	**Moderate potential to occur.** Potentially suitable habitat occurs in the Phase 1 SERP coverage area.
Yellow-headed blackbird	–	SC	Breeds in marshes that have tall emergent vegetation, such as cattails or tules, and in open areas near and over relatively deep water.	**Low potential to occur.** Suitable nesting habitat is not present within the Phase 1 SERP coverage area; individuals may occasionally use portions of the coverage area for foraging.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Vaux's swift *Chaetura vauxi*	–	SC	Prefers redwood and Douglas-fir habitats; nests in hollow trees and snags or, occasionally, in chimneys; forages aerially.	**Low potential to occur.** Suitable nesting habitat is absent from the Phase 1 SERP coverage area.
Western snowy plover *Charadrius alexandrines nivosus*	T	SC	Occurs throughout California, on sandy or gravelly beaches along the coast on estuarine salt ponds, alkali lakes, and Salton Sea.	**Not expected to occur.** Suitable sandy or gravelly beach-type habitat is absent in the Phase 1 SERP coverage area.
Mountain plover *Charadrius montanus*	–	SC	Wintering habitat includes short grasslands and plowed fields below 3,000 feet. Mountain plovers do not breed in California.	**Not expected to occur.** No suitable wintering habitat for this species is present within the Phase 1 SERP coverage area.
Black tern *Chlidonias niger*	–	SC	Shallow water and fresh emergent wetlands, lakes, ponds, moist grasslands, and agricultural fields.	**Not expected to occur.** No suitable nesting or foraging habitat for this species is present within the Phase 1 SERP coverage area.
Northern harrier *Circus cyaneus*	–	SC	Found in a variety of open grassland, wetland, and agricultural habitats. Open wetland habitats used for breeding include marshy meadows, wet and lightly grazed pastures, and freshwater and brackish marshes. Breeding habitat also includes dry upland habitats, such as grassland, cropland, drained marshland, and shrub-steppe in cold deserts.	**Low potential to occur.** No suitable nesting habitat for this species is present within the Phase 1 SERP coverage area. Occasionally individuals may forage in or migrate through the Phase 1 SERP coverage area.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Black swift *Cypseloides niger*	–	SC	Nests in moist crevices, in caves or sea cliffs above the surf, or on cliffs behind or adjacent to waterfalls in deep canyons; forages widely in many habitats.	**Not expected to occur.** No suitable nesting habitat for this species is present within the Phase 1 SERP coverage area.
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	C	E	Nesting habitat in cottonwood/ willow riparian forest. Occurs only along the upper Sacramento Valley portion of the Sacramento River, the Feather River in Sutter County, the south fork of the Kern River in Kern County, and along the Santa Ana, Amargosa, and lower Colorado rivers.	**Low potential to occur.** No suitable nesting habitat (extensive riparian forest) for this species is present within the Phase 1 SERP coverage area. Occasionally individuals may forage in or migrate through the Phase 1 SERP coverage area.
Yellow warbler *Dendroica petechia*	–	SC	Typically breeds in wet areas with dense riparian vegetation. Breeding habitats primarily include willow patches in montane meadows and riparian scrub and woodland dominated by willow, cottonwood, aspen, or alder with dense understory cover.	**High potential to occur.** Suitable nesting habitat present in riparian woodlands within the Phase 1 SERP coverage area.
White-tailed kite *Elanus leucurus*	–	FP	Occurs in low elevation grassland, agricultural, wetland, oak-woodland, or savannah habitats. Riparian habitat adjacent to open areas also used.	**High potential to occur.** Suitable nesting and foraging habitat is present within the Phase 1 SERP coverage area.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Willow flycatcher *Empidonax traillii*	–	E	Suitable habitat typically consists of montane meadows that support riparian deciduous shrubs and remain wet through the nesting season. Important characteristics of suitable meadows include a high water table that results in standing or slow-moving water or saturated soils during the breeding season, abundant riparian deciduous shrub cover, and riparian shrub structure with moderate to high foliar density that is uniform from the ground to the shrub canopy.	**Not expected to occur.** Willow flycatcher is a spring/ fall migrant that breeds in Sierras and Cascades in montane meadows. Migrating individuals may pass through the Phase 1 SERP coverage area.
Peregrine falcon *Falco peregrinus*	–	E, FP	Nests and roosts on protected ledges of high cliffs, usually adjacent to water bodies and wetlands that support abundant avian prey.	**Low potential to occur.** No suitable cliffs are present to serve as breeding habitat, but this species may forage within the Phase 1 SERP coverage area.
Saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	–	SC	Limited to the San Francisco Bay area. Occurs in salt and brackish water with tall grasses and tule patches.	**Not expected to occur.** No suitable marsh habitat is present within the Phase 1 SERP coverage area; the coverage area is outside of the species range.
Greater sandhill crane *Grus canadensis tabida*	–	FP	Extensive marshlands required for breeding; forages in nearby pastures, fields, and meadows. This species does not breed in the Central Valley.	**Not expected to occur.** No suitable marsh habitat is present within the Phase 1 SERP coverage area.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Bald eagle *Haliaeetus leucocephalus*	–	E, FP	Uses ocean shorelines, lake margins, and river courses for both nesting and wintering. Most nests are within 1 mile of water and in large trees with open branches. Bald eagles roost communally in winter.	**Low potential to occur.** No suitable nesting habitat is present within the Phase 1 SERP coverage area; individuals may forage within the coverage area.
Yellow-breasted chat *Icteria virens*	–	SC	Breeds in riparian habitats with dense understory vegetation, such as willow and blackberry on the coast and in the Sierra foothills.	**Moderate potential to occur.** Suitable nesting habitat is present in riparian woodlands within the Phase 1 SERP coverage area.
Western least bittern *Ixobrychus exilis hesperis*	–	SC	Breeds in expansive freshwater marshes.	**Not expected to occur.** No suitable marsh habitat is present within the Phase 1 SERP coverage area.
Loggerhead shrike *Lanius ludovicianus*	–	SC	Forages in open grassland habitats throughout the Central Valley of California. Nests in shrubs and trees.	**Low potential to occur.** Open grassland habitats are not present within the Phase 1 SERP coverage area.
California black rail *Laterallus jamaicensis coturniculus*	–	T	Coastal and inland tidal salt marsh and freshwater marsh habitat.	**Not expected to occur.** No suitable marsh habitat is present within the Phase 1 SERP coverage area.
Suisun song sparrow *Melospiza melodia maxillaris*	–	SC	Suisun Bay; brackish water with emergent vegetation.	**Not expected to occur.** No suitable marsh habitat is present within the Phase 1 SERP coverage area; species range is limited to Suisun Bay.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
American white pelican *Pelecanus erythrorhynchos*	–	SC	Nests on small islands or remote dikes that are flat or gently sloping and lack shrubs or other obstructions and in large freshwater or saltwater lakes.	**Not expected to occur.** No suitable nesting habitat is present within the Phase 1 SERP coverage area.
Purple martin *Progne subis*	–	SC	Nests in valley foothill, montane hardwood-conifer, and riparian habitats with tree cavities or human-made structures available for nesting.	**Not expected to occur.** Breeding populations in California are limited to the coast and mountains and several bridges in the city of Sacramento. Suitable nesting structures or cavities are very limited within the Phase 1 SERP coverage.
California clapper rail *Rallus longirostris obsoletus*	E	E	San Francisco, Morro, and Monterey Bays; mudflats, marshes, or tidal sloughs with taller plant material.	**Not expected to occur.** No suitable marsh habitat is present within the Phase 1 SERP coverage area.
Bank swallow *Riparia riparia*	–	SE	Nests in fine-textured or sandy banks or cliffs along rivers, streams, ponds, or lakes. Typically nests in colonies.	**Moderate potential to occur.** Levees and erosion sites may provide or be near suitable habitat.
California spotted owl *Strix occidentalis occidentalis*	–	SC	Occurs in several forest vegetation types, including mixed conifer, ponderosa pine, red fir, and montane hardwood. Nesting habitat is generally characterized by dense canopy closure with medium to large trees and multistoried stands. Foraging habitat can include intermediate to late-successional forest with greater than 40 percent canopy cover.	**Not expected to occur.** No suitable nesting or foraging habitat for this species is present within the Phase 1 SERP coverage area.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Mammals				
Pallid bat *Antrozous pallidus*	–	SC	Locally common at lower elevations in California and occurs in grassland, shrubland, woodland, and mixed conifer forests. Absent from highest elevation locations in the Sierra Nevada. Rocky outcrops, caves, crevices, and occasional tree cavities or buildings provide roosts.	**Low potential to occur.** Suitable roosting habitat is absent from erosion sites. Individuals may forage within the Phase 1 SERP coverage area.
Ring-tailed cat *Bassariscus astutus*	–	FP	Occurs in dense riparian habitats and in brush stands of most forest and shrub habitats. Nests in rock recesses, hollow trees, logs, snags, abandoned burrows, or woodrat nests.	**Low potential to occur.** Erosion sites are unlikely to support the ample riparian habitat required by this species.
Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens*	–	SC	Range is throughout California, mostly in mesic habitats. Limited by available roost sites (i.e., caves, tunnels, mines, and buildings).	**Low potential to occur.** Suitable roosting habitat is absent from erosion sites. Individuals may forage within the Phase 1 SERP coverage area.
Marysville kangaroo rat *Dipodomys californicus eximius*	–	SC	Annual grassland, desert, or chaparral with friable soils or other rodent burrows. Known distribution limited to Sutter Buttes.	**Not expected to occur.** No suitable habitat is present within the Phase 1 SERP coverage area; the species range is outside of the coverage area.
California mastiff bat *Eumops perotis californicus*	–	SC	Many open habitats, including coniferous and deciduous woodlands, grassland, and chaparral. Roosts in significant rock outcroppings and crevices in cliff faces.	**Low potential to occur.** Suitable roosting habitat is absent from erosion sites. Individuals may forage within the Phase 1 SERP coverage area.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Western red bat *Lasiurus blossevillii*	–	SC	Day roosting common in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas. An association with intact riparian habitat may exist (particularly willows, cottonwoods, and sycamores).	**Moderate potential to occur.** Suitable roosting and foraging habitat present within the Phase 1 SERP coverage area.
Riparian woodrat *Neotoma fuscipes riparia*	E	SC	Deciduous valley oak habitat with abundant shrub cover. Occurs in San Joaquin and Stanislaus River watersheds. Only known population in Caswell State Park, San Joaquin County.	**Not expected to occur.** No suitable habitat is present within the Phase 1 SERP coverage area; the species range is outside of the coverage area.
Salt-marsh harvest Mouse *Reithrodontomys raviventris*	E	E	San Francisco, San Pablo, and Suisun Bays; pickleweed and other halophytes in marshes.	**Not expected to occur.** No suitable habitat is present within the Phase 1 SERP coverage area; the species range is outside of the coverage area.
Suisun shrew *Sorex ornatus sinuosus*	–	SC	San Pablo and Suisun Bays; tidal marshes.	**Not expected to occur.** No suitable habitat is present within the Phase 1 SERP coverage area; the species range is outside of the coverage area.
American badger *Taxidea taxus*	–	SC	Variety of habitats, including grasslands and shrub-dominated areas with loose, dry, friable soils.	**Not expected to occur.** No suitable habitat with loose friable soils is present within the Phase 1 SERP coverage area.
San Joaquin kit fox *Vulpes macrotis mutica*	E	–	San Joaquin Valley; prefers grasslands and prairie habitats near freshwater marshes and alkali sinks.	**Not expected to occur.** No suitable open grassland habitat is present within the Phase 1 SERP coverage area.

Table 3.3-3
Special-Status Fish and Wildlife Species Evaluated for the SERP

Common Name and Scientific Name	Regulatory Status[1]		Habitat Associations	Potential for Occurrence[2]
	Federal	State		
Sierra Nevada red fox *Vulpes vulpes necator*	–	T	Inhabits upper montane and alpine habitats of Sierra Nevada, Cascades, Klamath, and north Coast Ranges. Needs water source and denning sites. Rarely seen. Sensitive to human disturbance.	**Not expected to occur.** No suitable montane or alpine habitat present in the Phase 1 SERP coverage area.

Notes:
[1] Regulatory Status Definitions:

Federal—U.S. Fish and Wildlife Service:
E = Endangered species under the federal Endangered Species Act
T = Threatened species under the federal Endangered Species Act
C = Candidate for listing under the federal Endangered Species Act

State—California Department of Fish and Wildlife:
T = Threatened
E = Endangered
FP = Fully Protected
SC = Species of special concern

[2] Potential for Occurrence Definitions:

Observed	Species was observed in the study area during site visits or was documented there by another reputable source.
High potential to occur	All of the species' specific life history requirements can be met by habitat present in the study area, and populations are known to occur in the immediate vicinity.
Moderate potential to occur	Some or all of the species life history requirements are provided by habitat in the study area; populations may not be known to occur in the immediate vicinity, but are known to occur in the region.
Low potential to occur	Species not likely to occur because of marginal habitat quality or distance from known occurrences.
Not expected to occur	None of the species' life history requirements are provided by habitat in the study area and/or the study area is outside of the known distribution for the species. Any occurrence would be very unlikely.

Source: Data compiled by AECOM in 2012

snake, Swainson's hawk, yellow warbler, white-tailed kite, burrowing owl, yellow-breasted chat, bank swallow, and western red bat. These species are described below.

Central Valley Steelhead

The Central Valley steelhead distinct population segment (DPS) was federally listed as threatened on March 19, 1998 (63 Federal Register [FR] 11481–11519). The threatened status of Central Valley steelhead was reaffirmed in NMFS's final listing determination on January 5, 2006 (70 FR 37160–37204). NMFS originally designated critical habitat for Central Valley steelhead on February 16, 2000 (65 FR 7764–7787); however, following a lawsuit (*National Association of Home Builders et al. v. Donald L. Evans, Secretary of Commerce, et al.* [2002] U.S. District Court of District of Columbia, Case 1:00-CV-02799), NMFS decided to rescind the listing and reevaluate how to classify critical habitat for several evolutionary significant units (ESUs, now DPSs) of steelhead. Critical habitat for Central Valley steelhead was redesignated by NMFS on September 2, 2005 (70 FR 52630–52858). The DPS includes all naturally spawned populations of steelhead in the Sacramento and San Joaquin rivers and their tributaries, excluding steelhead from San Francisco and San Pablo bays and their tributaries. Artificially propagated fish from the Coleman and Feather River fish hatcheries are included in the DPS.

Steelhead has one of the most complex life histories of any salmonid species, exhibiting life histories as both anadromous and freshwater residents. Freshwater residents typically are referred to as rainbow trout, and those exhibiting an anadromous life history are called steelhead (64 FR 50394–50415, December 29, 1999). Steelhead exhibits highly variable life history patterns throughout its range, but is broadly categorized into winter and summer reproductive ecotypes. Winter steelhead, the most widespread reproductive ecotype and the only type currently present in Central Valley streams, becomes sexually mature in the ocean; enters spawning streams in summer, fall, or winter; and spawns a few months later in winter or late spring (McEwan and Jackson 1996).

In the Sacramento River, adult steelhead migrate upstream during most months of the year, beginning in July, peaking in September, and continuing through February or March (Hallock 1987). Spawning occurs primarily from January through March, but may begin as early as late December and may extend through April (Hallock 1987). Individual steelhead may spawn more than once, returning to the ocean between each spawning migration.

Juvenile steelhead rear a minimum of 1 and typically 2 or more years in freshwater before migrating to the ocean as smolts. Juvenile migration to the ocean generally occurs from December through August. The peak months of juvenile migration are January to May (McEwan 2001).

The importance of main channel and floodplain habitats to steelhead in the lower Sacramento River and upper Delta is not well understood. Steelhead smolts have been found in the Yolo Bypass during –winter and spring inundation, but the importance of this and other floodplain areas in the lower Sacramento River and upper Delta is not yet clear.

Critical habitat for Central Valley steelhead includes the stream channels in the designated stream reaches and the lateral extent as defined by the ordinary high-water line or bank-full elevation. Primary constituent elements (PCEs) of critical habitat in the Phase 1 SERP coverage area include (1) freshwater rearing sites that have adequate water quality and quantity, floodplain connectivity, and natural cover that supports juvenile growth and mobility; and (2) freshwater migration corridors that support adequate water quantity and quality as well as natural cover to provide food and migration pathways for juveniles and adults. Central Valley steelhead are known to occur in Regions 1–3 of the Phase 1 SERP coverage area.

Central Valley Spring-Run Chinook Salmon

The Central Valley spring-run Chinook salmon ESU was federally listed as threatened on September 16, 1999 (64 FR 50394–50415). The threatened status of this species was reaffirmed in NMFS's final listing determination issued on June 28, 2005 (70 FR 37160–37204). Critical habitat for Central Valley spring-run Chinook salmon was designated by NMFS on September 2, 2005 (70 FR 52630–52858). The ESU includes all naturally spawned spring-run Chinook salmon in the Sacramento River and its tributaries. Naturally spawned fish of hatchery origin in the Feather and Yuba rivers as well as hatchery-spawned fish in the Feather River are also included (70 FR 37160–37204, June 28, 2005).

Adult spring-run Chinook salmon enter the mainstem Sacramento River from March through September, with the peak upstream migration occurring from May through June (Yoshiyama et al. 1998). Adults generally enter tributaries from the Sacramento River between mid-April and mid-June (Moyle 2002). Spring-run Chinook salmon are sexually immature during upstream migration, and adults hold in deep, cold pools near spawning habitat until spawning begins in late summer and fall. Spring-run Chinook salmon spawn in the upper reaches of the mainstem Sacramento River and tributary streams, with the largest tributary runs occurring in Butte, Deer, and Mill creeks (Yoshiyama et al. 1998). Spawning typically begins in late August and may continue through October. Juveniles emerge in November and December in most locations but may emerge later when water temperature is cooler. Newly emerged fry remain in shallow, low-velocity edgewater (DFG 1998).

Critical habitat for spring-run Chinook salmon includes all river channels and sloughs in the Phase 1 SERP coverage area. Critical habitat includes the stream channels and the lateral extent as defined by the ordinary high-water line or bank-full elevation. PCEs of critical habitat in the Phase 1 SERP Coverage area include (1) freshwater rearing sites that have adequate

water quality and quantity, floodplain connectivity, and natural cover that supports juvenile growth and mobility; and (2) freshwater migration corridors that support adequate water quantity and quality as well as natural cover to provide food and migration pathways for juveniles and adults (70 FR 52488–52586, September 2, 2005). Central Valley spring-run Chinook salmon are known to occur in Regions 1–3 of the Phase 1 SERP coverage area. The conservation value of critical habitat in this area is high because it supports both recruitment and survival of juveniles and adults (NMFS 2006).

The Phase I SERP coverage area includes habitats that have been designated as Essential Fish Habitat (EFH) for Chinook salmon, a major contributor to Pacific coast salmon fisheries. Pacific Coast salmon fishery EFH extends along the Pacific coast from Washington to Point Conception in California. Freshwater EFH includes all habitats currently and historically accessible to salmon and is based on descriptions of habitats used by Chinook salmon. Important components of EFH for Chinook salmon spawning, rearing, and migration include substrate composition; water quality, quantity, depth, and velocity; channel gradient and stability; food, cover, and habitat complexity; space, access, and passage; and habitat connectivity. EFH excludes areas above naturally occurring barriers, such as waterfalls, that have been present for several hundred years, and impassible dams identified on large rivers, including waterways within Region 4 of the Phase 1 SERP coverage area (62 FR 2343–2383, January 16, 1997). EFH has been designated for Central Valley spring–run Chinook salmon ESU. Spring-run EFH includes migration, holding, and rearing habitat for the Sacramento River and several tributaries (NMFS 1998a).

Sacramento River Winter-Run Chinook Salmon ESU

The Sacramento River winter-run Chinook salmon ESU was listed as threatened under the federal ESA on August 4, 1989 (54 FR 32085–32088). NMFS subsequently upgraded the federal listing to endangered on January 4, 1994 (59 FR 440–450). NMFS designated critical habitat for Sacramento River winter-run Chinook salmon on June 16, 1993 (58 FR 33212–33210). The ESU includes all naturally spawned populations of winter-run Chinook in the Sacramento River and its tributaries and populations from two artificial propagation programs, one at the Livingston Stone National Fish Hatchery and the other at Bodega Marine Laboratory (70 FR 37160–37204, January 5, 2006).

Winter-run Chinook salmon spend 1–3 years in the ocean. Adult winter-run Chinook salmon leave the ocean and migrate through the Sacramento–San Joaquin Delta (Delta) into the Sacramento River from December through July with peak migration in March (Moyle 2002). Adults spawn from mid-April through August (Moyle 2002). Egg incubation continues through October. The primary spawning habitat in the Sacramento River is above River Mile (RM) 243, although spawning has been observed downstream as far as RM 218 (NMFS 2001). Spawning

success below RM 243 may be limited primarily by warm water temperatures (Yoshiyama et al. 1998).

Within the Phase 1 SERP coverage area, the Sacramento River is considered to be critical habitat for winter-run Chinook salmon. Critical habitat includes the water column, river bottom, and adjacent riparian zone, which fry and juveniles use for rearing (71 FR 17757–17766, June 6, 2006). Sacramento River winter-run Chinook salmon are known to occur in Regions 1–3 of the Phase 1 SERP coverage area. The conservation value of critical habitat in the Phase I SERP coverage area is high because it supports both recruitment and survival of juveniles and adults (NMFS 2006).

EFH has been designated for Sacramento River winter–run Chinook salmon ESU (1998b). Winter-run EFH includes migration, holding, and rearing habitat for the Sacramento River and several tributaries (63 FR 11481–11519, March 19, 1998).

Central Valley Fall-/Late Fall-Run Chinook Salmon

On September 16, 1999 (50 FR 50394), NMFS determined that listing was not warranted for Central Valley fall-/late fall-run Chinook salmon ESU. However, the ESU was designated as a candidate for listing because of concerns about specific risk factors. On April 14, 2004 (69 FR 19975), the ESU was reclassified as a species of concern.

Adult fall-run Chinook salmon migrate upstream from July through December and spawn in October and November (Moyle 2002), with the greatest spawning activity typically occurring in November and early December. Late fall-run Chinook salmon adults migrate upstream through the Delta from November through May and spawn from January through April. The success of fall-run Chinook salmon spawning is dependent, in part, on seasonal water temperatures.

After incubating and hatching, the young salmon emerge from the spawning areas as fry. A portion of the fry population migrates downstream soon after emergence, rearing in the downstream river channels and the Delta estuary during spring. The remaining portion of juvenile salmon continues to rear in the upstream systems through spring months until they have adapted to migration into salt water (smolting), which typically takes place between April and early June. In some streams, a small proportion of the fall-/ late fall-run Chinook salmon juveniles may rear through summer and fall, migrating downstream during fall, winter, or early spring as 1-year-old smolts.

EFH has been designated for Central Valley fall-/late fall–run Chinook salmon ESU (NMFS 1998c, 1998d). Fall-/late fall-run EFH includes migration, holding, and rearing habitat for the Sacramento River and several tributaries (63 FR 11481–11519, March 9, 1998). Central Valley fall-/late fall-run Chinook salmon are known to occur in Regions 1-3 of the Phase 1 SERP

coverage area. Critical habitat has not been designated for fall-/late fall-run Chinook salmon because it is not a federally listed species.

Green Sturgeon

On January 23, 2003, NMFS determined that green sturgeon comprise two populations: a northern and a southern DPS (68 FR 4433–4441). The southern DPS includes populations south of the Eel River to the Sacramento River. The Sacramento River supports the southernmost spawning population of green sturgeon (Moyle 2002). On April 6, 2005, NMFS determined that the northern DPS does not warrant listing under the federal ESA, but it remained on the Species of Concern List (70 FR 17386–17401). On April 7, 2006, NMFS determined that the southern DPS of green sturgeon was threatened and listed it under the federal ESA (71 FR 17757–17766).

Green sturgeon was classified as a Class 1 Species of Special Concern by the California Department of Fish and Game (DFG in 1995 (Moyle et al. 1995). Class 1 Species of Special Concern are those that conform to the state definitions of threatened or endangered and could qualify for addition to the official list. On March 20, 2006, emergency regulations for green sturgeon were put into effect by DFG, requiring a year-round, zero bag limit of green sturgeon in all areas of the state (DFG 2006).

The green sturgeon is anadromous, but it is the most marine-oriented of the sturgeon species and has been found in nearshore marine waters from Mexico to the Bering Sea (71 FR 17757–17766). The northern DPS has included spawning populations in the Rogue, Klamath, and Eel rivers; the southern DPS has a single spawning population in the Sacramento River (71 FR 17757–17766). Adults typically migrate upstream into rivers between late February and late July. Spawning occurs from March to July, with peak spawning from mid-April to mid-June. Green sturgeon are believed to spawn every 3–5 years, although recent evidence indicates that spawning may be as frequent as every 2 years (Moyle 2002). Little is known about the green sturgeon's specific preferences for spawning habitat. Adult green sturgeon are believed to broadcast their eggs in deep, fast water over large cobble substrate, where the eggs settle into the interstitial spaces (Moyle 2002). In the Central Valley, spawning occurs in the Sacramento River upstream of Hamilton City, perhaps as far upstream as Keswick Dam, and possibly in the lower Feather River (Moyle 2002).

Critical habitat for green sturgeon includes portions of the Sacramento River, lower Feather River, lower Yuba River, and Delta portions of the Phase 1 SERP coverage area (74 FR 52300–52348, October 9, 2009). PCEs of critical habitat in the Phase 1 SERP coverage area include (1) freshwater habitats with suitable food resources, substrate, water flow, water quality, migratory corridors, depth, and sediment quality; and (2) estuarine habitats with suitable food resources, water flow, water quality, migratory corridors, depth, and sediment

quality. The conservation value of critical habitat in the Phase 1 SERP coverage area is high because it supports both recruitment and survival of juveniles and adults (74 FR 52300–52348, October 9, 2009).

Delta Smelt

Delta smelt was federally listed as threatened on March 5, 1993 (58 FR 12854–12863), and critical habitat was designated on December 19, 1994 (59 FR 65256–65278). Population trends and abundance of delta smelt are poorly understood because of their short life span (1 year). Delta smelt occur in Region 1 of the Phase 1 SERP coverage area throughout all of their life stages and have been documented in the Sacramento River up to the city of Sacramento, RM 60 (Moyle 2002). This species historically has been documented as far upstream as RM 78 (Hobbs, pers. comm., 2011). Delta smelt migrate into freshwater channels and sloughs between December and January, and spawn in those locations as late as July; then, during summer, juveniles return downriver into the Delta.

Delta smelt are endemic to the Sacramento–San Joaquin estuary and are found seasonally in Suisun Bay and Suisun Marsh. They typically are found in shallow water (less than 10 feet) where salinity ranges from 2 to 7 parts per thousand (ppt), although they have been observed at salinities between 0 and 18.4 ppt. Delta smelt have relatively low fecundity and most live for 1 year. They feed on planktonic copepods, cladocerans, amphipods, and insect larvae. Delta smelt are semi-anadromous. During their spawning migration, adults move into the freshwater channels and sloughs of the Delta between December and January. Spawning occurs between January and July, with peak spawning from April through mid-May (Moyle 2002).

Critical habitat for delta smelt consists of all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including the contiguous Grizzly and Honker bays); the length of Goodyear, Suisun, Cutoff, First Mallard (Spring Branch), and Montezuma Sloughs; and the contiguous waters in the Delta (59 FR 65256–65278, December 19, 1994). Critical habitat for delta smelt is designated in the California counties of Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo. PCEs of critical habitat determined to be essential to the conservation of the species include the physical habitat, water, river flow, and salinity concentrations required to maintain delta smelt habitat for spawning, larval and juvenile transport, rearing, and adult migration (59 FR 65256–65278, December 19, 1994). Delta smelt could occur in Region 1 of the Phase 1 SERP coverage area.

Longfin Smelt

Longfin smelt (*Spirinchus thaleichthys*) is a federal species of concern and a California-listed threatened species. A petition to list the longfin smelt under the federal ESA was submitted to

USFWS in 2007, and in 2009 USFWS determined that a DPS was not warranted and began a status review of the entire species range.

Longfin smelt can tolerate a broad range of salinity concentrations, ranging from fresh water to seawater. Spawning is believed to occur in the Sacramento and San Joaquin rivers and adjacent sloughs. Spawning may take place as early as November and may extend into June, with the peak spawning period occurring from December to April. Adult longfin smelt are found mainly in Suisun, San Pablo, and San Francisco bays, although their distribution is shifted upstream into the western Delta in years of low outflow (Moyle 2002).

Longfin smelt are more broadly distributed throughout the Delta and are found at higher salinities than delta smelt. During non-spawning periods, longfin smelt are most often concentrated in Suisun, San Pablo, and North San Francisco bays (Moyle 2002). Longfin smelt could occur in the Phase 1 SERP coverage area in Region 1 during their spawning season.

River Lamprey

River Lamprey is designated by CDFW as a species of special concern. River lamprey is an anadromous species that migrates into streams, including tributaries of the Sacramento River, between July and October. Spawning takes place the following spring. Spawning habitat is characterized by low-gradient reaches with gravel and sandy bottoms. After young hatch, they burrow into sediments and filter feed. River lamprey could occur in Regions 1–3 of the Phase 1 SERP coverage area in suitable habitats.

Hardhead

Hardhead is designated by CDFW as a species of special concern. Hardhead is a large cyprinid fish that occupies low-elevation to mid-elevation streams in the Sacramento and San Joaquin River drainages. Hardhead is typically found in undisturbed areas, with deep pools and runs, in areas that have warm summer temperatures exceeding 68°F (Moyle 2002). Large, warm streams with deep pools, rocky substrate, low turbidities, and low water velocities are preferred. Spawning takes place in April and May, and while some fish from large rivers or reservoirs migrate upstream to spawn, others may have only short spawning migrations. Once widespread and abundant in California, hardhead have become increasingly isolated into foothill streams that are free of introduced species and human activity. Hardhead could occur throughout the Phase 1 SERP coverage area.

Sacramento Splittail

Sacramento splittail was previously listed under the ESA as a threatened species; however, USFWS removed the listing in 2003 (68 FR 55140). The Sacramento splittail is currently designated as a CDFW species of special concern. Sacramento splittail are cyprinid minnows that occur in the Delta and Suisun Marsh, and migrate seasonally through the Sacramento

River. Adults move upstream during the onset of winter, from late November to late January. Inundated floodplains provide foraging and spawning habitat, and seasonal migration is tied to the timing of seasonal flooding. Important spawning habitat occurs along the lower Sacramento River in the Sutter and Yolo Bypass areas. Although juvenile Sacramento splittail can remain in upstream areas to rear for a year or more, most move downstream into bay or estuary waters. Sacramento splittail can tolerate both high salinities and low levels of dissolved oxygen. Adult and juvenile Sacramento splittail could occur throughout the Phase 1 SERP coverage area.

Valley Elderberry Longhorn Beetle

The Valley elderberry longhorn beetle is listed as a threatened species under the federal ESA (45 FR 52803–52806, August 8, 1980). In 2006, USFWS published a 5-year status review for the Valley elderberry longhorn beetle (Talley et al. 2006), which determined that delisting is warranted because many new locations of the beetle have been identified since its listing, destruction of habitat has slowed greatly, and efforts have resulted in the protection of significant acreage of habitat. The Valley elderberry longhorn beetle's range extends from southern Shasta County to Fresno County (Talley et al. 2006). Along the eastern edge of the species' range, adult beetles have been found in the foothills of the Sierra Nevada at elevations up to 2,220 feet, and beetle exit holes have been seen on elderberry plants at elevations up to 2,940 feet. Along the western edge of the species' range, adult beetles have been found on the eastern slopes of the Coast Ranges at elevations of up to 500 feet, and beetle exit holes have been detected on elderberry plants at elevations up to 730 feet (Barr 1991).

Valley elderberry longhorn beetle is found only in close association with its host plant, elderberry (*Sambucus* spp.). Elderberry plants are found in or near riparian and oak woodland habitats. The life history of the Valley elderberry longhorn beetle is assumed to follow a sequence of events similar to those of related taxa. Female beetles deposit eggs in crevices in the bark of living elderberry plants. Presumably, the eggs hatch shortly after they are laid, and the larvae bore into the pith of the trunk or stem. When larvae are ready to pupate, they move through the pith of the plant, open an emergence hole through the bark, and return to the pith for pupation. Adults exit through the emergence holes and can sometimes be found on elderberry foliage, flowers, or stems or on adjacent vegetation. The entire life cycle of the Valley elderberry longhorn beetle is thought to encompass 2 years, from the time eggs are laid and hatch until adults emerge and die (USFWS 1984).

Critical habitat for the Valley elderberry longhorn beetle occurs in two locations near the City of Sacramento (45 FR 52803–52806, August 8, 1980). One area is enclosed by the Western Pacific railroad tracks and State Route 160, approximately 0.5 mile north of the American River near its confluence with the Sacramento River. The second site is located along the south bank of the American River at River Bend Park (formerly Goethe Park), just upstream of RM 13.

There is no critical habitat for Valley elderberry longhorn beetle within the Phase 1 SERP coverage area; however, elderberry shrubs could occur with the Phase 1 SERP coverage area.

Western Pond Turtle

Western pond turtle is designated by CDFW as a species of special concern. This species prefers permanent or near-permanent aquatic habitats, such as lakes, ponds, streams, freshwater marshes, and agricultural ditches. Because the western pond turtle regulates its body temperature through basking, it requires still or slow-moving water with instream emergent woody debris, rocks, or similar features for basking sites. Pond turtles are highly aquatic but can venture far from water for egg laying. Nests are typically located on unshaded upland slopes in dry substrates with clay or silt soils (Jennings and Hayes 1994). Western pond turtles can overwinter in upland sites. Western pond turtle is known to occur within the Phase 1 SERP coverage area and is likely to occupy suitable habitat in the area if any is present.

Giant Garter Snake

The giant garter snake is listed as a threatened species under the ESA. Currently, this species is only known from 13 isolated population clusters within the Central Valley, from Chico to an area just southwest of Fresno (58 FR 54053–54067, October 20, 1993). The giant garter snake inhabits agricultural wetlands and associated waterways, including irrigation and drainage canals, rice fields, marshes, sloughs, ponds, low-gradient streams, and adjacent uplands. It has also been observed using revetment as cover. Giant garter snakes are believed to be most numerous in rice-growing regions (USFWS 1999). Giant garter snakes are typically absent from the larger rivers; wetlands with sand, gravel, or rock substrates; and riparian areas lacking suitable basking sites or suitable prey populations (USFWS 1999). The giant garter snake hibernates from October to March in abandoned burrows of small mammals located above prevailing flood elevations (Fisher et al. 1994) and breeds during March and April.

Giant garter snake populations that occur near the Phase 1 SERP coverage area include the Yolo Basin/Willow Slough population near Davis, the American Basin population north of the city of Sacramento and east of the Sacramento River, and the Sutter Basin and Colusa Basin populations. The species has been reported in the Colusa Main Drain, Feather River, Natomas Cross Canal, Wadsworth Canal, Conaway Main Canal, Yolo and Sutter Bypass, and south fork of Putah Creek (CNDDB 2012); however, in general, the Phase 1 SERP coverage area covers little suitable habitat for giant garter snake because the area contains larger waterways, typified by steep banks and dense, overhanging riparian vegetation. Suitable aquatic habitat for giant garter snake can be found along some portions of Phase 1 SERP coverage area waterways, including the Wadsworth and Cherokee canals; the Colusa, Sutter, and Willow Slough bypasses; and the Colusa main drain. Suitable aquatic habitat for giant garter snake is more likely to exist in areas adjacent to and on the land side of the coverage area, in drainage ditches, irrigation canals, and flooded rice fields. Several observations of giant garter snake

have been made within a few miles of the coverage area reaches, in or around small irrigation drainages, canals, and rice fields (CNDDB 2012), but these normally occur on the landside of levees.

Critical habitat has not been designated for giant garter snake.

Swainson's Hawk

Swainson's hawk is listed as threatened under the CESA. Historically, Swainson's hawk nested throughout lowland California. As many as 17,000 Swainson's hawk pairs may have nested in California at one time (DFG 1994). Currently, there are 2,081 breeding pairs in California, of which 1,948 are in the Central Valley (Anderson et al. 2007). The overall Swainson's hawk population is considered to be declining (DFG 1994), although individuals in the Central Valley appear to have adapted relatively well to certain agricultural patterns in areas where suitable nesting habitat remains (DFG 1993).

Swainson's hawks typically occur in California only during the breeding season (March through September) and winter in Mexico and South America, although a small number of individuals have been wintering in the San Francisco Bay-Delta for several years (City of Sacramento et al. 2003). The Central Valley population migrates only as far south as Central Mexico. Swainson's hawks begin to arrive in the Central Valley in March. Nesting territories are usually established by April, with incubation and rearing of young occurring through June (DFG 1993).

Swainson's hawk is most commonly found in grasslands, low shrublands, and agricultural habitats that include large trees for nesting. Nests occur in riparian woodlands, roadside trees, trees along field borders, and isolated trees. Stringers of remnant riparian forest along drainages contain the majority of known nests in the Central Valley (England et al. 1997, Estep 1984, Schlorff and Bloom 1984). Nesting pairs frequently return to the same nest site for multiple years and decades. Potentially suitable nesting trees and foraging habitat are found in the Phase 1 SERP coverage area.

Yellow Warbler

Yellow warbler (*Dendroica petechia*) is designated by CDFW as a species of special concern. Yellow warblers typically breed in wet areas with dense riparian vegetation. Breeding habitats primarily are willow patches in montane meadows and riparian scrub and woodland dominated by willow, cottonwood, aspen, or alder with dense understory cover. Localized breeding has been documented in more xeric (dry) sites, including chaparral, wild rose (*Rosa* spp.), thickets, and young conifer stands (Siegel and DeSante 1999, RHJV 2004). Potentially suitable riparian habitat occurs within the Phase 1 SERP coverage area.

White-Tailed Kite

The white-tailed kite (*Elanus leucurus*) is designated by CDFW as a fully protected species. White-tailed kite occurs and forages year round in the Central Valley in a variety of habitat types, including grasslands, meadows, emergent wetlands, and agricultural areas. Nests are typically constructed on dense oak or willow patches or in trees adjacent to foraging areas. Potentially suitable habitat occurs within the Phase 1 SERP coverage area.

Burrowing Owl

The burrowing owl (*Athene cunicularia*) is designated by CDFW as a species of special concern. A year-round resident in most of its range in California, burrowing owl primarily inhabits grasslands but will use other habitats with relatively short vegetation that have adequate burrows for roosting and nesting. Mammal burrows, particularly ground squirrel burrows, are the primary source for roosting and nesting locations. Burrowing owls have adapted to increasingly urban environments and will live next to busy roads, even living near airport runways. Burrowing owls feed primarily on insects, small rodents, amphibians, or carrion depending on what is available. Levees in the Phase 1 SERP coverage area provide potential burrowing owl habitat.

Yellow-Breasted Chat

The yellow-breasted chat (*Icteria virens*) is designated by CDFW as a species of special concern. An uncommon neotropical migrant, the yellow-breasted chat breeds in riparian and marsh habitat in northern California. Preferred habitat includes dense shrubs and complex understory close to water. Dense thickets of brush provide foraging habitat; the yellow-breasted chat gleans insects and other food from trees and shrubs. The yellow-breasted chat constructs nests low to the ground in similar thick vegetation areas. Potentially suitable habitat occurs within the Phase 1 SERP coverage area.

Bank Swallow

Bank swallow (*Riparia riparia*) is listed as endangered under the CESA. A neotropical migrant, the bank swallow uses riparian and other lowland habitats in California during spring through fall. The bank swallow nests in fine-textured or sandy banks or cliffs along rivers, streams, ponds, or lakes and typically nests in colonies. Potentially suitable habitat occurs within the Phase 1 SERP coverage area where levees have bluff-like qualities.

Western Red Bat

Western red bat (*Lasiurus blossevilli*) has a broad distribution, ranging from British Columbia, Canada, to Chile. In California, western red bat is designated by CDFW as a species of special concern. Suitable habitat includes edge habitats adjacent to streams or open fields, orchards,

and sometimes urban areas. Roost sites are generally hidden from view in all directions; lack obstruction beneath, allowing the bat to drop downward for flight; lack lower perches that allow visibility by predators; have dark ground cover to minimize solar reflection; have nearby vegetation to reduce wind and dust; and are generally located on the south or southwest side of a tree. They may have an association with intact riparian habitat, particularly willows, cottonwoods, and sycamores. Potentially suitable habitat occurs within the Phase 1 SERP coverage area.

Sensitive Natural Communities

Sensitive natural communities are plant communities that are of special concern to resource agencies or are afforded specific consideration through CEQA, section 1602 of the California Fish and Game Code, section 404 of the federal CWA, and the State's Porter-Cologne Act. Sensitive natural communities may be of special concern to agencies and conservation organizations for a variety of reasons, including their diversity, locally or regionally declining status, or because they provide important habitat to common and special-status species.

Many of these communities are tracked in the CNDDB. Riparian forest and riparian scrub/shrub communities qualify as sensitive natural communities while the riparian herbaceous community generally does not. Sensitive natural communities present in the Phase 1 SERP coverage area consist of riparian forest, riparian scrub/shrub, and emergent marsh.

Wetlands and Other Waters of the United States

Several of the waterways within the defined Phase 1 SERP coverage area, including the Sacramento and Feather rivers and their tributaries and sloughs, qualify as jurisdictional waters of the United States under section 404 of the CWA.

3.3.4 Environmental Impacts and Mitigation Measures

Thresholds of Significance

Based on Appendix G of the CEQA Guidelines, the SERP would result in a significant impact on biological resources if it would:

- have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW, USFWS, or NMFS;
- have a substantially adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by CDFW, USFWS, or NMFS;

- result in a substantial loss of riparian forest land or conversion of riparian forest to non-forest use;
- have a substantial adverse effect on federally protected wetlands as defined by CWA section 404 (including but not limited to marsh, vernal pool, coastal) through direct removal, filling, hydrological interruption, or other means;
- interfere substantially with the movement of any native resident or migratory fish or wildlife species or established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- substantially conflict with any applicable local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan.

IMPACTS NOT DISCUSSED FURTHER IN THIS EIR

Special-status Species

Section 3.3.2, “Environmental Setting,” discusses all special-status plant, fish, and wildlife species evaluated in this analysis, and Tables 3.3-1, 3.3-2, and 3.3-3 summarize the potential for each of these species to occur in the wider study area. Those plant, wildlife, and fish species not expected or with a low probability to occur (because of a lack of suitable habitat, lack of other occurrence records, or range limitations that place the Phase 1 SERP coverage area outside the known range of the species) are not addressed further in this analysis. Implementation of Phase 1 of the SERP is not expected to affect those species.

Fish and Wildlife Movement

The SERP Manual contains conservation measures to be applied to all SERP projects, including resource-specific conservation measures for sensitive biological resources and special-status fish and wildlife species. Among the required conservation measures are timing restrictions for in-channel work to avoid impacts on seasonally present and migratory fish and wildlife species (see Section I in Appendix B). Therefore, impacts on movement and movement corridors are not addressed further in this analysis.

Forestry Resources

Because forest land within the SERP coverage area is limited to small patches of riparian forest, and there is no timberland within the SERP coverage area, the SERP would not conflict with existing zoning or cause rezoning of forest land, timberland, or timberland zoned

Timberland Production. For the same reason, loss or conversion of forest land, not including riparian forest, would not occur. Therefore, these impacts are not addressed further in this analysis.

ANALYSIS METHODOLOGY

The impact analysis for biological resources examines temporary, short-term, and long-term effects of the SERP. Temporary effects could occur over hours, days, or up to 4 weeks during active construction. In addition, the river system is expected to experience minor adjustments after construction, so analysis of temporary impacts also looks at interim effects that might occur during the first few years after construction (i.e., short-term effects). Long-term effects are the result of changes to the riverbank and associated riparian corridor and include changes to habitat conditions over a period of time after each erosion site has responded and achieved a new dynamic equilibrium.

IMPACT ANALYSIS

IMPACT 3.3-1 ***Temporary Effects to Fish and Aquatic Habitat Resulting from Construction.*** *SERP construction activities could result in temporary adverse effects on water quality, aquatic habitats, and the aquatic community. However, the SERP Manual includes conservation measures that would be implemented to avoid and/or minimize temporary adverse effects that could otherwise result from construction. This impact would be* ***less than significant****.*

SERP construction activities would be limited to specific erosion sites that meet the criteria described in the SERP Manual (see Section B, “Baseline Assessment Methodology,” of the SERP Manual in Appendix B of this EIR). The maximum area that would be disturbed by equipment during construction for any site is 0.1 acre with a maximum linear foot limit of 264 feet (Tier 1), or 0.5 acre with a maximum linear foot limit of 1,000 feet (Tier 2). A separation of 500 feet between sites repaired in the same year would be required, and a maximum of 15 sites would be repaired per year. Because of the size of these projects, impacts on habitat would be isolated and small, relative to the 306-mile extent of the Phase 1 SERP coverage area.

Potential impacts on water quality include sedimentation and turbidity and potential release and exposure of contaminants (see Section 3.6, “Hydrology and Water Quality,” for more information). Construction activities could disturb instream sediments and soils adjacent to individual erosion sites. Reduced fish population levels and survival rates have been linked to elevated turbidity levels and silt deposition (Harrington and Born 2000).

The potential also exists for contaminants such as fuels, oils, other petroleum products, and various chemicals used in construction activities to be accidentally introduced into the water system, either directly through spills or incrementally through surface runoff, from work within

or immediately adjacent to the channel. In sufficient concentrations, these contaminants would be toxic to fish occupying habitats in the coverage area.

The SERP Manual contains mandatory conservation measures to be applied to all SERP projects, and resource-specific conservation measures to address impacts on fish and aquatic habitat. These conservation measures include timing restrictions for in-channel work to avoid impacts on seasonally present fish species; restrictions on vegetation and habitat disturbance; specific direction for construction, equipment, staging, material stockpiling, erosion control during construction, and hazardous materials; and other mandatory or resource-specific conservation measures as detailed in Section I, “Conservation Measures,” of the SERP Manual (see Appendix B).

With implementation of the conservation measures in the SERP Manual, potential temporary adverse effects on fish habitat would be avoided and/or minimized. During review of the notification package for each year’s sites, the SERP permitting agencies would have the ability to determine that additional conservation measures should be implemented in the event that circumstances require such treatment. Therefore, this impact would be less than significant.

No mitigation is required.

IMPACT 3.3-2 ***Temporary Construction-Related Disturbance or Loss of Special-Status Fish or Wildlife Species and Habitats.*** *SERP activities could result in the loss of individuals or nests or cause disruptions to nesting, spawning, or migration of the 20 special-status species known to occur or with a moderate or high potential to occur in the Phase 1 SERP coverage area. Portions of the Phase 1 SERP coverage area include habitat for special-status fish and other aquatic species; construction activities could temporarily degrade these habitats. However, the SERP Manual includes conservation measures that would be implemented to avoid and/or minimize disturbance or loss of species or habitat that could otherwise result from construction. This impact would be* ***less than significant****.*

A total of 10 special-status fish and 10 special-status wildlife species are known to occur or have a moderate to high potential to occur in the Phase 1 SERP coverage area. See Section 3.3.3 and listed in Table 3.3-3.

Construction activities at erosion repair sites within the Phase 1 SERP coverage area could result in water quality degradation, including sedimentation and turbidity, and potential release of contaminants (see Impact 3.3-1). Water quality degradation could affect special-status fish or other aquatic species, if the species occur in the project vicinity. Construction activities could also result in the loss of individuals, nests, or habitat for the 20 special-status species.

To address potential impacts on special-status fish and wildlife species that could result from construction activities, SERP projects must implement mandatory conservation measures, including timing restrictions for in-channel work to avoid impacts on seasonally present fish species; restrictions on vegetation and habitat disturbance; specific direction for construction, equipment, staging, material stockpiling, erosion control during construction, and hazardous materials; and other mandatory or resource-specific conservation measures (see Section I, "Conservation Measures," of the SERP Manual in Appendix B of this EIR).

The SERP Manual provides specific conservation measures applicable to sensitive biological resources including giant garter snake, Valley elderberry longhorn beetle, delta smelt, Swainson's hawk, burrowing owl, bank swallow, nesting birds/migratory birds, raptors, woody shaded riverine habitat, and anadromous fish (see Section I, "Conservation Measures," of the SERP Manual in Appendix B of this PEIR). In combination with timing restrictions, these conservation measures address the potential impacts of construction on special-status fish and wildlife species that could occur with implementation of the SERP.

The implementation of these conservation measures would avoid or minimize potential temporary adverse effects on special-status fish and wildlife species and their habitat to a less-than-significant impact.

No mitigation is required.

IMPACT 3.3-3 ***Long-Term Effects to Special-Status and Common Fish and Wildlife and Habitats.*** *The SERP (Phase 1) would result in long-term beneficial effects for fish, wildlife, and their habitats by preventing further habitat degradation from erosion at small sites along SRFCP levees and substantially reducing the potential for a more major disturbance such as bank failure. This effect would be* ***beneficial.***

In most cases, small erosion sites if left alone expand over time with high water events. They can dramatically expand, putting public safety at risk and jeopardizing adjacent riparian habitat. In most cases, erosion sites are a detriment to habitat for most fish and aquatic species because of high sedimentation rates, lack of cover (shade riverine aquatic), and degraded habitat conditions. The SERP would repair small erosion sites and restore habitat in those areas, where feasible.

The SERP streamlines the permit process so more small erosion sites, up to 15 per year for 5 years, can be repaired. The SERP includes a set of seven design templates to be used based on sensitive biological resources, including special-status fish and wildlife species (see Section C, "Project Design Templates and Construction Details," of the SERP Manual in Appendix B). The SERP would repair small erosion sites and enhance habitat in those areas, where feasible. This long-term effect would be beneficial.

No mitigation is required.

IMPACT 3.3-4 ***Loss or Disturbance of Special-Status Plant Species and Habitats.*** *The SERP could result in mortality of individuals of the seven special-status plant species with moderate or high potential to occur in the Phase I SERP coverage area. Portions of the Phase I SERP coverage area include habitat for special-status plant species and construction activities could temporarily degrade these habitats. However, the SERP Manual includes conservation measures that would be implemented to avoid and/or minimize disturbance or loss of species or habitat that could otherwise result from construction. This impact would be* ***less than significant****.*

Seven special-status plant species associated with marsh or riparian habitat types have moderate to high potential to occur in the Phase 1 SERP coverage area. These species, their listing status, habitat requirements, and potential to occur are discussed in Table 3.3-1. Erosion repairs could result in the direct removal of individuals or damage that causes eventual mortality of individuals. For example, plants could get broken, bent, or trampled, their roots could be damaged, or their habitat could be modified so that it is no longer suitable to sustain the species. Examples of habitat modifications that could lead to mortality or reduced vigor of special-status plants include hydrologic modifications that result in a site becoming too wet or too dry, soil compaction, installation of rock riprap, and water or soil contamination. Special-status plants could also be adversely affected by the introduction or spread of invasive plant species or by efforts to eradicate or control invasive plants.

The SERP Manual provides mandatory conservation measures to protect sensitive biological resources, including restrictions on vegetation and habitat disturbance and specific direction for construction equipment staging, material stockpiling, erosion control during construction, and hazardous materials (see Section I, “Conservation Measures,” of the SERP Manual in Appendix B). Disturbance to existing grades and vegetation will be limited to the minimum necessary to accomplish the necessary repairs. When repair work is completed at a given site, waterway contours and flows will be returned as close as possible to pre-erosion, preconstruction conditions. Measures to prevent soil or water contamination are also included in the conservation measures. Potential impacts on special-status plants and their habitats would be further minimized because the erosion repair sites would be limited to a maximum disturbance footprint and would be separated both spatially and temporally (a minimum of 500 feet is required between Tier 1 sites repaired in the same year and a maximum of 15 sites would be repaired per year (see Section B, “Baseline Assessment Methodology,” of the SERP Manual in Appendix B).

With implementation of the SERP Manual’s conservation measures, potential adverse effects on special-status plant species and their habitats would be avoided or minimized. This impact would be less than significant.

No mitigation is required.

IMPACT 3.3-5 ***Discharge of Dredged or Fill Material into Jurisdictional Waters of the United States.*** *The SERP could result in permanent or temporary fill of waters of the United States. However, the SERP Manual includes conservation measures that would be implemented to avoid and/or minimize such discharges and the resulting disturbance of special-status habitats. In addition, DWR is requesting a regional general permit from USACE for activities under the SERP, and the conservation measures include measures typically required as special conditions of such a permit. This impact would be* ***less than significant****.*

Erosion repair activities may involve grading and recontouring within the ordinary high-water mark of waters of the United States. As a result, fill materials would be discharged into waters of the United States and/or waters of the state. In addition to direct fill, indirect impacts on water quality could result from the transport of pollutants and sediment in runoff from SERP construction sites. The SERP Manual contains mandatory conservation measures to be applied to all SERP projects to minimize and avoid impacts on waters of the United States and waters of the state. These measures include timing restrictions for work within and adjacent to active stream channels, and measures that specifically direct equipment staging, material stockpiling, and erosion control to maximize protection of water quality. Other mandatory conservation measures include prohibiting placement of materials that would impair flow of surface water into or out of any wetland area; prohibiting placement of fill material other than silt-free gravel or riprap into live streams; treating water through filtration or retention pond settling before release into live streams; and removing materials, trash, and debris from the construction site immediately upon completing work. Disturbance areas would be limited to the minimum necessary to accomplish the necessary repair. When repair work is completed at a given site, waterway contours and flows would be returned as close as possible to pre-erosion, preconstruction conditions (see Section I, “Conservation Measures,” of the SERP Manual in Appendix B).

In addition, the SERP would be implemented in coordination with USACE. DWR is seeking to obtain a regional general permit (RGP) from USACE for compliance with section 404 of the CWA. Compliance with section 401 of the CWA would be achieved through development of a programmatic 401 water quality certification from the Central Valley RWQCB. Agencies with regulatory authority over the SERP, including USACE and the Central Valley RWQCB, would be notified by June 1 of each year of the erosion repair projects proposed for SERP authorization that year, as described in Section F, “Notification Requirements,” of the SERP Manual. The notification packet would provide individual project application materials, including a wetland delineation, if applicable, and would identify any impacts on waters of the United States, including wetlands, that would result from each individual project. Where impacts on waters of the United States would result from SERP activities, USACE may request additional

conservation measures to mitigate the impacts. Activities conducted under the SERP will comply with all terms and conditions of the RGP.

Additionally, as described in Section G, “Mitigation,” of the SERP Manual, erosion repair sites will be monitored to determine whether vegetation plantings incorporated into the design would fully restore pre-erosion biological functions. If final success criteria provided in Section H, “Monitoring and Success Criteria,” of the SERP Manual are not met, contingency actions or compensatory mitigation would be identified.

Compliance with the terms of the RGP; implementation of the SERP Manual size and placement limits described in Section B, “Baseline Assessment Methodology”; the mitigation requirements described in Section G, “Mitigation”; and the mandatory conservation measures described in Section I, “Conservation Measures,” would ensure that potential adverse effects on waters of the United States and waters of the state would be avoided or minimized. This impact would be less than significant.

No mitigation is required.

IMPACT 3.3-6 ***Temporary Loss or Degradation of Riparian Habitat/Forest or Other Sensitive Natural Communities.*** *The SERP could result in removal of surrounding riparian or marsh vegetation. Construction activities could temporarily or permanently degrade riparian or marsh habitat. However, the SERP Manual includes conservation measures that would be implemented to avoid and/or minimize loss or degradation of riparian or marsh vegetation that could otherwise result from construction. In addition, DWR is requesting a streambed alteration agreement memorandum of agreement from CDFW for activities under the SERP, and the conservation measures include mitigation typically required by such a permit. This impact would be* ***less than significant****.*

Erosion repairs could result in vegetation removal in riparian and marsh plant communities, which are considered sensitive natural communities by CDFW and are protected under section 1602 of the California Fish and Game Code. In addition to direct vegetation removal, repair actions could degrade surrounding riparian or marsh habitat by altering hydrology, damaging tree and shrub roots, altering soil conditions, installing rock riprap in areas previously vegetated with riparian or marsh plants, releasing contaminants into the soil or water, and introducing or spreading invasive plant species.

The SERP Manual provides mandatory conservation measures to protect sensitive biological resources, including restrictions on vegetation and habitat disturbance (see Section I, “Conservation Measures,” of the SERP Manual in Appendix B). Disturbance or removal of vegetation would not exceed the minimum necessary to complete operations. Work would be done in such a manner that, to the extent feasible, native riparian vegetation within the vegetation-clearing zones would be avoided and left undisturbed. When repair work is

completed at a given site, waterway contours and flows would be returned as close as possible to pre-erosion, preconstruction conditions. Areas with vegetation that are disturbed by project activities will be replanted as specified in the SERP Manual, Appendix B. Measures to prevent soil or water contamination are also included in the conservation measures.

In addition to mandatory conservation measures to protect water quality and habitat, the SERP Manual provides specific conservation measures to protect sensitive biological resources and woody shaded riverine habitat that further reduce potential adverse effects on riparian and marsh communities by requiring awareness training focusing on sensitive biological resources, fencing of sensitive biological resources, biological monitoring as needed during construction, and avoidance of woody riparian vegetation to the extent feasible. Woody riparian and shaded riverine habitat will be replaced at a 3:1 ratio on an area or linear-foot basis, as determined appropriate by DWR in coordination with NMFS (see Section I, “Conservation Measures,” of the SERP Manual in Appendix B).

The SERP would be implemented in coordination with CDFW. DWR submitted an application for section 1600 Notification of Lake or Streambed Alteration Application package on October 4, 2011, for the SERP Program. .

Compliance with the terms of the streambed alteration agreement issued for the SERP; implementation of the SERP Manual size and placement limits described in Section B, “Baseline Assessment Methodology”; the mitigation measures described in Section G “Mitigation”; and the conservation measures described in Section I, “Conservation Measures,” would help DWR to avoid or minimize potential adverse effects on sensitive natural communities, including riparian forest habitat. This impact would be less than significant.

No mitigation is required.

IMPACT 3.3-7 ***Long-Term Effects on Riparian Habitats/Forests.*** *The SERP would result in long-term beneficial effects on riparian habitats by planting or enhancing native riparian vegetation, preventing further degradation from erosion, and reducing the risk for a more major impact such as bank failure. This effect would be* ***beneficial.***

The SERP would repair small erosion sites and restore, and enhance habitat in those areas, where feasible. Planting and site-specific restoration design would be tailored to each repair site and to the habitat present at the repair site (see Section C, “Project Design Templates and Construction Details,” of the SERP Manual in Appendix B).

Repair sites would be returned as close as possible to pre-erosion conditions. The sites would be monitored for 5 years and be required to meet success criteria, including final success criterion of 80 percent cover by planted and seeded native species.

The SERP is also part of the 2012 Central Valley Flood Protection Plan (CVFPP) (DWR 2012), which includes an associated Conservation Framework (Attachment 2, DWR 2012). Levee vegetation management practices and procedures are an important component of the CVFPP.Through management actions set forth in the CVFPP and associated Conservation Framework, DWR proposes to implement a flexible and adaptive integrated vegetation management strategy (VMS) that would meet public safety goals and protect and enhance sensitive habitats in the Central Valley.

To sustain important habitat, the CVFPP levee VMS would retain lower waterside vegetation below the vegetation management zone zone (see Figures 3.3-1 and 3.3-2). Similar figures appear in Section C, “Project Design Templates and Construction Details,” of the Final SERP Manual in Appendix B, but are outdated and will be updated accordingly. Vegetation would be removed (in coordination with resource agencies) only when it presented an unacceptable threat. In addition to protecting existing vegetation, flood management actions would promote the development of, appropriate vegetation for erosion control on the waterside slope, outside of the vegetation management zone.

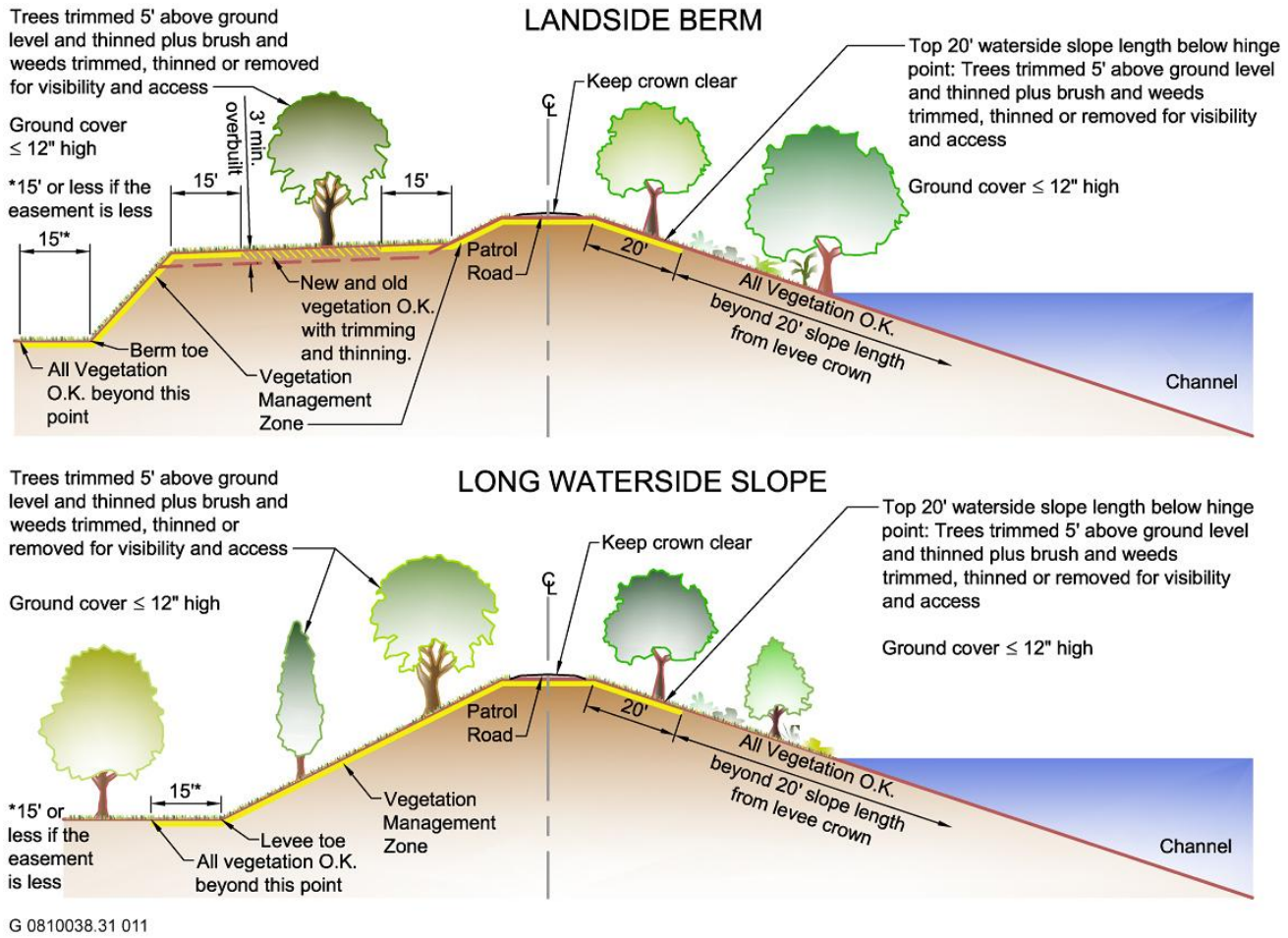
The SERP Manual design templates take into consideration riparian habitats and other sensitive biological resources. These design templates, in conjunction with the revegetation, recontouring, monitoring, and success criteria, would help DWR to implement erosion repair projects that will return levees to pre-erosion conditions and also take into account existing riparian habitat within the Phase 1 SERP coverage area. Implementation of the CVFPP Conservation Framework would further reduce impacts to riparian habitat/forests on levees. Therefore, this impact would be less than significant.

No mitigation is required.

IMPACT 3.3-8 ***Conflict with Tree Preservation Ordinances****. The City of Sacramento and several counties within the Phase I SERP coverage area have tree preservation ordinances that prohibit the removal of native oak trees without a tree removal permit. This impact would be* ***less than significant****.*

Erosion repair actions could result in vegetation removal in areas containing native oak trees protected under county or city ordinances. Removal of trees protected under county or city ordinances (usually trees measuring 6 inches or greater in diameter at breast height [dbh]) typically requires the removing party to obtain a permit from the county or city and mitigate for the loss of protected tree(s). In addition, several of these municipalities have general plan policies that call for the preservation of native riparian vegetation.

The SERP Manual provides mandatory conservation measures to avoid removal of or damage to native trees 3 inches dbh or larger, a standard stricter than most tree preservation

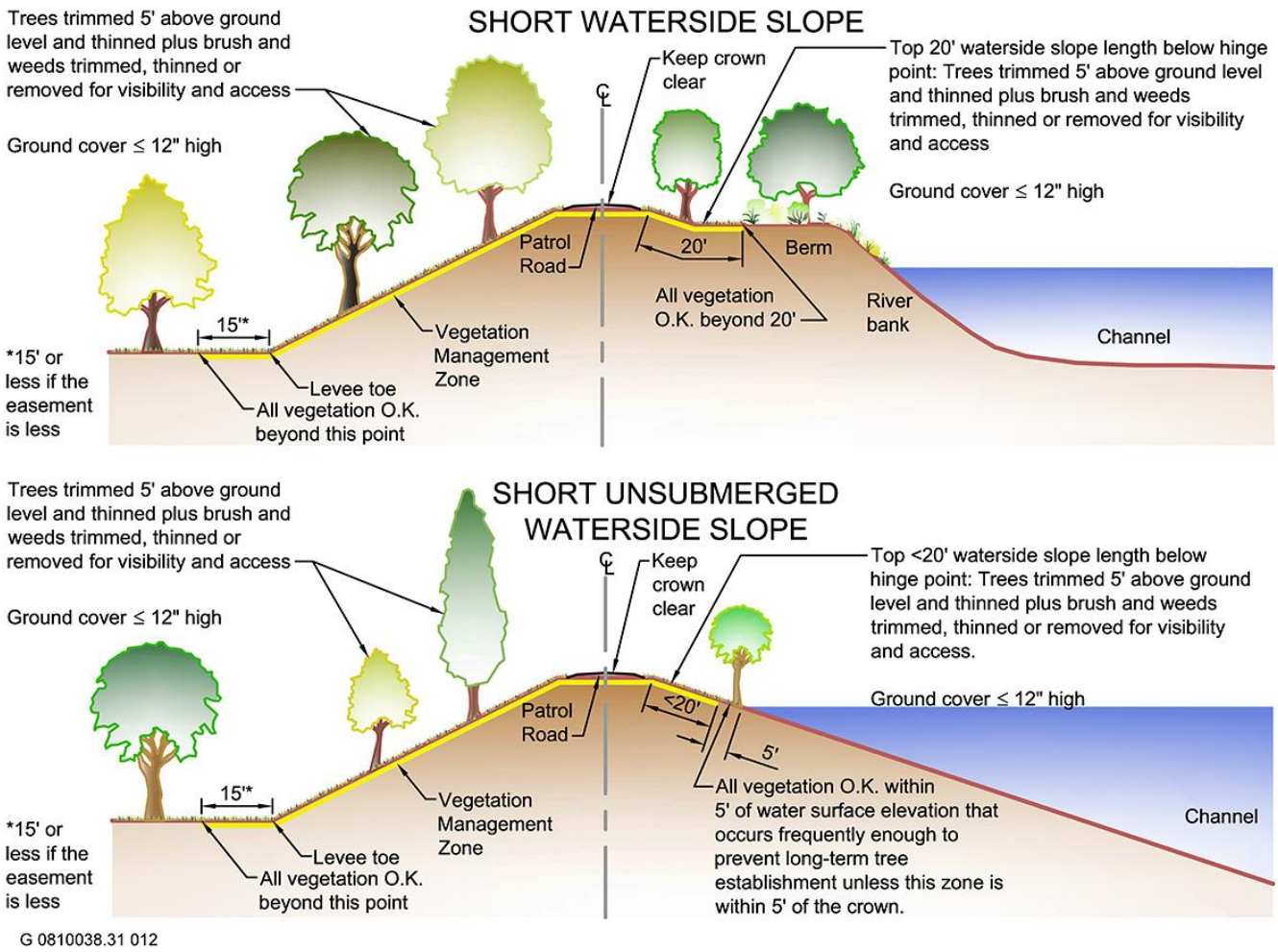


Source: AECOM 2013

Figure 3.3-1 **Vegetation Management for Existing Levees – Long Waterside Slopes and Landside Berm**

ordinances. Native riparian vegetation within the erosion repair sites would be avoided and left undisturbed where this can reasonably be accomplished without compromising flood protection efforts and, basic engineering design and safety. In addition, it is common for city and county general plans to include exemptions to the tree preservation ordinances for trees that need to be removed for public safety reasons. However, if removal of one or more protected trees is necessary for public safety reasons, DWR would coordinate with CDFW, USFWS, and NMFS, and the applicable municipalities prior to removal of protected trees. DWR would also obtain and comply with the terms of a streambed alteration agreement as described under Impact 3.3-6.

Compliance with the terms of the CDFW streambed alteration agreement, and implementation of the SERP Manual conservation measures described in Section I, “Conservation Measures,” of the SERP Manual, would help DWR to avoid or minimize potential adverse effects on trees



Source: AECOM 2013

Figure 3.3-2 **Vegetation Management of Existing Levees – Short Waterside Slope and a Short Waterside Slope Above the Water Surface Elevation that Frequently Submerges the Lower Waterside Slope**

and riparian vegetation protected under local ordinances and policies. This impact would be less than significant.

No mitigation is required.

IMPACT 3.3-9 ***Conflict with an Adopted Habitat Conservation Plan.*** *Several of the counties within the Phase I SERP coverage area have habitat conservation plans in development. However, none of these plans have been adopted. The SERP would not interfere with the implementation success of any of the draft HCPs. There would be* ***no impact.***

Consistency of the SERP with the habitat conservation plans (HCPs) currently being developed for the various counties in the Phase 1 SERP coverage area cannot be evaluated under CEQA because these HCPs have not been finalized and adopted, and therefore are

subject to potentially substantial change. However, conservation measures provided in Section I, “Conservation Measures,” of the SERP Manual to avoid and minimize impacts on sensitive biological resources, as discussed in Impacts 3.3-1 through 3.3-8, as well as limits on the size, spacing, and timing of repairs, would reduce all potential impacts on sensitive species and habitats to a less-than-significant level. Implementing the SERP would not substantially reduce the viability of target species, reduce habitat value, interfere with the management of conserved lands, or eliminate opportunities for conservation actions. Therefore, based on the information known at this time about HCPs currently under development, there would be no impact.

No mitigation is required.

3.3.5 Residual Impacts

With implementation of the conservation measures included in the SERP Manual, all impacts on biological resources are less than significant. There are no significant and unavoidable impacts on biological resources.

3.4 CULTURAL RESOURCES

3.4.1 INTRODUCTION

This section presents an evaluation of potential impacts on cultural resources that could result with implementation of the SERP. Cultural resources consist of built environment features (buildings and structures), historic-era or prehistoric archaeological deposits, and traditional cultural properties (detailed in the following section).

3.4.2 REGULATORY SETTING

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Section 106 of the National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) (or "section 106") and its implementing regulations require federal agencies to consider the effects of their undertakings on cultural resources that are listed in or eligible for listing on the National Register of Historic Places (NRHP). These resources are defined as "historic properties" in the section 106 process. The federal authorizations and permits required for the SERP (in particular, approval of a permit by the U.S. Army Corps of Engineers [USACE] under section 404 of the Clean Water Act, as described in section 3.3) are undertakings as defined in the section 106 regulations (36 Code of Federal Regulations [CFR] Part 800.16[y]) that require compliance with section 106.

Federal agencies typically perform the following primary steps to satisfy the requirements of section 106:

1. Initiate the section 106 process by consulting with the State Historic Preservation Officer (SHPO) (36 CFR Part 800.3).

2. Determine the area of potential effects (APE). The APE consists of the footprint of activities associated with the undertaking that have the potential to adversely affect historic properties (36 CFR Part 800.4[a][1]).

3. Perform an inventory of cultural resources within the APE and evaluate those resources to determine which resources constitute historic properties subject to management under section 106 (36 CFR Part 800.4). Inventory methods should be appropriate to the nature of the APE and the types of resources that may be encountered in the APE.

4. Identify and consult with Native American tribes that attach cultural religious significance to resources within the APE and with interested members of the public (36 CFR Part 800.3[f]).

5. Assess the effects of the undertaking on identified historic properties within the APE (36 CFR Part 800.5).

6. Resolve adverse effects on historic properties, if any (36 CFR Part 800.6).

Because the SERP would consist of individual small erosion repairs, the location of specific sites cannot be predicted in advance; identifying one APE for the entire SERP and performing all required section 106 management steps before receiving federal permitting is not practicable. The section 106 regulations allow agencies to develop an alternative process for satisfying section 106 by developing and executing a programmatic agreement (PA) for a related set of undertakings (36 CFR Part 800.14). The PA would define the specific set of procedures that USACE and other federal agencies would use for the project in lieu of the standard section 106 process and provided for in the implementing regulations. Under a PA, identification, evaluation, and treatment of historic properties may be phased according to the sequence of federal actions (36 CFR Part 800.4[b][2]). Upon execution (signing and approval) of the PA by the consulting parties, section 106 is deemed sufficiently complete to allow the federal agency to provide permits and authorizations dependent on the section 106 process (36 CFR Part 800.14[b[[2][iii]). The sequence of management steps under a typical PA is similar, but not identical, to the steps under the section 106 process:

- For each small erosion repair, the section 106 lead (USACE) would identify an APE and consult with the SHPO to determine if the APE is appropriate.

- Upon agreement with the SHPO regarding the APE, either USACE as the section 106 lead or DWR as the permittee would perform an inventory of cultural resources in the APE for each individual repair site determined to have the potential to affect historic properties, evaluate those resources for listing in the NRHP, and determine if the repair work would result in adverse effects on those resources.

- For every historic property subject to adverse effects, USACE as the section 106 lead or DWR as the permittee would prepare a historic property treatment plan (HPTP) in consultation with the SHPO and any other consulting parties. The HPTP is typically attached to the PA and may be amended separately from the PA.

- Consultation with Native American tribes that attach cultural or religious significance to resources subject to management under the PA should occur both during the development of the PA and during substantive decision making regarding specific properties of significance to Native American organizations and individuals.

DWR anticipates developing a palette of treatment protocols for resources subject to adverse effects pursuant to the PA to expedite the resolution of adverse effects. These would be

embodied in the Research Design, HPTP, and the Construction Monitoring and Inadvertent Discovery Plan appended to and stipulated by the PA.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

California Environmental Quality Act

CEQA provides a broad definition of what constitutes a cultural or historical resource. Cultural resources can include traces of prehistoric habitation and activities, historic-era sites and materials, and places used for traditional Native American observances or places with special cultural significance.

CEQA states that if a project would have significant impacts on important cultural resources, then alternative plans or mitigation measures must be considered. However, only significant cultural resources (termed “historical resources”) need to be addressed. The State CEQA Guidelines define a historical resource as “a resource listed or eligible for listing on the CRHR” (Public Resources Code Section 5024.1). A resource may be eligible for inclusion in the CRHR if it:

1. is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage;
2. is associated with the lives of persons important in our past;
3. embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. has yielded, or may be likely to yield, information important in prehistory or history.

The State CEQA Guidelines also require consideration of unique archaeological resources (Section 15064.5). As used in the Public Resource Code (PRC) (Section 21083.2), the term “unique archaeological resource” refers to an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information,
2. has a special and particular quality such as being the oldest of its type or the best available example of its type, or

3. is directly associated with a scientifically recognized important prehistoric or historic event or person.

In addition to meeting one or more of the above criteria, resources eligible for listing in the CRHR must retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association.

California Health and Safety Code

The SERP is also subject to the provisions of the California Health and Safety Code with respect to the discovery of human remains. Health and Safety Code Section 7050.5 states, "Every person who knowingly mutilates or disinters, wantonly disturbs, or willfully removes any human remains in or from any location other than a dedicated cemetery without authority of law is guilty of a misdemeanor, except as provided in Section 5097.99 of the Public Resources Code." PRC Section 5097.98, as amended by Assembly Bill 2641, states:

a) Whenever the commission receives notification of a discovery of Native American human remains from a county coroner pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code, it shall immediately notify those persons it believes to be most likely descended from the deceased Native American. The descendents may, with the permission of the owner of the land, or his or her authorized representative, inspect the site of the discovery of the Native American human remains and may recommend to the owner or the person responsible for the excavation work means for treatment or disposition, with appropriate dignity, of the human remains and any associated grave goods. The descendents shall complete their inspection and make recommendations or preferences for treatment within 48 hours of being granted access to the site.

b) Upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred, as prescribed in this section, with the most likely descendents regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendents on all reasonable options regarding the descendants' preferences for treatment.

LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

The SERP consists of a unified approach to environmental permitting and review of erosion repairs within the Sacramento River Flood Control Project (SRFCP). The work proposed under the Phase 1 SERP includes six California counties (Sacramento, Yolo, Solano, Sutter, Colusa, and Butte). Each county has unique goals and policies for the conservation and protection of cultural resources under county general plans and local ordinances. Within the counties, local municipalities also influence land use through general plans and local codes. The breadth of these policies precludes comprehensive discussion herein.

3.4.3 ENVIRONMENTAL SETTING

PREHISTORIC ARCHAEOLOGICAL SETTING

Prehistoric inhabitants of California are described according to the following archeological periods: Paleo-Indian and Lower Archaic, Middle Archaic, Upper Archaic, and Emergent. The earliest well-documented entry of humans into California occurred at the beginning of the Paleo-Indian period (10,000–6000 B.C.). During the Middle Archaic period (3000–1000 B.C.), the broad regional patterns of foraging subsistence strategies gave way to permanent villages occupied year-round, primarily along major waterways. The Upper Archaic period (1000 B.C.–A.D. 500) is marked by the onset of status distinctions and other indicators of growing sociopolitical complexity. Several technological and social changes characterized the Emergent period (A.D. 500–1800). The bow and arrow were introduced, ultimately replacing the dart (small spear) and atlatl (spear thrower). Territorial boundaries between groups became well-established. Exchange of goods between groups became more regularized with more goods, including raw materials, entering into the exchange networks.

The Middle and Upper Archaic and Emergent periods are further broken down under the Central California Taxonomic System. These three time periods are well represented in archaeological assemblages within and near the Phase 1 SERP coverage area:

- Windmiller Pattern (3000–500 B.C.)
- Berkeley Pattern (200 B.C.–A.D. 700)
- Augustine Pattern (A.D. 700–1800)

ETHNOGRAPHIC CONTEXT

The Phase 1 SERP coverage area encompasses lands traditionally occupied by the Patwin, Nisenan, Maidu/Konkow, and Miwok. A very small portion of the Phase 1 SERP coverage area falls in the territory of the Nomlaki. While the indigenous lifeways associated with these groups were transformed and altered in the historic era, descendants of these groups still attach cultural significance to resources that may be affected by projects implemented under the SERP.

HISTORIC CONTEXT

Land reclamation and flood risk reduction are historically associated with the Sacramento Valley and the surrounding watershed. The history of flood risk reduction that would culminate in the construction of the SRFCP is inextricably intertwined with historical industries that drastically altered the landscape and the river systems of the state. The first state-level attempt to orchestrate flood management occurred in 1861 with the creation of the Board of Swampland Commissioners (Board). The California State Legislature enacted a law that empowered this independent body to oversee and orchestrate flood management (Kelley 1989:42–47). While this Board was eventually abolished, the basic blueprint for flood management that persists to the present day came into being with this legislation. In the early 20th century, the growth of agriculture highlighted the demand for a unified flood management system to protect valuable land under cultivation and to expand the industry. In 1917, Congress created the Sacramento Flood Control Project—a unified system of flood control (now the SRFCP). The original scheme encompassed the Sacramento River from Ord Bend (just north of the Sutter Buttes) to approximately Rio Vista (Kelley 1989:275), and was administered by USACE.

NATIVE AMERICAN CONSULTATION

On October 8, 2009, DWR requested a list from the Native American Heritage Commission (NAHC) of Native American individuals and organizations that are affiliated with the regions encompassed in the Phase 1 SERP coverage area. The NAHC responded and provided a list of such individuals on October 23, 2009. DWR sent letters to all individuals on the list on January 12, 2010. The letters provided information about the potential for the SERP to result in impacts on cultural resources and requested information regarding the location of known resources so that they could be protected to the extent feasible.

During development of the PA, Native American organizations that attach cultural and religious significance to resources that may occur in the SRFCP would be contacted. If the SERP would result in adverse effects on specific cultural resources during implementation of individual small erosion repairs, USACE and DWR will be required to consult with Native American organizations that are culturally affiliated with such resources.

Traditional Cultural Properties

This category of resources embraces properties that are significant for traditional values to people of a particular ethnicity or religious affiliation. Specific guidance that defines TCPs and provides for the identification and evaluation of these resources was developed by the U.S. Department of the Interior in the late 1990s. TCPs are generally identified through consultation with Native Americans or other ethnic groups.

3.4.4 Environmental Impacts and Mitigation Measures

Thresholds of Significance

California Environmental Quality Act

Based on Appendix G of the CEQA Guidelines, the SERP would result in a significant impact on cultural resources if it would:

- cause a substantial adverse change in the significance of a historical resource as defined in section 15064.5 of the CEQA Guidelines;
- cause a substantial adverse change in the significance of an archaeological resource pursuant to section 15064.5; or
- disturb human remains, including those interred outside of formal cemeteries.

Section 15064.5 of the CEQA Guidelines defines “substantial adverse change” as physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resources is materially impaired.

Generally, CEQA Guidelines Section 15064.5 provides that unlisted resources shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register of Historical Resources, including the following:

(A) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

(B) Is associated with the lives of persons important in our past;

(C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

(D) Has yielded, or may be likely to yield, information important in prehistory or history.

Analysis Methodology

The potential for impacts on cultural resources is addressed at a program level. Because of the large size of the Phase 1 SERP coverage area, records of identified cultural resources were not retrieved from the California Historical Resources Information System (CHRIS). The Sacramento and San Joaquin Valleys and the Delta are known to be densely populated with prehistoric and historic-era cultural resources; thus, this analysis assumes that resources that are significant under CEQA and section 106 may be present on at least some of the Phase 1

SERP project sites. For purposes of section 106 consultation for the PA, in coordination with USACE, DWR has assumed that the SRFCP levees are historically significant for the purposes of this analysis, although it is likely that few, if any of the levees would be found to meet the significance criteria if they were formally evaluated.

IMPACT ANALYSIS

IMPACT 3.4-1 ***Potential Impacts on Identified Cultural Resources.*** *The Phase 1 SERP coverage area encompasses lands that were inhabited for at least the past 10,000 years by prehistoric Native American populations and potentially significant historical resources. Therefore, repair of small erosion sites could affect significant prehistoric or historic resources. This impact would be* ***potentially significant.***

The Phase 1 SERP coverage area encompasses lands that were inhabited for at least the past 10,000 years by prehistoric Native American populations. Native American settlements and activity loci were often focused near waterways such as the river corridors now managed under the SRFCP. Prehistoric archaeological sites associated with Native American occupation may constitute historic properties eligible for listing on NRHP and would be subject to section 106. It is also possible that significant historic-era resources, such as historic transportation, agricultural, commercial, and navigational features such as shipwrecks and associated artifacts, are located within the SRFCP. Although a comprehensive survey of all previously recorded resources on file with the CHRIS has not been performed, the volume of information on file and the intensity of prehistoric and historic activity along the waterways now encompassed by the SRFCP suggest that significant prehistoric and historic-era cultural resources may occur at some of the individual small erosion sites that would be repaired under the SERP.

Implementation of SERP would require physical construction activity at the repair sites, such as placement of rock slope material, bank fill, and a variety of vegetation plantings. These activities could require disturbance of native soil in addition to disturbance of levee fill. Cultural resources found in levee fill would likely not be significant because they would have been imported from elsewhere, and therefore disassociated from their significance-defining characteristics. Cultural resources found in native soil, however, would have a higher potential to be associated with their significance-defining characteristics. Activities that disturb native soil could alter cultural resources that qualify as historic properties under section 106 or unique archaeological resources such that the significance defining characteristics are damaged or lost. This impact would be potentially significant.

Mitigation Measure 3.4-1: Comply with the PA Prepared by USACE, SHPO, and DWR; Consult with Stakeholders as Required under Section 106 and the PA; Perform Site-specific Technical Studies to Identify and Evaluate Cultural Resources; and Implement Avoidance or Treatment Protocols as Necessary to the Extent Feasible.

Management of cultural resources for the SERP would be performed under a PA prepared by USACE. DWR will perform technical studies and treatment required to identify and manage impacts on cultural resources subject to the input of stakeholders and the approval of USACE and the SHPO. Management of cultural resources required under CEQA would be combined with the management protocols stipulated in the PA. Prior to implementation of individual small erosion repair activities, DWR will perform the following steps:

- conduct an inventory of the individual small erosion repair site and define an APE as required under section 106;
- evaluate identified resources eligible for listing in the NRHP and CRHR;
- determine if the proposed activity would result in significant impacts on resources eligible for the CRHR or adverse effects on historic properties within the meaning of section 106;
- resolve significant impacts either by developing resource-specific treatment protocols or by selecting and implementing treatment measures from a palette of treatment protocols developed pursuant to the PA; and
- consult with stakeholders and consulting parties under the PA such as the SHPO. The inventory, evaluation, and selection of treatment will include a review of relevant local land use policies regarding cultural resources.

DWR will employ methods for inventory efforts and consultation that are appropriate for the sensitivity of the individual small erosion repair site and the probable resources that may occur. Such methods may include geomorphological studies, subsurface testing, and consultation with appropriate Native American organizations and representatives (for example in the identification of TCPs). As necessary, specific technical studies prepared for individual small erosion repairs will define important historic themes relevant to individual repair sites. Mitigation efforts will include, when feasible, avoidance of the resource rather than data recovery excavations or other work that would require disturbance of the deposit. These measures represent the feasible methods for identifying significant cultural resources and reducing potential impacts. Implementation of these measures and compliance with the PA would ensure that adverse effects on cultural resources that may be identified are resolved. Therefore, after the implementation of mitigation, potential impacts to prehistoric or historic resources would be less than significant.

IMPACT 3.4-2 ***Potential Impacts on Assumed Historically Significant Levees.*** *The Phase 1 SERP coverage area encompasses aspects of reclamation and flood risk reduction that are assumed to be historically significant for the purposes of this analysis. Therefore, repair of small erosion sites could affect significant historic resources but would not materially impair the historical significance of the levees. This impact would be* ***less than significant****.*

Although it is likely that few if any of the SERP levees would be found to meet significance criteria, for purposes of section 106 consultation and this analysis DWR in coordination with USACE has assumed that the SRFCP levees are historically significant. SERP does not propose the removal of any levee, the construction of any new levee, the alteration of any levee such that land use patterns would change, nor any changes to any land uses in the vicinity of the program. The waterside small erosion repair sites would not adversely affect these levees, and the historically significant characteristics of the levees would be preserved by implementation of SERP; that is, there would be no change to the characteristics of levees that make them historically significant. Minor alterations to SRFCP levees from small erosion repair projects implemented under SERP would not materially impair the historical significance of the levees; therefore, impacts on assumed historically significant levees would be less than significant.

No mitigation is required.

IMPACT 3.4-3 ***Impacts on Previously Unidentified Cultural Resources.*** *Previously unidentified cultural resources have the potential to be affected by repair of individual erosion sites. This impact would be* ***potentially significant****.*

The floodplains and riverbanks within the SRFCP were extensively occupied and used by prehistoric populations. Prehistoric occupation sites frequently took the form of mounds constructed above the natural ground surface. However, the upper portions of many of these sites have been leveled by recent historic activity or natural fluvial processes, and the remains of these sites are thus no longer easily visible aboveground. Additionally, intermittent flooding deposited layers of alluvium over prehistoric deposits, leaving these resources intact below grade with few or no surface manifestations. These conditions may obscure both prehistoric and historic-era archaeological deposits and shipwrecks. Where cultural resources are buried below sterile soils or truncated with no surface manifestation, discovery before construction repair activities begin is not always possible. It is possible that ground-disturbing work in native soil at individual small erosion repair sites could result in impacts on these resources. This impact is potentially significant.

Mitigation Measure 3.4-3: Train Construction Workers before Construction Begins, Monitor Construction Activities, Stop Potentially Damaging Activities, Evaluate Discovery(ies), and Resolve Adverse Effects on Significant Resources.

DWR will implement the following measures to minimize potential impacts on previously undiscovered cultural resources:

- Every 2 years or before construction begins, construction crews will be given a presentation and training session incorporated into the environmental awareness training before performing work in areas sensitive for previously unidentified resources so that they can assist with identifying undiscovered cultural resource materials and avoid them where possible.
- A DWR archaeologist, where appropriate, will monitor all ground-disturbing construction activities at locations determined to be sensitive for unidentified cultural resources. If a previously unidentified archaeological resource is uncovered during construction, construction activities will be halted within 100 feet of the find and USACE, and other appropriate parties, will be notified regarding the discovery.
- DWR will then consult with USACE and the SHPO to determine the eligibility of the resource for listing in the NRHP or qualification as a unique archaeological resource. If DWR and USACE, in consultation with the SHPO, concur that the resource is eligible for listing and the project may result in adverse effects or significant impacts on the resource, DWR either will implement one of the treatment protocols developed under the PA for the resource or will prepare a resource-specific treatment plan.
- Work may only resume when either all necessary treatment has been performed under the treatment method selected, or approved by the appropriate entity, or construction in the vicinity of the resource will not result in adverse effects or encroach within an appropriate distance from the known boundaries of the resource or the boundaries of the resource.

Implementation of this mitigation measure, in concert with implementation of Mitigation Measure 3.4-1 and compliance with the PA, reduces this impact to less than significant because erosion repair will be allowed to proceed only after the treatment method has been fully implemented.

IMPACT 3.4-4 ***Impacts on Previously Unidentified Human Remains.*** *Prehistoric archaeological deposits that occur along the waterways often contain interred human remains. Therefore, repair of individual erosion sites could affect unidentified human remains. This impact would be* ***potentially significant.***

Prehistoric archaeological deposits that occur along the waterways managed under the SRFCP often contain interred human remains. Because these deposits may not be easily

identifiable on the surface and may be obscured by alluvium, debris, or vegetation, interred human remains may not always be identified before construction begins and during cultural resources inventories. Implementation of the SERP requires ground-disturbing work; therefore, the potential exists for individual small erosion repairs to result in impacts on previously unidentified interred human remains. This impact is potentially significant.

Mitigation Measure 3.4-4: Stop Work in the Event of a Discovery of Human Remains, Notify the Applicable County Coroner and Most Likely Descendant, and Treat Remains in Accordance with State Law and Measures Stipulated in the Programmatic Agreement Prepared by USACE and the SHPO.

DWR will ensure that the following measures are implemented to address the potential discovery of human remains during construction:

- If human remains are uncovered during ground-disturbing activities, all ground-disturbing activities will cease within an appropriate radius of the find. DWR will notify the county coroner of the county in which the remains are uncovered and a professional archaeologist to determine the nature of the remains. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code section 7050.5[b]). If the coroner determines that the remains are those of a Native American, he or she will contact the NAHC by phone within 24 hours of making that determination (Health and Safety Code section 7050[c]). The NAHC will designate a most likely descendant (MLD) to dispose of the remains with appropriate dignity (California Public Resources Code section 5097.98).

- After a determination that the remains are of prehistoric Native American origin, DWR will coordinate with the MLD for reburial of the remains and associated grave goods in an appropriate location. If, within 48 hours, the MLD fails to make a recommendation or reinter the remains, DWR will coordinate with the landowner to reinter the remains in a location not subject to further disturbance as provided for in California Public Resources Code section 5097.98.

- The discovery of prehistoric burials often reveals locations sensitive for the occurrence of additional archaeological material. After the initial discovery and management of human remains, a professional archaeologist working on behalf of DWR will record the site with the NAHC and the appropriate information center and, if possible, use project features to protect the site from future disturbance.

These measures represent the feasible actions to protect inadvertently discovered human remains. Implementation of this mitigation measure reduces this potential impact to a less-than-significant level because the remains would be given to the MLD if possible and any significant additional archeological materials found associated with a burial would be recovered and preserved.

3.4.5 RESIDUAL IMPACTS

The implementation of the SERP would result in potentially significant impacts to previously identified cultural resources and resources that may be discovered during inventory efforts performed for the SERP (Impacts 3.4-1, 3.4-3, and 3.4-4). The available mitigation consists of cultural resource inventories, implementation of treatment measures, and inadvertent discovery protocols. Management of cultural resources for the SERP would be performed under a PA prepared by USACE. Therefore, Impacts 3.4-1, 3.4-3, and 3.4-4 would be **less-than-significant** with implementation of Mitigation Measures 3.4-1, 3.4-3, and 3.4-4, respectively. No significant and unavoidable impacts would occur.

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3.5 GEOLOGY, SOILS, AND PALEONTOLOGICAL RESOURCES

3.5.1 INTRODUCTION

This section identifies the environmental setting and evaluates the potential impacts related to geology, soils, and paleontological resources, as well as seismic conditions, in the Phase 1 SERP coverage area.

3.5.2 REGULATORY SETTING

FEDERAL PLAN, POLICIES, REGULATIONS, AND LAWS

The SERP entails work along levees that are within the SRFCP area. Levee design and construction must be performed in accordance with USACE's *Engineering Design and Construction of Levees* (USACE 2000), which are the primary federal standards applicable to levee improvements. This document contains the basic principles used for the design and construction of federal levees. In general, it provides requirements for analysis of issues such as underseepage, through-seepage, slope stability, and settlement, and specifies design of features including embankments, slope protection, and borrow sites. In addition, this document provides an outline of geologic and subsurface investigations for project feasibility that covers both technical studies and field surveys. Evaluations include geophysical exploration for the top of bedrock, faults, suspected voids, material boundaries, subsurface conduits, groundwater fluctuations, soils permeability, and foundation strengths.

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

Because the SERP would involve work on levees, the Central Valley Flood Protection Board's (CVFPB's) standards are the primary state standards applicable to the proposed levee maintenance and repairs; these are stated in Title 23, Division 1 of the California Code of Regulations. These requirements pertain to the aspects of structure design and construction that could affect flood management projects. These requirements cover issues such as use of borrow material; pipelines; bicycle trails; vegetation; dredged, spoiled, and waste materials; and other encroachments within the flood management limit. In addition, this article supplements the USACE manual, *Engineering Design and Construction of Levees* (described above), requires submission of documentation to the CVFPB (e.g., geotechnical studies, seismic surveys, settlement analysis), and provides specifications related to construction material, design of levees, and utility structure requirement. DWR maintenance yards that inspect and repair levees within the SRFCP conduct those operations in accordance with CVFPB and federal requirements.

REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

The work proposed under Phase 1 of the SERP occurs in six California counties (i.e., Sacramento, Yolo, Solano, Sutter, Colusa, and Butte). Each county has its own policies under county general plans and local ordinances. Within the counties, local municipalities also influence various aspects of land use through their own general plans and local codes.

3.5.3 ENVIRONMENTAL SETTING

TOPOGRAPHY

Topography of individual erosion sites would consist of gentle terrain along the channels and steeper sloping terrain along embankments and levees. The proposed repairs would occur along existing levees and associated waterside slopes within the levee prism, which are sloped from the levee crown toward the surface of the water. The slopes where improvements would occur range in steepness from 3:1 to 1:1.

GEOLOGY

The Phase 1 SERP erosion sites would all be located within the Sacramento Valley, which is 30–45 miles wide in the southern to central parts, but narrows to about 5 miles near Red Bluff. The elevation of the Sacramento Valley decreases almost imperceptibly from 300 feet at its northern end to near sea level in the Sacramento–San Joaquin River Delta (Delta).
The Sacramento Valley and the San Joaquin Valley together make up the Central Valley Geomorphic Province. This province consists of a sediment-filled trough that extends over 400 miles from north to south and separates the primarily granitic rock of the Sierra Nevada to the east from the primarily Franciscan Formation rock of the California Coastal Ranges to the west.

The central portion of the Sacramento Valley consists mainly of Holocene-age (i.e., 11,000 years Before Present [BP] and younger) basin and alluvial sediments that were deposited by the Sacramento River and its two major local tributaries—Putah and Cache Creeks. In the southern area of the Sacramento Valley, these deposits grade into the peat-rich muds of the Delta. East of the Sacramento River, large areas of the Modesto and Riverbank Formations overlie older alluvial fan deposits of the Turlock Lake, Laguna, and Mehrten Formations. Moving north, the eastern side of the Sacramento Valley opposite to and north of the Sutter Buttes is covered by Holocene-age alluvial deposits from the Feather River and smaller streams of the western Sierra Nevada. Deposits of the Riverbank Formation are also found in this area (Helley and Harwood 1985).

SOILS

The soils of the Sacramento Valley vary widely as a result of differences in geomorphologic processes, climate, parent material, biologic activity, topography, and time. Under the SERP, DWR would conduct annual maintenance surveys each spring to identify small erosion sites within the Phase 1 SERP coverage area that require repairs to maintain the integrity of the flood management system. DWR would conduct a baseline assessment at each site in accordance with Section B of the SERP Manual (see Appendix B) to evaluate and document the erosion damage. Because specific sites would be selected on a case-by-case basis by DWR staff members, this analysis does not attempt to evaluate the erosion potential or other soil properties along every water body shown in Exhibit 2-1 “Phase 1 Coverage Area for the Small Erosion Repair Program.” Therefore, the list of soil types shown in Table 3.5-1 is not intended to be all inclusive; rather, it is intended to disclose to agencies and members of the public the types of soils and their properties that may generally be encountered at erosion sites where work may occur under the SERP.

Erosion

Soil erosion rates at the SERP sites vary depending on location, soil characteristics, climate, slope, type of vegetation and levee construction materials, amount of wind and wave activity, and runoff from precipitation events. Severe soil erosion can damage the levee system; such damage can ultimately lead to structural failure of the levee. Secondary effects of erosion occur when the eroded soil particles are carried downstream and later deposited as sediment, which can adversely affect aquatic species and their habitat. Soils along various portions of the levees within the SRFCP area are subject to erosion.

Subsidence

Subsidence of the land surface can be induced by both natural and human phenomena. Natural phenomena that can cause subsidence can result from tectonic deformations and seismically induced settlements; consolidation, hydrocompaction, or rapid sedimentation; oxidation or dewatering of organic-rich soils; and subsurface cavities. Subsidence related to human activity can result from withdrawal of subsurface fluids or sediment. Pumping of water for residential, commercial, and agricultural uses from subsurface water tables causes more than 80% of the identified subsidence in the United States (Galloway et al. 1999). Lateral spreading is the horizontal movement or spreading of soil toward an open face, such as a streambank, the open side of fill embankments, or the sides of levees. The potential for failure from subsidence and lateral spreading is highest in areas where the groundwater table is high, where relatively soft and recent alluvial deposits exist, and where creek banks are relatively high.

Table 3.5-1 General Soil Types and Properties in the Phase 1 SERP Coverage Area				
Soil Series Name	**Description**	**Shrink/ Swell Potential**	**Permeability**	**Drainage**
Sacramento County				
Dierssen	Sandy or clay loam	Moderate	Moderately high	Somewhat poorly drained
Egbert	Clay	High	Moderately low	Poorly drained
Lang	Sandy Loam	Low	High	Moderately well drained
Laugenour	Loam	Low	High	Poorly drained
Sailboat	Silt loam	Low	Moderately high	Somewhat poorly drained
San Joaquin	Sand or silt loam	Low	Moderately high	Moderately well drained
Scribner	Clay loam	Moderate	Moderately high	Poorly drained
Valpac	Loam	Moderate	Moderately high	Somewhat poorly drained
Colusa County				
Capay	Clay loam	High	Very slow	Moderately well drained
Corbiere	Silt loam	High	Slow	Somewhat poorly drained
Grandbend	Loam	Moderate	Moderately slow	Somewhat poorly drained
Moonbend	Silt loam	Moderate	Moderately high	Moderately well drained
Scribner	Silt loam	Low	Moderately low	Poorly drained
Tujunga	Loam	Low	Moderately high	Excessively drained
Vina	Loam	Low	Moderately low	Well drained
Willows	Silty clay	High	Moderately low	Poorly drained
Solano County				
Reiff	Sandy loam	Low	High	Well drained
Yolo	Loam	Low	Moderately high	Well drained

Table 3.5-1 General Soil Types and Properties in the Phase 1 SERP Coverage Area				
Soil Series Name	**Description**	**Shrink/ Swell Potential**	**Permeability**	**Drainage**
Butte County				
Almendra	Loam	Low	Moderately high	Well drained
Blavo	Silt loam	Very high	Moderately high	Poorly drained
Clear Lake	Clay	Very high	Moderately high	Poorly drained
Conejo	Sandy loam	Low	High	Well drained
Esquon	Silty clay loam	High	Moderately high	Poorly drained
Gianella	Sandy loam	Low	High	Moderately well drained
Liveoak	Sandy loam	Low	High	Moderately well drained
Neerdobe	Silt loam	Low	High	Poorly drained
Redtough	Loam	Low	Moderately high	Somewhat poorly drained
Thompson Flat	Loam	Low	Moderately high	Moderately well drained
Yolo County				
Brentwood	Silty clay loam	High	Moderately high	Well drained
Hillgate	Loam	Low to moderate	Moderately high	Well drained
Maria	Silt loam	Moderate	Moderately high	Poorly drained
Marvin	Silty clay loam	Moderate	Moderately high	Somewhat poorly drained
Merritt	Silty clay loam	Moderate	Moderately high	Poorly drained
Pescadero	Silty clay	High	Moderately low	Poorly drained
Rincon	Silty clay loam	Moderate	Moderately high	Well drained
Riz	Loam	Moderate	Moderately high	Poorly drained
Sacramento	Silty clay loam or clay	High	Moderately low to moderately high	Poorly drained
Sycamore	Silt loam or clay loam	Low to moderate	Moderately high	Somewhat poorly drained

Table 3.5-1 General Soil Types and Properties in the Phase 1 SERP Coverage Area				
Soil Series Name	**Description**	**Shrink/ Swell Potential**	**Permeability**	**Drainage**
Sutter County				
Columbia	Sandy loam	Low	High	Somewhat poorly drained
Gridley	Clay loam	Moderate	Moderately high	Somewhat poorly drained
Holillipah	Loamy sand or sandy loam	Low	High	Somewhat excessively drained
Marcum	Clay loam	Moderate	Moderately high	Moderately well drained
Nueva	Loam	Low	Moderately high	Somewhat poorly drained
Oswald	Clay	High	Moderately low	Poorly drained
Shanghai	Sandy loam or silt loam	Moderate	Moderately high	Somewhat poorly drained
Subaco	Clay	High	Moderately low	Poorly drained
Tisdal	Clay loam	Moderate	Moderately high	Well drained
Yuvas	Loam	Moderate	Moderately high	Moderately well drained

Notes:
[1] Based on percentage of linear extensibility.
[2] Based on standard U.S. Department of Agriculture saturated hydraulic conductivity (Ksat) class limits; Ksat refers to the ease with which pores in a saturated soil transmit water.
Source: NRCS 2009

SEISMICITY

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is fault ground rupture, also called surface faulting. Common secondary seismic hazards include ground shaking, liquefaction, and subsidence. Each of these potential hazards is discussed below.

Fault Ground Rupture

Surface rupture is an actual cracking or breaking of the ground along a fault during an earthquake. Structures built over an active fault can be torn apart if the ground ruptures. Surface ground rupture along faults is generally limited to a linear zone a few yards wide.

The Alquist-Priolo Earthquake Fault Zoning Act was created to prohibit the location of structures designed for human occupancy across the traces of active faults, thereby reducing the loss of life and property from an earthquake. There are no Alquist-Priolo Earthquake Fault Zones within the Phase 1 SERP coverage area (CGS 2010, Hart and Bryant 1999).

Seismic Ground Shaking

The Foothills Fault system is located approximately 30 miles east of the Phase 1 SERP coverage area; however, Jennings (1994) does not indicate that fault activity has occurred within the last 11,000 years, and the slip rate of the Foothills Fault system is extremely low (0.05 millimeters per year), which is well below the planning threshold for major earthquakes (USGS 2000). The northern segment of the Cleveland Hills Fault, located near Lake Oroville, is approximately 10 miles northeast of the northernmost portion of the Feather River where the Phase 1 SERP work could occur. However, research conducted by DWR indicates that the magnitude 5.7 earthquake that occurred on August 1, 1975, along the Cleveland Hills Fault mostly likely resulted from reservoir-induced stress (DWR 1989). The Dunnigan Hills Fault, approximately 5 miles north of the Phase 1 SERP coverage area, may have been the source of an earthquake in 1892 that caused damage in Vacaville and Winters. However, with the exception of these two known sources of seismic activity during historic time (i.e., the last 200 years), the Sacramento Valley has generally not been seismically active during the Holocene. Faults with known or estimated activity during the Holocene epoch are generally located in the San Francisco Bay Area to the west, as shown in Table 3.5-2. In addition, Table 3.5-2 identifies the faults' approximate distance from the Phase 1 SERP coverage area, the fault type, and the maximum moment magnitude of the fault.

Liquefaction

Soil liquefaction occurs when ground shaking from an earthquake causes a sediment layer saturated with groundwater to lose strength and take on the characteristics of a fluid. Primary factors used in determining the liquefaction potential are soil type, the level and duration of seismic ground motions, the distance from an active seismic source, and the depth to groundwater. Loose sands and peat deposits are generally the most susceptible to liquefaction. Age is also a factor in the potential of soils to liquefy, with the younger (less than 11,000 years old) Holocene deposits being the most sensitive to liquefaction.

Sediments used in construction of the levees vary depending on the location. In some locations, they consist of loosely compacted Holocene-age fill material. In others, levee materials consist of older Pleistocene-age fill material from borrow sites that has been engineered, designed, and compacted specifically to withstand potential damage from liquefaction.

PALEONTOLOGY

The Phase 1 SERP coverage area is depicted in Exhibit 2-1, in Chapter 2, "Project Description." Because the site-specific locations of future repairs are unknown, exactly which geologic formations would be affected by earth-moving activities is not possible to determine. For this paleontological analysis, published geologic maps at a scale of 1:250,000 were

Table 3.5-2
Faults with Evidence of Activity During Holocene Time in the SERP Region

Fault Name	Approximate Distance from Nearest SERP Levee Site (miles)	Fault Type[1]	Maximum Moment Magnitude[2]	Slip Rate (mm/yr)	Regional Location
Dunnigan Hills	5	N/A	N/A	N/A	Western Sacramento Valley
Cleveland Hills/Swain Ravine	15	N/A	6.5	N/A	Sierra Nevada foothills
Great Valley Fault Zone Segment 4	15	B	6.6	1.5	Margin between Sacramento Valley and Coast Range
Hunting Creek-Berryessa	30	B	7.1	3.0	Coast Range
Green Valley	40	B	6.2	5.0	Coast Range
Greenville Fault Zone (includes Clayton and Marsh Creek sections)	50	B	6.6	2.0	Coast Range

Notes:
N/A = not available or not known; mm/yr = millimeters per year
[1] Faults with an "A" classification are capable of producing large magnitude (M) events (M greater than 7.0), have a high rate of seismic activity (e.g., slip rates greater than 5 millimeters per year), and have well-constrained paleoseismic data (e.g., evidence of displacement within the last 700,000 years). Class "B" faults are those that lack paleoseismic data necessary to constrain the recurrence intervals of large-scale events. Faults with a "B" classification are capable of producing an event of M 6.5 or greater.
[2] The moment magnitude scale is used by seismologists to compare the energy released by earthquakes. Unlike other magnitude scales, it does not saturate at the upper end, meaning that there is no particular value beyond which all earthquakes have about the same magnitude, which makes this scale a particularly valuable tool for assessing large earthquakes.
Sources: Cao et al. 2003, Jennings 1994, Petersen et al. 1996, data compiled by AECOM in 2009

reviewed to determine which geologic formations underlie the existing levees and determine the potential geologic formations where Phase 1 SERP work may occur. Table 3.5-3 presents the project reach, the formation name and age, and the determination of paleontological sensitivity. A detailed description of each formation follows.

Table 3.5-3 Paleontological Sensitivity of Rock Formations in the Phase 1 SERP Coverage Area		
Project Reach[1]	**Rock Formation Name and Age**	**Paleontological Sensitivity**
Butte Creek	Basin Deposits/Holocene	Low
	Modesto/Pleistocene	High
Cherokee Canal	Basin Deposits/Holocene	Low
Feather River from River Mile 31 to Western Canal Left Bank	Natural Levee and Channel Deposits/ Holocene	Low
	Modesto/Pleistocene	High
	Riverbank/Pleistocene	High
Sacramento River west of Cherokee Canal, south below Colusa	Natural Levee and Channel Deposits/ Holocene	Low
Colusa Trough	Basin Deposits/Holocene	Low
East/West Levee above Wadsworth Canal	Basin Deposits/Holocene	Low
	Modesto/Pleistocene	High
Wadsworth Canal, Sutter Bypass, Nelson Slough	Natural Levee and Channel Deposits/ Holocene	Low
	Basin Deposits/Holocene	Low
	Riverbank/Pleistocene	High
Cache Creek, Tule Canal	Natural Levee and Channel Deposits/ Holocene	Low
	Basin Deposits/Holocene	Low
Willow Slough Bypass	Basin Deposits/Holocene	Low
	Modesto-Riverbank mix/Pleistocene	High
South Fork Putah Creek	Natural Levee and Channel Deposits/ Holocene	Low
	Basin Deposits/Holocene	Low
	Modesto/Pleistocene	High
Sacramento Bypass and south along Sacramento River	Natural Levee and Channel Deposits/ Holocene	Low
	Basin Deposits/Holocene	Low
	Riverbank/Pleistocene	High

Note:
[1] Based on estimated Phase 1 SERP coverage areas shown in Exhibit 2-1.
Sources: Jennings and Strand 1960, Wagner et al. 1987, Saucedo and Wagner 1992

Description of Geologic Formations

Natural Levee and Channel Deposits

This geologic formation consists of deposits of active stream channels and their natural levees, as well as adjacent broad alluvial fans. These deposits are of Holocene age (i.e., 11,000 year BP and younger).

Basin Deposits

This geologic formation consists of fine grained deposits of silt and clay in flood basins between modern watercourses (locally, this includes marsh deposits). These deposits also are of Holocene age.

Modesto Formation

The Modesto Formation forms ancient alluvial terraces and some fans and channel ridges of major rivers, and can be divided into upper and lower members. It generally consists of tan and light-gray gravely sand, silt, and clay. Helley and Harwood (1985, citing Marchand and Allwardt 1981) suggest an age range of 12,000 to 26,000 years BP for the upper member, and 29,000 to 42,400 years BP for the lower member (i.e., Pleisotcene in age). The Modesto Formation is underlain at depth by the Riverbank Formation, the Turlock Lake Formation, and the Laguna Formation (among others).

Riverbank Formation

Sediments of the Riverbank Formation consist of weathered reddish gravel, sand, and silt that form alluvial terraces and fans. In the Sacramento Valley, this formation contains more mafic igneous rock fragments than the San Joaquin Valley, and thus tends towards stronger soil profile developments that are more easily distinguishable from the Modesto Formation.

The Riverbank Formation is Pleistocene in age but is considerably older than the Modesto Formation; estimates place it between 130,000 and 450,000 years BP (Helley and Harwood 1985 citing Marchand and Allwardt 1981). Similar to the Modesto Formation, the Riverbank Formation also forms alluvial fans and terraces on major rivers; however, Riverbank fans and terraces are higher in elevation and generally have a more striking topography than those formed by the Modesto.

Paleontological Sensitivity

A paleontologically important rock unit is one that: 1) has a high potential paleontological productivity rating, and 2) is known to have produced unique, scientifically important fossils. The potential paleontological sensitivity rating of a rock unit exposed at a project site refers to the abundance/densities of fossil specimens and/or previously recorded fossil sites in

exposures of the unit in and near the project site. Exposures of a specific rock unit at a project site are most likely to yield fossil remains representing particular species, in quantities or densities similar to those previously recorded from the unit in and near the project site.

Natural Levee and Channel Deposits/Basin Deposits

By definition, to be considered a fossil, an object must be older than 11,000 years BP. Because the Natural Levee and Channel Deposits and the Basin Deposits are of Holocene age (i.e., less than 11,000 years BP), they would not contain unique paleontological resources.

Modesto and Riverbank Formations

Jefferson (1991a, 1991b) compiled a database of California Late Pleistocene vertebrate fossils from published records, technical reports, unpublished manuscripts, information from colleagues, and inspection of museum paleontological collections at more than 40 public and private institutions. He listed numerous sites throughout the Sacramento and San Joaquin Valleys yielding Rancholabrean vertebrate fossils that could be referable to the Modesto or Riverbank Formations.

A search of the University of California, Berkeley Museum of Paleontology database (UCMP 2012) indicates that remains of land mammals have been found throughout northern California, at various localities in alluvial deposits that are referable to the Modesto and Riverbank Formations, including Yuba City, Sutter, Lincoln, Woodland, Davis, Sacramento, and Elk Grove, as well as Stockton, Lathrop, Tracy, Modesto, and numerous other locations in the Central Valley. In the Sacramento Valley, these localities have yielded fossil specimens of rodents, snakes, horses, antelope, bison, coyote, camel, Harlan's ground sloth, mammoth, and saber-toothed tiger.

The Modesto and Riverbank Formations are considered to be of high paleontological sensitivity because of the thousands of fossil specimens recovered throughout the Sacramento and San Joaquin Valleys from them.

3.5.4 Environmental Impacts and Mitigation Measures

Thresholds of Significance

Based on Appendix G of the CEQA Guidelines, the SERP would result in a significant impact on geology and soils if it would:

- expose people, property, or structures to potential substantial adverse impacts, including the risk of loss, injury, or death involving:

- rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
- landslides;
- cause substantial soil erosion or the loss of topsoil;

- be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property; or
- have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems.

Based on Appendix G of the CEQA Guidelines, a project would have a significant impact on paleontological resources if it would directly or indirectly destroy a unique paleontological resource or site. For the purposes of this DEIR, a unique resource or site is one that is considered significant under the following professional paleontological standards.

An individual vertebrate fossil specimen may be considered unique or significant if it is identifiable and well preserved, and it meets one of the following criteria:

- a type specimen (i.e., the individual from which a species or subspecies has been described);
- a member of a rare species;
- a species that is part of a diverse assemblage (i.e., a site where more than one fossil has been discovered) wherein other species are also identifiable, and important information regarding life history of individuals can be drawn;
- a skeletal element different from, or a specimen more complete than, those now available for its species; or
- a complete specimen (i.e., all or substantially all of the entire skeleton is present).

The value or importance of different fossil groups varies, depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to

which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions (such as for a research project). Marine invertebrates generally are common; the fossil record is well developed and well documented, and they generally would not be considered a unique paleontological resource. Identifiable vertebrate marine and terrestrial fossils generally are considered scientifically important because they are relatively rare.

Analysis Methodology

Evaluation of potential geology and soils impacts for the project relied on U.S. Natural Resources Conservation Service soil survey data ("Web Soil Survey") and published geologic literature and maps. The information obtained from these sources was reviewed and summarized to present the environmental setting and to identify potential environmental impacts, based on the thresholds of significance presented in this section. Impacts associated with geology and soils that could result from construction and operational activities were evaluated qualitatively based on expected construction practices and materials, locations, and duration of construction and related activities. Proposed engineering cross-sections of work to be performed at the erosion sites, prepared by DWR, were also used to evaluate potential impacts. These conceptual exhibits are provided in Section C, "Project Design Templates and Construction Details," of the SERP Manual in Appendix B (of this DEIR).

In its standard guidelines for assessing and mitigating adverse impacts on paleontological resources, the Society of Vertebrate Paleontology (1995:22–27) has established three categories of sensitivity for paleontological resources: high, low, and undetermined. Areas where fossils previously have been found are considered to have a high sensitivity and a high potential to produce fossils. Areas that are not sedimentary in origin and that have not been known to produce fossils in the past typically are considered to have low sensitivity. Areas that have not had any previous paleontological resource surveys or fossil finds are considered to be of undetermined sensitivity until surveys and mapping are performed to determine their sensitivity. After reconnaissance surveys, observation of exposed cuts, and possibly subsurface testing, a qualified paleontologist can determine whether an area should be categorized as having high or low sensitivity. In keeping with the significance criteria of the Society of Vertebrate Paleontology (1995:22–27), all vertebrate fossils generally are categorized as being of potentially significant scientific value.

Impacts Not Discussed Further in this DEIR

The SERP sites would not be located in areas of steep terrain and therefore would not subject people or structures to hazards from landslides. Additionally, the SERP would not involve wastewater treatment. Therefore, the risks to people or structures caused by landslides and the soil suitability for use with septic tanks are not discussed further in this DEIR.

IMPACT ANALYSIS

IMPACT 3.5-1 ***Risks to People or Structures Caused by Surface Fault Rupture.*** *The Phase 1 SERP coverage area is not located within or adjacent to an Alquist-Priolo Earthquake Fault Zone or any known active fault. Therefore, this impact would be* ***less than significant****.*

The Phase 1 SERP coverage area is not located within or adjacent to an Alquist-Priolo Earthquake Fault Zone, nor is the coverage area underlain by or located adjacent to any other known active faults. The SERP work that would occur along the northern portion of the Feather River would be located approximately 10 miles from the nearest Alquist-Priolo Earthquake Fault Zone/known active fault (the Cleveland Hill/Swain Ravine Fault). Furthermore, the SERP would not include the construction of any pipelines, permanent roadways, bridges, or structures intended for human habitation. Because damage from surface fault rupture is generally limited to a linear zone a few yards wide, the potential for surface fault rupture to cause damage to the proposed erosion repairs would be less than significant.

No mitigation is required.

IMPACT 3.5-2 ***Possible Risks to People and Structures Caused by Strong Seismic Ground Shaking.*** *The Phase 1 SERP coverage area is located in an area of generally low seismic activity. Therefore, this impact would be* ***less than significant****.*

The northern segment of the Cleveland Hills/Swain Ravine Fault, located near Lake Oroville, is approximately 10 miles northeast of the northernmost portion of the Feather River where SERP work could occur. However, research conducted by DWR indicates that the magnitude 5.7 earthquake that occurred on August 1, 1975, along the Cleveland Hills Fault, mostly likely resulted from reservoir-induced stress (DWR 1989). The Dunnigan Hills Fault, approximately 5 miles north of the Phase 1 SERP coverage area along Cache Creek in the southwestern portion of the Sacramento Valley, has been classified by Jennings (1994) as active and may have been responsible for a damaging earthquake in Vacaville and Winters in 1892. Aside from these two faults where earthquakes occurred in 1975 and 1892, the Sacramento Valley has historically experienced very low levels of seismic activity. Faults with known or estimated activity during the last 11,000 years are generally located in the San Francisco Bay Area within the Coast Ranges geomorphic province. The SERP projects would be small in size, would occur in the levee surface soils (therefore the core structural integrity of the levees would not be affected), and are intended to achieve an overall strengthening of the levees by addressing the effects of ongoing erosion. Small levee repair projects are considered maintenance projects rather than levee modification projects; thus, the repairs do not entail upgrades to seismic design or geometry issues. Furthermore, the SERP would not include the construction of any pipelines, permanent roadways, bridges, or structures intended for human habitation. All erosion repairs would be designed using the approved SERP templates supported by the

results of geotechnical engineering evaluation. Therefore, because the SERP sites would not likely experience strong seismic ground shaking, and erosion repairs would meet or exceed applicable design standards, this impact would be less than significant.

No mitigation is required.

IMPACT 3.5-3 ***Geologic Hazards from Liquefaction, Unstable Soils, and Shrink-Swell Potential.*** *The Phase 1 SERP coverage area is located within an area that could be subject to geologic hazards from liquefaction, unstable soils, and shrink-swell potential. However, the erosion repairs would be engineered to withstand these hazards, and therefore this impact would be* ***less than significant****.*

Levees are subject to two types of hazards related to liquefaction: (1) as induced by seismic activity, and (2) as induced by construction activity in saturated soils. In the latter case, when loose, unconsolidated silty soils become saturated with water, the weight of construction equipment on those saturated soils can cause the sediments to liquefy and sink. Liquefaction of the levees could result in a direct hazard to construction workers and indirect hazards to residents in the area from flooding and to aquatic habitat from increased sediment transport in stream channels. Construction on portions of the levees that consist of unstable soils could result in the same direct and indirect hazards.

Sediments that were used to construct the existing levees vary depending on the location. In many locations, particularly where more recent levee repair work has occurred, levee materials consist of older Pleistocene-age fill material from borrow sites that have been engineered, designed, and compacted specifically to withstand potential damage from liquefaction. However, in locations where the levees are older, levee fill materials consist of loosely compacted and/or silty or clayey Holocene-age fill material that could be unstable, subject to liquefaction, or have a high shrink-swell potential.

As shown in the engineering design templates attached to this DEIR as Appendix B, the erosion repairs would be specifically engineered to account for stability factors and safety coefficients, including liquefaction, unstable soils, and shrink-swell potential. As further stated by DWR engineers (McGrath, pers. comm., 2009; Eckman, pers. comm., 2009), on-site soil investigations would be made by a qualified engineer at each erosion site and repairs would be designed to appropriately withstand these hazards. Therefore, this impact would be less than significant.

No mitigation is required.

IMPACT 3.5-4 ***Potential for Substantial Erosion.*** *The SERP has been specifically designed to reduce erosion. Therefore, this impact would be* ***beneficial****.*

The purpose of implementing the SERP is to expeditiously repair existing erosion sites to maintain the SRFCP integrity and prevent further erosion from occurring at those sites to reduce the flood risk and maintain riparian and nearshore aquatic habitat. DWR staff members would select specific sites for erosion repair on a case-by-case basis and would conduct a baseline assessment at each site in accordance with Section B of the SERP Manual (Appendix B) to evaluate and document the erosion damage. The erosion repair templates have been designed to be self-mitigating through incorporation of bioengineering erosion control methods. Erosion repair at each site would involve one of the following methods:

- bank fill rock slopes with live pole planting,
- willow wattle with rock toe,
- branch layering,
- rock toe with live pole planting,
- soil and rock fill at the base of a fallen tree,
- bank fill rock slope with native grass planting, or
- bank fill rock slope with emergent vegetation planting.

Engineering design schematics for each of these erosion repair options are shown in Templates 1–7, in Section C of the SERP Manual (Appendix B). Maximum slopes associated with the repairs would range from 3:1 to 1:1. Each of the erosion repair options would involve placing a varying amount and composition of rock riprap and/or soil or vegetation. The project engineer would use a DWR-approved rock sizing chart as a guide to determine appropriate rock size and weight based on local scour velocities, with adjustments for bank angle, bend hydraulics, stability factors, and safety coefficients. Appropriate locations for each type of erosion repair would be determined on a case-by-case basis by the project engineer.

DWR would also conduct multiyear monitoring of each SERP repair site within the Phase 1 coverage area and would submit annual monitoring reports to the appropriate regulatory agencies to track and evaluate the success of the SERP.

Because the SERP would implement repair mechanisms to address erosion, this impact would be beneficial.

No mitigation is required.

IMPACT 3.5-5 ***Potential Damage to Unknown, Unique Paleontological Resources during Earthmoving Activities.*** *Portions of the Phase 1 SERP coverage area may be located within areas having high potential for paleontological resources. However, native soils are unlikely to be disturbed, and therefore this impact would be* ***less than significant****.*

As described in Sections B and C of the SERP Manual, potential SERP projects would be categorized into two tiers, based on the size of the project disturbance area, and then DWR would identify the appropriate preapproved SERP design template to be applied. The Phase 1 SERP would have a maximum of 15 projects per year that could include any combination of the following:

> Tier 1: The footprint of new bank protection materials, including any additional vegetated area that would be disturbed by equipment during construction, would be 0.1 acre or less with a maximum linear foot limit of 264 feet.
>
> Tier 2: The footprint of new bank protection materials, including any additional vegetated area that would be disturbed by equipment during construction, would be 0.5 acre or less with a maximum linear foot limit of 1,000 feet.

Thus, the total acreage disturbed during the Phase 1 SERP could range from 1.5 to 7.5 acres per year. Erosion repair at each site would involve one of the following methods:

- bank fill rock slopes with live pole planting,
- willow wattle with rock toe,
- branch layering,
- rock toe with live pole planting,
- soil and rock fill at the base of a fallen tree,
- bank fill rock slope with native grass planting, or
- bank fill rock slope with emergent vegetation planting.

The Modesto and Riverbank Formations are of high paleontological sensitivity because of the large number of Pleistocene-age fossils that have been recovered from those formations throughout the Central Valley. Although these formations may be located on the landside of and/or underneath existing levees, they are present only in certain locations rather than throughout the length of the levees. Based on the types of repair methods and the fact that SERP projects would take place primarily within existing levees, very little excavation is likely to occur within native soils (if any). If earth-moving activities were to occur within either of these rock formations (depending on a specific project location), considering the extremely small size of the projects (1.5 to 7.5 acres total per year) and the low probability that any construction project would encounter unique paleontological resources, this impact would be less than significant.

No mitigation is required.

3.5.5 RESIDUAL IMPACTS

Implementation of the SERP would not result in significant impacts on geology, soils, or paleontological resources; therefore, no mitigation is required, and no significant and unavoidable impacts would occur.

3.6 HYDROLOGY AND WATER QUALITY

3.6.1 INTRODUCTION

This section describes the SERP's impacts on hydrology and water quality. Specifically, it discusses the laws and policies relevant to hydrology and water quality, describes the existing hydrologic and water quality conditions in the Phase 1 SERP coverage area, and identifies the significant impacts that may result from the program, as well as mitigation measures to avoid or reduce those impacts.

3.6.2 REGULATORY SETTING

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

Federal Clean Water Act

The U.S. Environmental Protection Agency (EPA) is the lead federal agency responsible for managing water quality. The Clean Water Act (CWA) of 1972 is the primary federal law that governs and authorizes EPA to implement activities to control water quality and is the major federal legislation governing the water quality aspects of the project. The objective of the act is "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The CWA establishes the basic structure for regulating discharge of pollutants into the waters of the United States and gives EPA the authority to implement pollution control programs. EPA has delegated to the State of California the authority to implement and oversee most of the programs authorized or adopted for CWA compliance through the state's Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act), which is described below. The various elements of the CWA that address water quality and are applicable to the proposed program are discussed below.

Section 401 Water Quality Certification

Section 401 of the CWA requires an applicant for any federal license or permit (e.g., a section 404 permit, described below) that may result in a discharge into waters of the United States to obtain a certification that the discharge would comply with provisions of the CWA. Because the authority to implement this program has been delegated by EPA to the individual states, the certification is described more fully below. The State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards (RWQCBs) administer this program. RWQCBs administer the program in most cases, but the SWRCB issues 401 certifications for projects that would take place in two or more regions. Any condition of a 401 certification (or water quality certification), as well as the federal antidegradation analysis, would be incorporated into the USACE section 404 permit. Compliance with CWA section 401 for the SERP would be achieved through development of a programmatic 401 water quality certification from the Central Valley RWQCB. Issuance of a 401 water quality certification or

waiver from the Central Valley RWQCB is a requirement for issuance of the SERP Regional General Permit (RGP) from USACE.

Section 402 National Pollutant Discharge Elimination System

Section 402 of the CWA established a permit system known as the National Pollutant Discharge Elimination System (NPDES) to regulate point sources of discharges in navigable waters of the United States. In California, EPA has granted the SWRCB and RWQCBs the authority to issue NPDES permits to point-source dischargers. Under Section 401 of the CWA (discussed above) and the Porter-Cologne Water Quality Control Act (discussed further below), the state also issues either waste discharge requirements (WDRs) or conditioned water quality certification for other discharges.

Section 404 Discharge of Dredged or Fill Materials

In accordance with CWA section 404, USACE regulates and issues permits for activities that involve the discharge of dredged or fill materials into waters of the United States, which include navigable waters of the United States, interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. While important to water quality, the section 404 program primarily addresses overall aquatic habitat functions and is therefore addressed in more detail in Section 3.3, “Biological Resources.” Compliance with CWA section 404 for the SERP would be achieved through issuance of an RGP from USACE.

Water Quality Criteria and Standards

In accordance with federal law, EPA has published water quality regulations under Volume 40 of the Code of Federal Regulations (40 CFR). Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards consist of two elements: (1) designated uses of the water body in question, and (2) criteria that protect the designated uses. Section 304(a) requires EPA to publish advisory water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use. In California, EPA has granted SWRCB and the RWQCBs the authority to identify beneficial uses and adopt applicable water quality objectives.

Section 303(d) Impaired Waters List

Under section 303(d) of the CWA, states, territories, and tribes are required to develop an impaired water list of all water bodies where pollution controls are not sufficient to attain or maintain applicable water quality standards. The law requires that states establish a prioritized

schedule for waters on the lists and develop a total maximum daily load (TMDL) for the identified waters based on the severity of the pollution and the sensitivity of the uses to be made of the waters. The TMDL is the amount of the identified pollutant(s) (i.e., the loading) that the water body can receive and still be in compliance with water quality standards. The TMDL can also act as a plan to reduce loading of a specific pollutant from various sources to achieve compliance with water quality goals and objectives. After implementation of the TMDL, it is anticipated that the problems that led to placement of a given pollutant on the Section 303(d) list would be remediated. Six waterway segments within the Phase 1 SERP coverage area are listed on the 303(d) Impaired Waterways List. These waterways are described in Section 3.6.3, “Environmental Setting,” below.

National Toxics Rule and California Toxics Rule

In 1992, pursuant to the CWA, EPA issued the National Toxics Rule (NTR) to establish numeric criteria for priority toxic pollutants for California. The State must use these criteria together with the State's existing water quality regulations when controlling pollution in inland waters and enclosed bays and estuaries. The NTR established water quality criteria for 42 pollutants not covered, at that time, under California’s statewide water quality regulations. In May 2000, EPA issued the California Toxics Rule (CTR) that issued numeric criteria for priority pollutants not included in the NTR. The CTR documentation (65 *Federal Register* 31682, May 18, 2000) “carried forward” the previously issued criteria of the NTR, thereby providing a single document listing California’s fully adopted and applicable water quality criteria for priority pollutants.

National Flood Insurance Program and Flood Insurance Rate Maps

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program to provide subsidized flood insurance to communities that comply with FEMA regulations that limit development in floodplains. FEMA also issues Flood Insurance Rate Maps (FIRMs) that identify which land areas are subject to flooding. These maps provide flood information and identify flood hazard zones in the community. The design standard for flood protection covered by the FIRMs is established by FEMA, with the minimum level of flood protection for new development determined to be the 1-in-100 annual exceedance probability (AEP) (i.e., the 100-year flood event). As developments are proposed and constructed, FEMA is also responsible for issuing revisions to FIRMs, such as Conditional Letters of Map Revision and Letters of Map Revision, through the local agencies that work with the National Flood Insurance Program. FEMA 100- and 500-year Flood Zone areas in the Phase 1 SERP coverage area are shown in Exhibit 3.6-1.

Executive Order 11988

Executive Order 11988 (Floodplain Management, 44 CFR Part 9) addresses floodplain issues related to public safety, conservation, and economics. Executive Order 11988 generally requires federal agencies constructing, permitting, or funding a project to:

- avoid incompatible floodplain development,
- be consistent with the standards and criteria of the National Flood Insurance Program, and
- restore and preserve natural and beneficial floodplain values.

The SERP would reduce the risk of flood loss and minimize the impact of floods on human health, safety, and welfare by strengthening existing flood damage reduction infrastructure.

Section 10 of the Rivers and Harbors Act

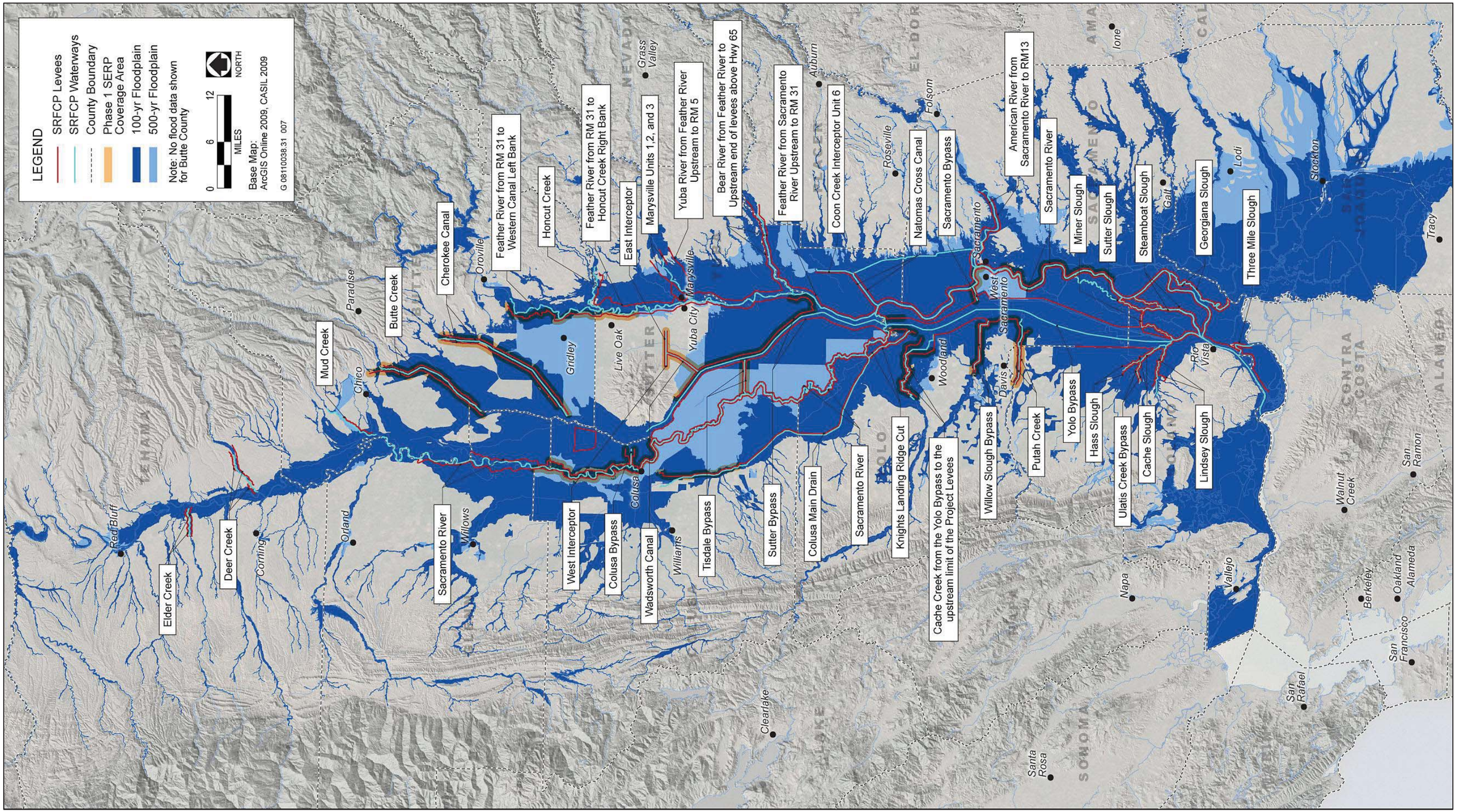
Section 10 of the Rivers and Harbors Act (33 U.S. Code 401 et seq.) requires authorization from USACE for the construction of any structure over, in, or under navigable waters of the United States. In addition, authorization is required for excavation/dredging or deposition of material or any obstruction or alteration in navigable waters. Navigable waters are those subject to the ebb and flow of the tide and those that are presently used, have been used in the past, or may be susceptible to use to transport interstate or foreign commerce (55 CFR 329.4). Compliance with section 10 of the Rivers and Harbors Act would be achieved through issuance of a regional general permit (RGP) from USACE.

State Plans, Policies, Regulations, and Laws

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act of 1969 is California's statutory authority for the protection of water quality. Under the act, the state must adopt water quality policies, plans, and objectives that protect the state's waters for the use and enjoyment of the people. In 1972, the Porter-Cologne Act was amended to delegate California with the authority and ability to operate as the state water pollution control agency for all purposes under the Clean Water Act, including the NPDES permit program. This law also requires regional water quality plans to be adopted and implemented by issuing waste discharge requirements (WDRs) to each discharger of waste that could affect the waters outside of Federal Jurisdiction or "waters of the state".

Regional authority for planning, permitting, and enforcement is delegated to the nine RWQCBs. The RWQCBs are required to formulate and adopt water quality control plans (known as basin plans) for all areas in the region and establish water quality objectives in the plans. The Phase 1 SERP coverage area is within the jurisdiction of the Central Valley RWQCB.



Source: DWR 2009, FEMA 2009, Adapted by AECOM 2013

Exhibit 3.6-1 **100-Year and 500-Year Floodplains**

NPDES Permit System

SWRCB and Central Valley RWQCB have adopted specific NPDES permits for a variety of activities that have potential to discharge wastes to surface water bodies. The SWRCB General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order 2009-0009-Division of Water Quality [DWQ]) is applicable to all land-disturbing construction activities that would affect 1 acre or more. Some NPDES permits may also serve as WDRs, as discussed further below. The Tier 1 SERP projects would disturb 0.1 acre or less of nonadjacent area and the Tier 2 projects would disturb 0.5 acre or less of nonadjacent area. Thus, SERP projects would not be subject to this permit, although they would be subject to county sediment and erosion control measures at the local level.

The Central Valley RWQCB general NPDES permit for construction dewatering activity (Order No. R5-2008-0081) authorizes direct discharges to surface waters up to 250,000 gallons per day for no more than a 4-month time period each year. No site dewatering activities would occur, however, including temporary diversion of flows around the work area, unless deemed necessary by the California Department of Fish and Wildlife and U.S. Fish and Wildlife Service, to avoid impacts to giant garter snake.

Water Quality Control Plan for the Sacramento River and San Joaquin River Basins and Waste Discharge Requirements

The Central Valley RWQCB is responsible for preparing and implementing the *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* (Basin Plan), adopted in 1998 and revised in October 2007 (Central Valley RWQCB 2007). The Basin Plan identifies the beneficial uses of water bodies and provides water quality objectives for waters of the Sacramento River and San Joaquin River hydrologic regions. Federal and state laws mandate the protection “beneficial uses” of water bodies. State law defines beneficial uses as “domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves” (Water Code section 13050[f]). Beneficial uses of the water bodies in the Phase 1 SERP coverage area are shown in Table 3.6-2.

Cherokee Canal, Colusa Bypass, Sacramento Bypass, Tisdale Bypass, Wadsworth Canal, and Willow Slough Bypass (see Exhibit 3.6-1 for the Phase 1 SERP coverage area) do not currently have any specifically designated beneficial uses attributed to them in the Basin Plan. Consequently, the Central Valley RWQCB applies the Basin Plan’s “tributary rule” and assigns to these creeks the beneficial uses designated for the nearest downstream location.

The Central Valley RWQCB also regulates waste discharges in undesignated streams to ensure that downstream water quality conditions and beneficial uses are not degraded. Thus, these creeks are subject to regulation for the existing beneficial uses in their receiving water bodies.

On May 4, 2004, the SWRCB adopted State Water Board Order No. 2004-0004-DWQ, Statewide General Waste Discharge Requirements for Dredged or Fill Discharges to Waters Deemed by the 28 USACE to be Outside of Federal Jurisdiction (General WDRs). The General WDRs are intended to cover small-scale projects (small acreage or linear feet and those involving a small volume of discharged dredged material with few or no permanent impacts for which USACE "disclaims" Federal jurisdiction.

General WDRs for Dredged or Fill Discharges, State Water Board Order No. 2003-0017-DWQ, are for projects that have received State water quality certification. These General WDRs are restricted to dredged or fill discharges of not more than 0.2 acre and 400 linear feet for fill and excavation discharges, and not more than 50 cy for dredged discharges. For larger projects, the RWQCBs issues Individual WDRs. Certification and issuance of WDRs are overlapping regulatory processes that are both administered by the SWRCB and RWQCBs.

SWRCB Resolution No. 68-16

SWRCB Resolution No. 68-16 contains the state antidegradation policy, which is titled "Statement of Policy with Respect to Maintaining High Quality Waters in California." SWRCB has interpreted Resolution No. 68-16, a predecessor to the federal policy, to incorporate the federal antidegradation policy where the federal policy applies (Order No. WQ 86-17). The state antidegradation policy applies more comprehensively to water quality changes than the federal policy. In particular, the state policy applies to all waters of the state, including both groundwater and surface water, whose quality meets or exceeds water quality objectives. The policy states that the disposal of wastes into state waters shall be regulated to achieve the highest water quality consistent with maximum benefit to the people of the state and to promote the peace, health, safety, and welfare of the people of the state. Compliance with SWRCB Resolution No. 68-16 would be achieved through a programmatic water quality certification from the Central Valley RWQCB and a section 404 RGP from USACE.

California Water Code

Among the many sections of the California Water Code that are related to the State's responsibilities, sections 8350, 8361, 12648, and 12878 authorize DWR to maintain federal project levees of the Sacramento River Flood Control Project.

Title 23

CCR Title 23 contains regulations and guidelines to regulate the modification and construction of levees and floodways to ensure public safety. The regulations state that review and an encroachment permit from the Central Valley Flood Protection Board (CVFPB) are required for any project or plan of work that is within federal flood control project levees and within a board easement, may have an effect on the flood control functions of project levees, is within a board

designated floodway, or is within regulated Central Valley streams listed in Table 8.1 in Title 23 of the CCR.

Following a review of the regulations, and SERP geotechnical designs and hydrologic analysis, the CVFPB passed Resolution 2012-20 on April 27, 2012, deeming all SERP program activities to be operations and maintenance activities not requiring CVFPB encroachment permits. The Resolution also directed CVFPB staff to assist DWR as necessary to finalize the SERP Manual, including geotechnical and hydraulic analysis review procedures, long-term vegetation maintenance procedures, and SERP member agency and public notification procedures; to review annual SERP repair proposals for conformance with the SERP Manual; and to provide an annual report on the SERP to the CVFPB including a detailed listing of annually authorized SERP sites.

REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

Integrated Regional Water Management Plans

As a result of the passage in 2002 of Proposition 50, the Water Security, Clean Drinking Water, Coastal and Beach Protection Act, Integrated Regional Water Management Plans (IRWMPs) are required for regional management of water resources in at least four main areas: water supply, groundwater management, ecosystem restoration, and water quality. Projects and programs included in IRWMPs are designed to integrate multiple strategies and projects to provide multiple benefits both locally and regionally.

Several IRWMPs within the Phase 1 SERP coverage area spatially overlap and thus provide a forum for coordination. The Sacramento Valley IRWMP shares planning areas with the Upper Feather River IRWMP, the Four County IRWMP, and the American River Basin IRWMP.

County General Plans

The Phase 1 SERP coverage area includes six California counties (i.e., Sacramento, Yolo, Solano, Sutter, Colusa, and Butte), as shown in Exhibit 2-1 of Chapter 2, “Project Description.” Each of these counties has general plans with unique goals and policies that address construction practices with respect to erosion control, flood control, and water quality best management practices (BMPs). The breadth of these goals and policies precludes comprehensive coverage here.

3.6.3 ENVIRONMENTAL SETTING

CLIMATE AND PRECIPITATION

The Phase 1 SERP coverage area is located in the Sacramento River hydrologic region, which covers 27,210 square miles and includes the entire area drained by the Sacramento River

(Exhibit 3.6-1). For planning purposes, this includes all watersheds tributary to the Sacramento River that are north of the Cosumnes River watershed (Central Valley RWQCB 2007:1-1). The Phase 1 levees from Butte Creek in the north to the Cache Creek north levee in the south are within the Colusa Basin Hydrologic Unit. The Cache Creek south levee, Willow Slough, and Putah Creek are within the Valley Putah-Cache Basin Hydrologic Unit, and the Sacramento River segment to the east is within the Sacramento Delta Hydrologic Unit. The Sacramento Valley floor has a typical Mediterranean climate, with mild winters during which the majority of precipitation occurs, and hot dry summers. Overall annual precipitation in the region generally increases from south to north and west to east. The heavy snow and rain that falls in this region contributes to the overall water supply for the entire state. Average annual rainfall in the Phase 1 SERP coverage area ranges from 15 to 22.5 inches (FRAP 2007).

Topography and Land Cover

The Phase 1 SERP coverage area is within the Sacramento Basin, with generally flat topography. The Sacramento Basin is bounded by the Sierra Nevada to the east and the Coast Ranges and San Francisco Bay to the west. Most of the valley floor is close to sea level, with most of the valley boundary along the eastern edge approximately 500 feet above sea level and most of the western boundary ranging from 50 feet to 350 feet above sea level (Faunt 2009).

The Sacramento River supports about 2,145,000 acres of irrigated agriculture (22% of the state total). About 1,847,000 acres are irrigated on the valley floor. Crop statistics show that irrigated agricultural acreage in the region peaked during the 1980s and has since declined. The main reason for this decline is the conversion of irrigated agricultural lands to urban development and managed wetlands. Urban use occurs in smaller areas of the valley and is dispersed along the major transportation routes. A few of the larger cities in the region take the major share of their water supplies from major rivers, but throughout most of the Sacramento River region, groundwater is the principal source of water for urban and rural dwellers. In the rural mountain areas of the region, domestic supplies come almost entirely from groundwater (DWR 2009a:8).

Surface Water

The Phase 1 SERP coverage area encompasses the Lower Sacramento River reach and tributaries (Exhibit 3.6-1). The Lower Sacramento River is generally defined as the portion of the river from Princeton (in Colusa County) to the Sacramento–San Joaquin Delta (Delta), at Chipps Island. Flows in the Lower Sacramento River are largely controlled by Shasta and Keswick Dams on the Upper Sacramento River. Shasta Dam provides flood protection for the Sacramento area and is part of the Central Valley Project operated by the U.S. Bureau of Reclamation. The portion of the Lower Sacramento River that forms the west border of the

region is predominantly channelized, has levees, and is bordered by agricultural lands and the county and city of Sacramento (DWR 2009a:6).

All waterways in the Phase 1 SERP coverage area are tributary to the Sacramento River:

- Putah Creek begins on Boggs Mountain south of Clear Lake, drains into Lake Berryessa, passes through Winters and Davis, and flows across the Sacramento Valley to end at the Yolo Bypass.
- Cache Creek begins in Lake County about 9 miles north of Clear Lake; many tributaries enter the lake, but the North Fork bypasses to the east through Indian Valley Reservoir. The creek traverses Capay Valley and the Sacramento Valley floor, passing near Woodland to end at the Yolo Bypass.
- The Feather River begins on the Sierra crest from Donner Summit to its northern end and in the Cascades west of Honey Lake. The system passes through several major reservoirs including Lake Almanor, Lake Oroville, and New Bullards Bar Reservoir. The river reaches the valley floor and flows along the east side of the valley, joining the Sacramento River at Verona.
- Butte Creek begins in northern Butte County, passes near Paradise and southeast of Chico, and ends at the Butte Sink west of the Sutter Buttes.

Table 3.6-1 lists the CWA section 303(d) impaired water body segments in the Phase 1 SERP coverage area.

Table 3.6-2 shows the designated beneficial uses for the water bodies in the Phase 1 SERP coverage area as defined by the Basin Plan.

GROUNDWATER

The Phase 1 SERP coverage area is located within the Sacramento Valley subregion of the Central Valley aquifer. Groundwater quality in the Sacramento River subregion is generally good, although there are localized problems (DWR 2003).

The major source of groundwater recharge in the Sacramento Valley subregion is natural recharge (i.e., precipitation). Large-scale groundwater development for both agricultural and urban uses has modified the groundwater levels and flow patterns relative to predevelopment conditions in the Sacramento Valley. Groundwater flow has become more rapid and complex, with groundwater pumpage and application of excess irrigation water resulting in steeper hydraulic gradients and shortened flow paths between sources and sinks (Faunt 2009:79)

Table 3.6-1 CWA Section 303(d)-Listed Water Body Segments in Phase 1 SERP Coverage Area		
Water Body	**Pollutant/Stressor**	**Potential Sources**
Sacramento River (Red Bluff to the Delta)	Mercury	Resource Extraction (mercury listing only applies to the area from Hamilton City downstream to Knights Landing)
	Unknown Toxicity	Source Unknown
Colusa Basin Drain	Azinphos-methyl; Carbofuran; Diazinon; Group A Pesticides; Malathion; Methyl Parathion; Unknown Toxicity	Agriculture
	Molinate/Ordram	Agriculture—irrigation tailwater
Feather River, Lower (Lake Oroville Dam to Confluence with Sacramento River)	Chlorpyrifos; Unknown Toxicity	Source Unknown
	Group A Pesticides	Agriculture
	Mercury	Resource Extraction
Wadsworth Canal	Diazinon	Agriculture
Cache Creek, Lower (Clear Lake Dam to Cache Creek Settling Basin near Yolo Bypass)	Unknown Toxicity	Source Unknown
Putah Creek (Solano Lake to Putah Creek Sinks)	Mercury	Resource Extraction
Source: SWRCB 2007		

Table 3.6-2
Designated Beneficial Uses of Water Bodies in the Phase 1 SERP Coverage Area

Beneficial Use	Butte Creek—Below Chico	Colusa Basin Drain	Sutter Bypass	Feather River	Cache Creek (a)	Putah Creek	Sacramento River	Yolo Bypass
Municipal and Domestic Supply		√		√	√	√	√	
Agriculture—Irrigation	√	√	√		√	√	√	√
Agriculture—Stock Watering	√	√			√	√	√	√
Industry—Process					√	√		
Industry—Service Supply					√		√	
Industry—Power				√		√	√	
Recreation—Contact	√	√	√	√	√	√	√	√
Recreation—Canoeing and Rafting	√	√		√	√	√	√	
Recreation—Other Noncontact		√		√	√	√	√	√
Freshwater Habitat—Warm	√	√	√		√	√	√	√
Freshwater Habitat—Cold	√	√		√	√	√	√	√
Migration—Warm		√			√			√
Migration—Cold		√	√		√			√
Spawning—Warm	√	√			√	√	√	√
Spawning—Cold		√	√	√	√		√	
Wildlife Habitat	√	√	√	√	√	√	√	√
Navigation				√			√	

Source: Central Valley RWQCB 2007
(a) The following beneficial uses also exist for Clear Lake tributaries. Mud Slough (north): Commercial and Sports Fishing (COMM) and Shellfish Harvesting (SHELL); Salt Slough: COMM, Preservation of Biological Habitats of Special Significance (BIOL), SHELL; Wetland Water Supply Channels: BIOL; Clear Lake: COMM. The following Beneficial uses exist for Cache Creek from Clear Lake to Yolo Bypass and in the following tributaries only: North Fork Cache Creek and Bear Creek.

DRAINAGE

Water use in the Sacramento River region is mostly for agricultural production with more than 2 million irrigated acres in 2000. Much of the economy of the region relies on agricultural water supplies, which are diverted and distributed through extensive systems of canals and drains. Basinwide water use efficiency is generally high, because many return flows from fields are captured by drainage systems and then resupplied to other fields downstream. The larger urban areas in the region have developed near major rivers, so surface water diversions are a key component of municipal water supplies (DWR 2009a:12).

LEVEES AND FLOODING

Floods within the Phase 1 SERP coverage area originate principally from heavy rainfall, rarely from snowmelt. Most flood events occur in December and January as a result of multiple storms and saturated soil conditions, but floods can occur in October and November or during late winter or early spring. Flood hazards in the region include (DWR 2009b:15–16):

- 100-year flood zones (Exhibit 3.6-1);
- 500-year flood zones (Exhibit 3.6-1);
- highways and roads vulnerable to the 100-year flood;
- insufficient capacity of some existing culverts and channels to carry flow resulting from the 100-year flood;
- some existing levees of unsound, porous, or unknown composition;
- some existing levees that are unable to retain the 100-year flood; and
- insufficient flood flow capacity due to structural constraints (e.g., levees constructed too close to the channel).

3.6.4 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the CEQA Guidelines, the SERP would result in a significant impact on drainage, hydrology, or water quality if it would:

- violate any water quality standards or waste discharge requirements, including NPDES waste discharge or stormwater runoff requirements, state or federal antidegradation policies, enforceable water quality standards contained in the Central Valley RWQCB Basin

Plan or statewide water quality control plans, or federal rulemakings to establish water quality standards in California;

- otherwise substantially degrade water quality through contribution of additional sources of polluted runoff;
- create or contribute runoff water that would exceed the capacity (peak flow) of existing or planned stormwater drainage systems;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on-site or off-site, or result in increased flooding on- or off-site;
- substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a substantial lowering of the level of the local groundwater table;
- place within a flood hazard area structures that would impede or redirect flood flows;
- expose 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; or
- result in inundation by seiche, tsunami, or mudflow.

For purposes of these thresholds, “flood hazard area” means an area that does not meet the minimum level of flood protection required by state or federal law, whichever is more stringent. Reduction of the risk of flooding caused by a 100-year flood was the standard applicable until the Central Valley Flood Protection Act of 2008, (Senate Bill [SB] 5), defined more stringent objectives for reducing the risk of flooding in the Central Valley, namely, either reduction of flood risk from a 200-year flood or “adequate progress” toward meeting the 200-year standard for flood risk reduction by 2025. The Central Valley Flood Protection Plan was developed to comply with objectives outlined in SB 5, and was adopted on June 29, 2012 by the CVFPB.

Impacts Not Discussed Further in This EIR

Because the SERP involves erosion repair and maintenance at currently undefined sites along existing levees, the analysis assumes that no new permanent housing, which would be subject to flood hazards, would be constructed because of the erosion repairs. Furthermore, the intent of the SERP is to repair small erosion sites within the same year, before they can expand into larger erosion areas that might threaten levee stability and thus the safety of nearby housing. Therefore, the SERP would have a beneficial impact on housing within a 100-year flood hazard area by reducing the risk of flooding at repaired erosion sites.

Impacts related to depletion of groundwater supplies or interference with groundwater recharge that could affect the level of the local groundwater table are not evaluated further in this DEIR. SERP activities would not require the use of groundwater, nor result in additional impervious surfaces that could interfere with groundwater recharge. No SERP activities would require excavation to groundwater. Levee cutoff (slurry) walls, which could affect flow exchange between a river and groundwater, are also not included as a SERP activity.

Although much of the low-lying valley area where the Phase 1 SERP coverage area is located is exposed to potential flooding from catastrophic failure of the major dams located upstream—Black Butte, Oroville, New Bullards Bar, and Folsom Dams—SERP activities would not increase the potential for dam failure.

Earthquakes can create hazards in relation to open bodies of water in two ways: by creating seismic sea waves (tsunamis) and by creating seiches. No project components would be subject to tsunamis because the Phase 1 SERP coverage area is not in the tsunami inundation zone (DOC 2007); the area is too distant from the ocean. Seiches are earthquake-induced oscillations of water, which can occur for a few minutes or several hours, in an enclosed or restricted water body such as a basin, river, or lake. Because the Delta consists of a network of interconnected bays and sloughs, any waves generated in a portion of this water body by an earthquake would likely be damped and would not develop a substantial “back and forth” motion of sufficient magnitude to overtop the levees. Seiches are unlikely to develop in the river systems north of the Delta because of the long distance from active seismic sources. For these reasons, these impacts are not evaluated further in the DEIR.

The topography within and surrounding the coverage area is relatively level and not subject to mudflow, and erosion repairs would be intended to repair and/or prevent mudflow and other types of erosion at the individual sites. These impacts are not evaluated further in this DEIR. Erosion control measures discussed in Impact 3.6-1 below would prevent localized mudflow to receiving waters due to construction on levees.

Analysis Methodology

This impact analysis assumes that hydrology and/or water quality could be affected by proposed program actions. Impacts caused by program actions potentially affecting hydrology and water quality are:

- accidental spills of petroleum products or drilling lubricants;
- removal or disturbance of vegetation;
- removal, disturbance, or exposure of soils;
- temporary runoff of petroleum products, concrete, or other construction-related materials;
- disturbance, removal, or burial of stream channel substrate;
- alteration or arrest of fluvial sediment processes;

- alteration of channel dimensions;
- temporary mobilization of fine sediment in surface water; and
- discharge of effluent containing contaminants related to program activities.

Effects associated with hydrology and water quality that could result from construction and operational activities related to SERP activities were evaluated based on the criteria described in Chapter 2, "Project Description," including expected construction practice, materials used, and locations and duration of the construction activities. Project effects were compared to environmental baseline conditions (i.e., existing conditions) to determine the duration and magnitude of impacts, consistent with the CEQA Guidelines. The impact analysis assumes that DWR would conform to the latest requirements and standards pertaining to construction, maintenance, and runoff, and conform to the performance standards listed in the SERP Manual, provided in Appendix B of this DEIR.

Impact Analysis

IMPACT 3.6-1 ***Temporary Water Quality Effects from Stormwater Runoff, Erosion, and Spills Associated with Construction.*** *The programmatic approval of erosion repairs under the SERP would enable DWR to implement repair activities within the same year that the damage is identified, reducing the amount of levee-side erosion and sedimentation that take place between identification of the damage and completion of the repair. Ground-disturbing activities associated with project construction could cause soil erosion and sedimentation of local drainages and waterways. Construction activities could also discharge waste petroleum products or other construction-related substances that could enter these waterways in runoff. These discharges could adversely affect river water quality. Because mandatory conservation measures to prevent release of soil or other materials into these waters are incorporated into Section I of the SERP Manual and would be applied to all SERP projects, this impact would be* ***less than significant****.*

The Phase 1 SERP is proposed by DWR as a means to accomplish small (0.1- to 0.5-acre) erosion repairs along levees maintained by DWR within the SRFCP area. The programmatic approval of erosion repairs under the SERP would enable DWR to implement repair activities within the same year that the damage is identified, reducing the amount of levee-side erosion and sedimentation that take place between identification of the damage and completion of the repair. A benefit of the SERP is that it reduces the hydrology and water quality effects of ongoing erosion damage on levees within the Phase 1 SERP coverage area.

Project construction activities would include use of construction equipment (bulldozers, trucks, barges, and excavators) for vegetation clearing, soil and riprap material placement, incorporation of plantings, and demobilization/cleanup. These activities have the potential to temporarily impair water quality because the discharge into receiving waters of construction-related wastes could include disturbed and eroded soil and petroleum products. Soil and

associated contaminants that enter receiving waters through stormwater runoff and erosion can increase turbidity, stimulate algae growth, increase sedimentation of aquatic habitat, and introduce compounds that are toxic to aquatic organisms. Accidental spills of construction-related substances such as oils, fuels, and levee repair materials can contaminate both surface water and groundwater. The extent of potential water quality effects would depend on the tendency for the soil types encountered to erode, the SERP design template used, the extent of the disturbed area, the duration of construction activities, the timing of particular construction activities as related to the rainy season, and the sensitivity of receiving water bodies to contaminants of concern.

Section I of the SERP Manual (Appendix B of this DEIR) contains conservation measures that are incorporated into the program to prevent and minimize stormwater runoff, erosion, and spills associated with SERP activities such as discharges to receiving waters or off-site. The following is a summary of the requirements included in these measures:

Timing Restrictions. Construction activities in-water and outside of the stream channel in each of the four regions in the Phase 1 SERP coverage area will take place outside of the rainy season (i.e., between April 15 and October 15), unless written approval is obtained from the regulatory agencies (see Exhibit I-1 and Page I-3). Construction activities will be timed to avoid precipitation and increases in stream flow. If there is a chance of rain within 48 hours, the project site will be prepared with adequate erosion control measures to protect against wind and water erosion. Within 24 hours of any predicted storm event, construction activities within the stream zone will cease until all reasonable erosion control measures, inside and outside of the stream zone, have been implemented (Appendix B, SERP Manual, Section I, “Conservation Measures”).

Minimization of Vegetation and Habitat Disturbance. Disturbance to soil and vegetation will be limited to the actual site of the project, necessary access routes, and staging areas. The number of access routes, the size of staging areas, and the total area of the project activity will be limited to the minimum necessary for the erosion repair. All roads, staging areas, and other facilities will be placed to avoid and limit disturbance to streambank or stream channel habitat as much as possible. The amount of rock riprap and other materials used for bank protection will be limited to the minimum needed for erosion protection. All herbicides (and pesticides) used to control nonnative vegetation will be used in accordance with label directions. Methods and materials used for herbicide application will be in accordance with DWR’s most current guidelines on herbicide use and with laws and regulations administered by the Department of Pesticide Regulation (Appendix B, SERP Manual, Section I, “Conservation Measures”). It is anticipated that SERP projects will generally achieve “self-mitigation” for unavoidable impacts to biological resources through application of the bioengineering erosion control methodologies (Appendix B, SERP Manual, Section G, “Mitigation”).

Construction Equipment Staging. Construction materials such as portable equipment, vehicles, and supplies, including chemicals, will be stored at designated construction staging areas and on barges, exclusive of any riparian or wetland areas. Barges will be used to stage equipment and construct the project when practical to minimize noise and traffic disturbances and effects on existing landside vegetation. When barge use is not practical, construction equipment and plant materials will be staged in designated landside areas adjacent to the project sites (Appendix B, SERP Manual, Section I, “Conservation Measures”).

Material Stockpiling. Stockpiling of soil and grading spoils will occur in designated areas on the landside of the levee reaches or on offshore barges. Sediment barriers (e.g., silt fences, fiber rolls, straw bales) will be installed to intercept runoff and sediment during storm events, and stockpiles will be covered to provide further protection against wind and water erosion if necessary (Appendix B, SERP Manual, Section I, “Conservation Measures”).

Erosion Control During Construction. Erosion control measures (i.e., BMPs) that minimize soil or sediment from entering waterways and wetlands will be installed, monitored for effectiveness, and maintained throughout construction operations. DWR will ensure sand, sediment, or sediment-water slurry does not enter the stream channel. Adequate erosion control supplies (e.g., gravel, straw bales, shovels) will be kept at all construction sites during all construction and maintenance activities to ensure their availability to keep sand and sediments out of any water bodies. Precautions to minimize turbidity/siltation will be taken into account during project planning and will be implemented at the time of construction. All disturbed soils will undergo appropriate erosion control treatment (e.g., sterile straw mulching, seeding, planting) prior to the end of the construction season, or prior to October 15, whichever comes first (Section I, Conservation Measures).

Hazardous Materials. DWR will exercise every reasonable precaution to protect streams and other waters from pollution with fuels, oils, bitumens, calcium chloride, and other harmful materials. Gas, oil, or other petroleum products, or any other substances that could be hazardous to aquatic life and resulting from project-related activities, will be prevented from contaminating the soil and/or entering waters of the state and/or waters of the United States. No solid petroleum products, such as asphalt, concrete, or similar rubble, will be used. Construction vehicles and equipment will be checked daily for leaks and will be properly maintained to prevent contamination of soil or water from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease. A written Spill Prevention and Control Plan (SPCP) will be prepared, and the SPCP and all material necessary for its implementation will be accessible on-site prior to initiation of project construction, and throughout the construction period. The SPCP will include a plan for the emergency cleanup of any spills of fuel or other material. Employees will be provided the necessary information from the SPCP to prevent or reduce the discharge of pollutants from construction activities to waters and to use the appropriate measures should a spill occur. Any such spills, and the cleanup efforts, will be

reported in an incident report and submitted to the SERP agencies (Appendix B, SERP Manual, Section I, “Conservation Measures”).

Other Mandatory Conservation Measures. All materials placed in streams, rivers, or other waters will be nontoxic. No fill material other than silt-free gravel or riprap will be allowed to enter the live stream. Water containing mud or silt from construction activities will be treated by filtration, or retention in a settling pond, adequate to prevent muddy water from entering live streams (Appendix B, SERP Manual, Section I, “Conservation Measures”).

These measures require preparation and implementation of appropriate BMPs such as runoff source control, detention basins, revegetation, and erosion control, to maintain surface water quality conditions in adjacent receiving waters. Several technical studies have been conducted regarding the impacts of water quality control features on groundwater and surface water (e.g., *California Stormwater Best Management Practice Handbook* prepared by the Stormwater Quality Task Force [California Stormwater Quality Association 2003], *Preliminary Data Summary of Urban Storm Water Best Management Practices* [EPA 1999] and *Truckee River Basin Stormwater Management Program, Program Years 2007–2012* [Placer County 2007]). These studies have identified that water quality control features such as revegetation, erosion control measures, and detention and infiltration basins have been successful in controlling water quality and avoiding water quality impacts. Further, technical studies associated with the Truckee River Basin Stormwater Management Program demonstrated that the use of a variety of BMPs such as source control, detention basins, revegetation, and erosion control have maintained surface water quality conditions in adjacent receiving waters. Because these measures are included in the SERP Manual and are part of project implementation, the short-term construction-related drainage and water quality impact of SERP activities would be less than significant.

No mitigation is required.

IMPACT 3.6-2 ***Long-Term Water Quality Effects from the SERP.*** *No land use changes or additional impervious surfaces would result from SERP activities that could result in contaminant loading of local drainages or receiving waters. Erosion repairs would result in a reduction of sedimentation. This impact would be* ***less than significant****.*

No land use changes or additional impervious surfaces would result from SERP activities that could result in contaminant loading of local drainages or receiving waters. Additionally, the erosion repairs would lead to a reduction of sedimentation resulting from existing erosion at the site. Follow-up monitoring of each SERP repair site would also be conducted. Annual monitoring reports would be submitted to the SERP agencies. This compliance would result in a reduction of sedimentation to receiving water bodies because the small erosion sites would be repaired. Therefore, this impact would be less than significant.

No mitigation is required.

IMPACT 3.6-3 ***Potential Increased Risk of Flooding from Increased Stormwater Runoff.*** *The SERP activities would include access to and repair of small erosion sites at levees throughout the Phase 1 SERP coverage area. However, no additional permanent impervious surfaces or alteration of existing drainage patterns would result or increase stormwater runoff. Therefore, this impact would be* ***less than significant****.*

Under the SERP, disturbance to existing grades and vegetation would be limited to the actual site of the project, necessary access routes, and staging areas. SERP activities would not result in changes to the local drainage patterns. Existing rights-of-way would be used to the maximum extent practicable, and the number of access routes, the size of staging areas, and the total area of the project activity would be limited to the minimum necessary to achieve successful repairs. No additional permanent impervious surfaces, which could increase watershed flow rates above the natural background level (i.e., peak flow rates), would result from SERP activities. Therefore, this impact would be less than significant.

No mitigation is required.

IMPACT 3.6-4 ***Hydraulic Effects of the Proposed SERP.*** *The proposed SERP would result in up to 15 small erosion repair projects per year on small areas of levees within the SRFCP area. These projects would have essentially no impact on channel profiles, and have no impact on water surface elevations, including those associated with 100- and 200-year flood conditions upstream of, downstream of, or within the Phase 1 SERP coverage area. Therefore, there would be* ***no impact*** *on hydraulics.*

The SERP would allow up to 15 small levee erosion repair projects per year within the Phase 1SERP coverage area of approximately 306 miles of levees maintained by DWR (Exhibit 3.6-1) to maintain the flood control integrity of the SRFCP system. SERP activities maintain existing levees and do not result in additional levee construction; changes in channel profiles or hydraulics, or the raising of existing levees. SERP efforts result in small-scale repairs (i.e., 0.5 acre or 1,000 linear feet or less) designed to prevent larger erosion sites. Consequently, there would be no impact on water surface elevations, including those associated with 100-year and 200-year flood conditions, upstream of, downstream of, or within the Phase 1 SERP coverage area.

No mitigation is required.

3.6.5 Residual Impacts

Implementation of the SERP would not result in significant impacts on water quality or hydrology; therefore, no mitigation is required, and no significant and unavoidable impacts would occur.

3.7 NOISE

3.7.1 INTRODUCTION

This section describes the proposed program's impacts on noise levels and sensitive receptors. Specifically, it describes the existing noise conditions in the Phase 1 SERP coverage area, discusses relevant laws and policies, and identifies the significant impacts that may result from the program, as well as mitigation measures to avoid or reduce those impacts.

3.7.2 REGULATORY SETTING

FEDERAL PLANS, POLICIES, REGULATIONS, AND LAWS

To address the human response to groundborne vibration, the Federal Transit Administration (FTA) has established guidelines for maximum acceptable vibration criteria for different types of land uses. These guidelines recommend 65 vibration decibels (VdB) referenced to 1 microinch per second (µin/sec) and based on the root mean squared (RMS) velocity amplitude for land uses where low ambient vibration is essential for interior operations (e.g., hospitals, high-tech manufacturing, laboratory facilities); 80 VdB for residential uses and buildings where people normally sleep; and 83 VdB for institutional land uses with primarily daytime operations (e.g., schools, churches, clinics, offices) (FTA 2006:8-3).

STATE PLANS, POLICIES, REGULATIONS, AND LAWS

The *State of California General Plan Guidelines 2003*, published by the California Governor's Office of Planning and Research (OPR), provides guidance for the acceptability of certain types of development within areas of specific noise exposure. Table 3.7-1 presents acceptable and unacceptable community noise exposure limits for various land use categories (OPR 2003:244–254). The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

REGIONAL AND LOCAL PLANS, POLICIES, REGULATIONS, AND ORDINANCES

Overview

The Phase 1 SERP coverage area includes six counties (i.e., Sacramento, Yolo, Solano, Sutter, Colusa, and Butte). Each county has its own general plan policies and local ordinances. Within the counties, local municipalities also influence various aspects of land use through their own general plans and local codes.

Some counties located within the Phase 1 SERP coverage area have adopted construction noise exemptions, performance standards, and land use compatibility guidelines. Butte and

Table 3.7-1
OPR Guidelines for Land Use Noise Compatibility

Land Use Category	Community Noise Exposure (L_{dn} or CNEL, dB)			
	Normally Acceptable[1]	Conditionally Acceptable[2]	Normally Unacceptable[3]	Clearly Unacceptable[4]
Residential—low density single family, duplex, mobile home	<60	55–70	70–75	75+
Residential—multiple family	<65	60–70	70–75	75+
Transient lodging, motel, hotel	<65	60–70	70–80	80+
School, library, church, hospital, nursing home	<70	60–70	70–80	80+
Auditorium, concert hall, amphitheater		<70	65+	
Sports arenas, outdoor spectator sports		<75	70+	
Playground, neighborhood park	<70		67.5–75	72.5+
Golf courses, stable, water recreation, cemetery	<75		70–80	80+
Office building, business commercial and professional	<70	67.5–77.5	75+	
Industrial, manufacturing, utilities, agriculture	<75	70–80	75+	

Notes:
CNEL = community noise equivalent level; dB = A-weighted decibels; L_{dn} = day-night average noise level.
[1] Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
[2] New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh-air supply systems or air conditioning, will normally suffice.
[3] New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor areas must be shielded.
[4] New construction or development should generally not be undertaken.
Source: OPR 2003:244–254

Sacramento counties exempt construction noise during daytime hours. Sutter and Solano counties apply performance standards when evaluating construction noise ranging from 45 dB (nighttime) to 55 dB energy-equivalent noise level (L_{eq}) (daytime) at the property lines of noise-sensitive land uses. The general plans of Colusa and Yolo counties contain noise policies only to guide development.

Degradation of the Ambient Community Noise Environment

In community noise assessments, increases in community noise levels associated with implementation of a project are “generally not significant” if no noise-sensitive sites are located within the plan area or if the noise levels related to a project would not exceed +3 dB at noise-sensitive locations near the project (Caltrans 1998:40–43). Using a single value to evaluate an impact relating to a noise level increase does not account for the preexisting ambient noise environment to which people have become accustomed. Studies assessing the percentage of people who are highly annoyed by changes in ambient noise levels indicate that when ambient noise levels are low, a greater change is needed to cause a response. As ambient noise levels increase, less change in noise levels is required to elicit significant annoyance.

3.7.3 ENVIRONMENTAL SETTING

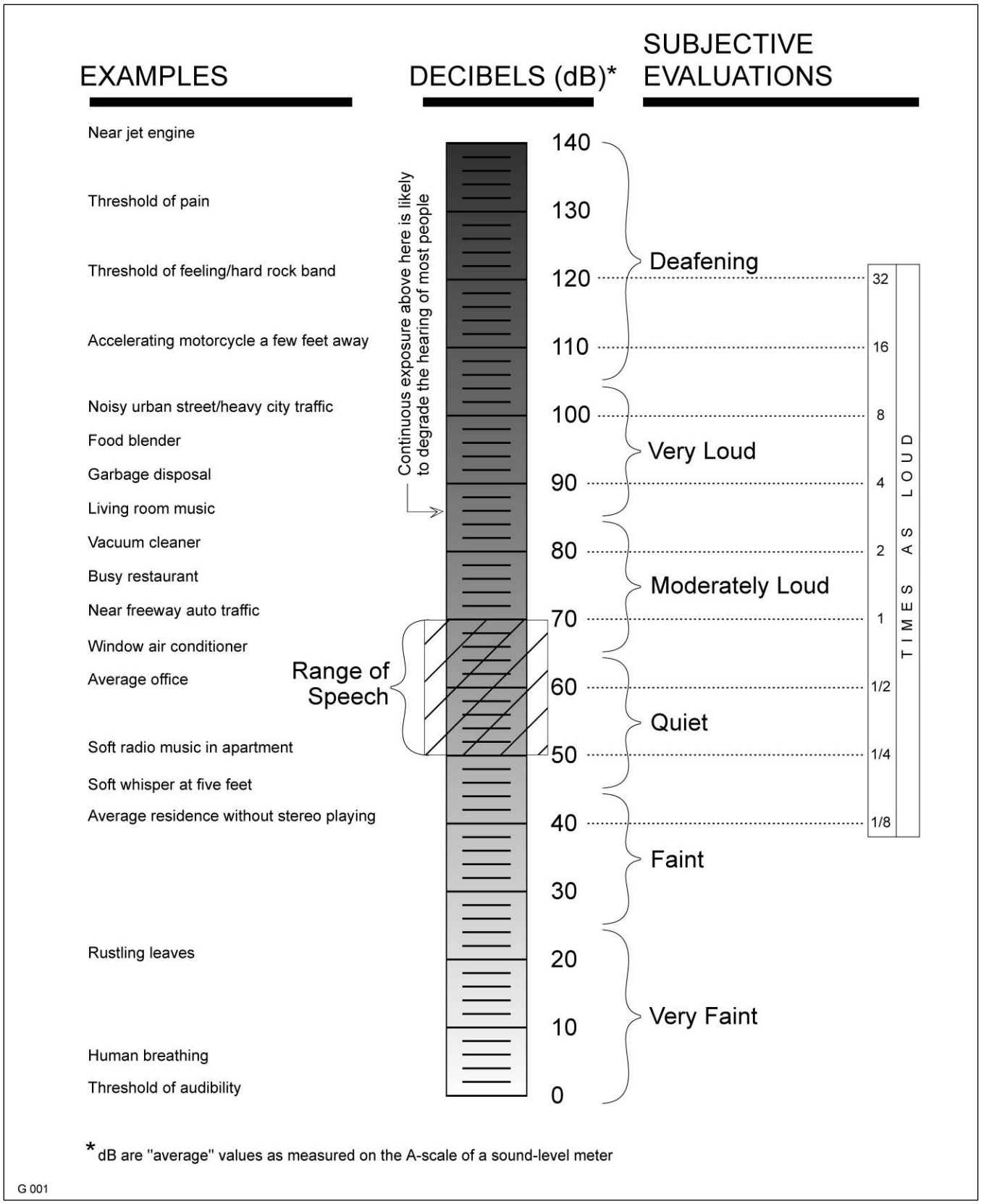
FUNDAMENTALS OF SOUND

Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable, unexpected, or unwanted is generally defined as noise; consequently, the perception of sound is subjective in nature and can vary substantially from person to person. Common environmental noise sources and noise levels are presented in Exhibit 3.7-1.

The loudness of sound preserved by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. A strong correlation exists between the way humans perceive sound and A-weighted sound levels (dBA). For this reason, dBA can be used to predict community response to environmental and transportation noise. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise.

As sound travels over distance, noise levels attenuate (reduce) dependent on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers (walls, building façades, berms). Noise generated from mobile sources (e.g., automobiles, trucks, and airplanes) generally attenuates at a rate of 4.5 dB per doubling of distance. Stationary noise sources (e.g., construction sites and fixed machinery) spread with more spherical dispersion patterns, which attenuate at a rate of 6 dB to 7.5 dB per doubling of distance.

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect noise levels at a receptor.



Source: Created by AECOM in 2008

Exhibit 3.7-1 **Typical Noise Levels**

Furthermore, the presence of a large object (barrier) between the source and the receptor can provide substantial attenuation of noise levels at the receptor.

NOISE DESCRIPTORS

The intensity of environmental noise changes over time. This section provides several different descriptors of time-averaged noise levels. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often used to describe environmental noise are defined below:

- L_{max} (Maximum Noise Level): The highest A/B/C-weighted, integrated noise level during a specific period of time.
- L_{min} (Minimum Noise Level): The lowest A/B/C-weighted, integrated noise level during a specific period of time.
- L_n (Statistical Descriptor): The noise level exceeded n% of a specific period of time, generally accepted as an hourly statistic. An L_{10} would be the noise level exceeded 10% of the measurement period.
- L_{eq} (Energy-Equivalent Noise Level): The energy mean (average) noise level and the steady-state sound level in a specified period of time that contains the same acoustical energy as a varying sound level over the same time period.
- L_{dn} (Day-Night Noise Level): The 24-hour L_{eq} with a 10 dB “penalty” applied during nighttime noise-sensitive hours, 10:00 p.m. through 7:00 a.m. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.
- CNEL (Community Noise Equivalent Level): The CNEL is similar to the L_{dn} described above, but with an additional 5 dB “penalty” for the noise-sensitive hours between 7:00 p.m. and 10:00 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the CNEL is typically 0.5 dB higher than the L_{dn}.
- SEL (Sound Exposure Level): The SEL describes the cumulative exposure to sound energy over a stated period of time.

EXISTING LAND USES SENSITIVE TO NOISE

The primary land uses adjacent to the levees and waterways included in the Phase 1 SERP coverage area are agricultural, urban, and open space. The largest urban center is the

Sacramento metropolitan area. Most of the coverage area is adjacent to agricultural uses. The noise environment comprises mobile (roadways and railroad tracks), stationary (industrial and commercial uses), and agricultural (seasonal) noise sources. Some airport uses are close to the coverage area, the largest being the Sacramento International Airport.

Land uses that are sensitive to noise generally include those uses for which exposure to noise would result in adverse effects and uses for which quiet is an essential element of the intended purpose. Residential dwellings near the individual project sites are of primary concern because individuals at these residences could be exposed to increased interior and exterior noise levels during short-term (1-4 weeks) small erosion repair construction projects. Existing off-site land uses that are sensitive to noise include single-family residences, places of worship, schools, and nursing homes that may be within the coverage area. These land uses could experience noise associated with construction, including increased haul-truck traffic and stationary sources (e.g., generators, compressors), as a result of the SERP.

3.7.4 Environmental Impacts and Mitigation Measures

Thresholds of Significance

Based on Appendix G of the CEQA Guidelines, the SERP would result in a significant noise-related impact if it would:

- expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- expose persons to or generate excessive groundborne vibration or groundborne noise levels;
- result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; or
- for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, or in the vicinity of a private airstrip, result in the project exposing people residing or working in the project area to excessive noise levels.

The first three significance thresholds above do not apply to the SERP. DWR is a State agency and, therefore, is not subject to compliance with local ordinances or policies; there would be no permanent increases in ambient noise levels; and excessive groundborne vibration would not be generated. The following threshold (evaluated in terms of L_{eq} is used to assess noise

impacts related to a temporary or periodic increase in ambient noise levels attributable to the project, and is consistent with previously approved DWR projects, including the recently adopted CVFPP PEIR.

- Temporary, short-term construction noise impacts are considered significant if construction-generated noise levels would exceed 70 dBA at the location of sensitive receptors outside of normal construction hours (from 6 a.m. to 8 p.m., Monday through Friday, and from 7 a.m. to 8 p.m., Saturday and Sunday, and any additional period required by the nature of the project or due to unforeseen circumstances that necessitate work in process to be completed) , and/or construction noise during normal construction hours in the vicinity of sensitive receptors has not been reduced through feasible noise control measures.

EFFECTS NOT EVALUATED FURTHER IN THIS DEIR

The SERP would not involve using any equipment or processes that would generate potentially high levels of ground vibration, such as pile drivers. Ground vibration generated during construction would be primarily associated with on-site truck activity, and sensitive receptors are not anticipated to be located near individual erosion repair sites. Therefore, the effects of vibration levels within the coverage area would be less than significant, and this issue is not evaluated further in this DEIR.

The SERP would not be expected to permanently affect environmental noise exposure in the Phase 1 SERP coverage area because of the short-term nature of individual erosion repair efforts. Therefore, implementation of the SERP would not result in a substantial permanent increase in ambient noise levels in the coverage area above levels existing without the SERP, and this issue is not evaluated further in this DEIR.

The SERP may include individual repair sites within 2 miles of an airport land use plan or near a public or private airport (see the discussion in Section VII, “Hazards and Hazardous Materials,” items [e] and [f] of Appendix A). The SERP would not involve developing new noise-sensitive receptors within 2 miles of an existing airport. Thus, the SERP would not be anticipated to expose people residing in the coverage area to excessive noise levels related to airports. Construction activities would be short-term (1 day to 1–4 weeks), heavy-duty construction equipment would be the dominant noise source to which workers would be exposed, and the SERP does not propose long-term work in areas within 2 miles of an airport land use plan or private air strip. Therefore, impacts relating to airport noise would be less than significant, and this issue is not evaluated further in this DEIR.

ANALYSIS METHODOLOGY

To assess the potential temporary noise impacts from construction, sensitive receptors and their relative exposure were identified. Construction noise generated by activities at individual

project sites under the SERP is predicted using the *Federal Transit Noise and Vibration Impact Assessment* methodology for construction noise prediction (FTA 2006: 5-1 through 5-29 and 10-1 through 10-12). Emission noise levels and usage factors were referenced from the Federal Highway Administration Roadway Construction Noise Model Version 1.0 (FHWA RCNM V1.0) (FHWA 2006:3). Noise levels of specific construction equipment operated and resultant noise levels at sensitive receptor locations have been calculated.

Regarding traffic noise, AECOM conducted modeling based on haul-truck volumes as discussed in Section XV, "Transportation and Circulation," of the NOP/Initial Study (Appendix A). The FHWA Highway Traffic Noise Prediction Model (FHWA RD 77–108) (FHWA 1978) was used to calculate an individual project's noise levels from haul-truck traffic along affected roadways based on the sizes of project sites (Tier 1 or Tier 2 as described in the project description), haul truck size, and amount of hauling material. A project's noise levels from haul-truck traffic along haul routes are predicted at a reference distance of 50 feet from the roadway centerline.

IMPACT ANALYSIS

IMPACT 3.7-1 ***Increase in Temporary Noise Levels from Construction Activities.*** *Implementation of the SERP would result in temporary construction activities associated with small erosion repairs along levees within the Phase 1 SERP coverage area. These construction activities could expose sensitive receptors to a noticeable increase in ambient noise levels. This impact would be* ***potentially significant****.*

Construction noise levels near individual erosion sites would fluctuate depending on the particular type, number, and duration of usage of the varying equipment. The effects of construction noise largely depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise-sensitive receptors, and the existing ambient noise environment near the receptor. Construction generally occurs in several discrete stages, with each stage requiring different equipment with varied noise characteristics. These stages alter the characteristics of the noise environment generated at each erosion site and in the surrounding area during the construction process.

Each small erosion repair, which would involve ground disturbance and aggregate material transport, would take from 1 day to 1–4 weeks to complete, depending on the size of the repair. Because the sites selected for construction each year may be located anywhere within the Phase 1 SERP coverage area, the individual repairs are treated here as temporary individual projects. No long-term construction or operational activities are proposed. On-site construction equipment used during site preparation would include excavators, dozers, backhoes, cranes, and trucks. Table 3.7-2 depicts the noise levels generated by the various types of construction equipment typically used during program implementation.

Table 3.7-2 Noise Emission Levels from Construction Equipment	
Equipment Type	**Typical Noise Level (dB) @ 50 Feet**
Excavator	85
Crane	85
Dozer	82
Backhoe	80
Cement Mixer with Extended Arm	85
Truck	74–81

Notes: dB = A-weighted decibels
Noise levels are for equipment fitted with properly maintained and operational noise control devices, per manufacturer specifications.
Source: Bolt, Beranek and Newman Inc. 1981, FTA 2006:12-6; data compiled by AECOM in 2009

As indicated in Table 3.7-2, noise levels for construction activities would range from 74 dB to 85 dB at a distance of 50 feet.[1] Continuous, combined noise levels generated by the simultaneous operation of the loudest pieces of construction equipment could result in a noise level of up to 89 dB at 50 feet. Accounting for the usage factor of individual pieces of equipment, topographical shielding, and ground absorption effects, construction activities at the erosion sites would be expected to result in hourly average noise levels of 80 dB L_{eq} at a distance of 50 feet. Maximum noise levels generated by construction activities are not expected to exceed 85 dB L_{max} at 50 feet from any given construction activity.

Noise from localized point sources (such as construction sites) typically decreases by 6–7.5 dB with each doubling of distance from source to receptor. Calculations to predict noise assume “soft” site conditions (i.e., sites with ground such as dirt, grass, or any vegetative cover that is not asphalt or concrete) with an attenuation rate of 7.5 dB per doubling of distance. To be conservative, no attenuation due to shielding from intervening structures (e.g., levees) is considered. Construction activities are predicted to generate exterior hourly noise levels of approximately 70 dB L_{eq} at a distance of 200 feet, 62 dB L_{eq} at 400 feet, and 55 dB L_{eq} at 800 feet when propagated from the edge of the closest construction activity (Appendix E).

Based on the applicable short-term construction noise exposure criteria, project construction would be exempt from any noise exposure limit during established normal construction hours (i.e., 6 a.m. to 8 p.m., Monday through Friday; 7 a.m. to 8 p.m., Saturday and Sunday; and any additional period required by the nature of the project or due to unforeseen circumstances that necessitate work in process to be completed). Construction noise of 70 dB Hourly L_{eq} or higher

[1] 50 feet is typically used as the standard distance of measurement for construction noise levels. Noise levels can then be adjusted to identify noise levels at a specific receptor, taking into account attenuation over distance and other factors.

at noise-sensitive uses, when measured outside of the established normal construction hours, would be considered a significant impact.

Although not planned, any construction activities occurring during evening and nighttime hours may be a nuisance and/or disrupt the sleep of the occupants of nearby residential dwellings. As a result, construction-generated noise would be considered a potentially significant temporary impact.

Mitigation Measure 3.7-1: Implement Measures to Reduce Temporary Noise Levels from SERP Construction.

DWR will implement the following measures during construction activities:

- DWR will require construction contractors, and/or DWR maintenance yard crews to properly maintain and equip construction equipment with noise controls, such as mufflers, in accordance with manufacturers' specifications.
- To the greatest extent feasible, construction outside of normal construction hours will be minimized or avoided completely when located in the vicinity of noise-sensitive receptors. Except under extreme circumstances (as in the case where a repair must be completed within a specific work window due to species or flood season requirements), construction activities will be limited to normal construction hours or hours identified in applicable local noise regulations.
- In locations where the erosion site would have a direct line of sight to sensitive receptors, on-site equipment and stockpiles will be strategically placed where feasible to block the line of sight (and thus the direct transmission of noise) from noise source to receptor.

With implementation of these mitigation measures, impacts associated with temporary noise levels from SERP construction would be reduced to a less-than-significant level.

IMPACT 3.7-2 ***Increase in Temporary Noise Levels Related to Construction Traffic.*** *Implementation of the SERP could result in an increase of average daily vehicle trips in the Phase 1 SERP coverage area near erosion repair sites. The increased traffic volumes would likely not be sufficient to result in a significant increase in traffic noise along roadways within the Phase 1 SERP coverage area near erosion repair sites. This impact would be* ***less than significant****.*

Temporary construction activities under the SERP would increase average daily traffic (ADT) volumes on the local roadway network (i.e., additional haul trucks on the road) and, consequently, increase noise levels along the affected segments of the levee near erosion repair sites. The SERP would use barges to transport material to the individual erosion sites whenever this method is appropriate and feasible. If individual erosion sites require materials to be transported on the local roadway network, noise-sensitive receptors located near

affected roadways would experience increases in traffic noise levels. Noise levels attributable to haul trucks were modeled as shown in Table 3.7-3 using assumptions provided by DWR for typical haul material amounts, truck capacity, and type of project (Tier 1 or 2) (Eckman, pers. comm., 2009). Three conditions were modeled. The maximum truck volume condition assumed the maximum amount of material (3,900 cubic yards [cy]) would be delivered in 5 days (minimum time) using the 12 cy trucks (minimum truck volume). The average truck volume condition assumed the average amount of material (1,650 cy) would be delivered in 10 days (average time) using the 12 cy trucks (minimum truck volume). The minimum truck volume condition assumed the minimum amount of material (450 cy) would be delivered in 10 days (average time) using the 25 cy trucks (maximum truck volume). These three conditions along with varying speeds are presented in Table 3.7-3.

Table 3.7-3
Modeled Traffic Noise from Haul Trucks

Condition	Total Material Needed (Cubic Yards)	CNEL at 50 feet				
		25 mph	35 mph	45 mph	55 mph	65 mph
Maximum (65 trips per day)	3,900	52.4	52.3	53.3	54.1	54.8
Average (14 trips per day)	1,650	45.8	45.6	46.6	47.4	48.1
Minimum (2 trips per day)	450	37.3	37.2	38.2	39.0	39.6

Notes: dB = A-weighted decibels; CNEL = Community Noise Equivalent Level; mph = miles per hour
Source: Eckman, pers. comm., 2009, adapted by AECOM in 2011

A quantitative evaluation of increased traffic noise levels along specific routes from haul trucks that would apply to a specific levee segment is not feasible at this time because the individual haul routes for each erosion site have not been identified. In addition, the additive noise contribution from haul-truck trips is expected to contribute nominally to existing levels of traffic noise because a doubling of traffic volume is required in order to increase traffic noise by 3 dB and the average truck traffic of 14 trips per day would be unlikely to double roadway traffic (Caltrans 1998: N-96). Also, haul trucks would be operating during identified normal construction hours or hours identified in applicable local noise regulations. As a result, traffic noise increases generated by project construction are expected to be less than significant.

No mitigation is required.

3.7.5 RESIDUAL IMPACTS

The implementation of the SERP would result in construction-generated noise that would have a potentially significant impact on sensitive receptors (Impact 3.7-1). However, this impact would be reduced to **less than significant** with implementation of Mitigation Measure 3.7-1. No significant and unavoidable impacts would occur.

4 ALTERNATIVES

4.1 INTRODUCTION

CEQA Guidelines section 15126.6(a) requires that an EIR describe “a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives.” The range of alternatives considered in an EIR is governed by the “rule of reason,” requiring evaluation of only those alternatives “necessary to permit a reasoned choice” (CEQA Guidelines section 15126.6[f]). Furthermore, an EIR “need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative” (CEQA Guidelines section 15126.6[f][3]). The analysis should focus on alternatives that are feasible (i.e., that may be accomplished in a successful manner within a reasonable period of time) and should consider economic, environmental, social, and technological factors. Alternatives that are remote or speculative should not be discussed. Furthermore, the alternatives analyzed for a project should focus on reducing or avoiding significant environmental impacts associated with the project as proposed (CEQA Guidelines section 15126.6[b]).

4.1.1 SIGNIFICANT EFFECTS OF THE PROPOSED PROGRAM

Impacts associated with the SERP are evaluated in Chapter 3, “Environmental Impact Analysis,” of this DEIR. For comparison with the alternatives described in this chapter, Table 4-1 provides a summary of SERP impact levels before and after implementation of mitigation for the six environmental resources evaluated in detail in this DEIR. For each resource, the table indicates whether the SERP would result in an overall less-than-significant impact, potentially significant impact, or significant impact, and whether the overall impact could be reduced to a less-than-significant level through mitigation or would be significant and unavoidable. As shown in this table, significant impacts are not anticipated for biological resources; geology, soils, and paleontological resources; or hydrology and water quality. In addition, mitigation would reduce potentially significant and significant impacts on air quality and climate change, cultural resources, and noise to less-than-significant levels.

4.2 ALTERNATIVES CONSIDERED AND REJECTED FROM FURTHER CONSIDERATION

Under CEQA, feasible alternatives should be considered that would avoid or substantially reduce any of the significant effects of the proposed project and attain most of the project objectives. Furthermore, CEQA requires that an EIR should briefly describe the rationale for selecting the alternatives to be discussed and briefly explain the reasons underlying the lead agency’s determination for rejecting alternatives including: failure to meet most of the basic

Table 4-1 Summary of Impact Levels Before and After Mitigation		
Environmental Resource	**Before Mitigation**	**After Mitigation**
Air Quality and Climate Change	Significant	Less than significant
Cultural Resources	Potentially significant	Less than significant
Biological Resources	Less than significant	Less than significant (no mitigation required)
Geology, Soils, and Paleontological Resources	Less than significant	Less than significant (no mitigation required)
Hydrology and Water Quality	Less than significant	Less than significant (no mitigation required)
Noise	Potentially significant	Less than significant
Source: Compiled by AECOM in 2011		

project objectives, infeasibility, or inability to avoid significant environmental impacts (CEQA Guidelines section 15126.6[c]).

4.2.1 SERP Subcommittee Design Alternatives

The SERP Subcommittee was established at the direction of the Interagency Flood Management Collaborative Program Group (referred to here as the Interagency Collaborative Group) on January 17, 2007. The Subcommittee consists of federal and state resource agency representatives, charged with defining what constitutes a small erosion repair and determining appropriate repair designs to adequately protect the levee system while avoiding substantial adverse effects on environmental resources. The SERP Subcommittee has crafted a program that is intended to improve current erosion repair practices, and thus maintain the necessary level of flood risk reduction while seeking to achieve a cumulative net benefit to aquatic and terrestrial fish and wildlife resources, including habitat for sensitive species. As a result of the cooperative efforts of the SERP Subcommittee, the proposed program gradually evolved, without a formal process of developing, and then accepting or rejecting, complete program alternatives.

Various issues and criteria that are now reflected in the SERP Manual, such as size and characteristics of projects qualifying under the SERP, were evaluated, considered, and ultimately accepted by the SERP Subcommittee. In addition, a wide range of erosion repair designs that would provide the necessary level of flood risk reduction were evaluated. The SERP Subcommittee focused on design alternatives that would incorporate bioengineering practices and thereby provide for self-mitigation opportunities for levee maintenance projects.

These were designs that have been successfully applied along California waterways by various public flood risk reduction and transportation agencies.

In April 2007, DWR provided the SERP Subcommittee with 13 potential erosion repair design templates that met the program objectives and would be potentially applicable to the SERP. In subsequent SERP Subcommittee meetings, these templates were reviewed and discussed for their potential use under the SERP program. The templates were evaluated based on factors including applicability of design to the type of levee damage, long-term maintenance requirements, wildlife hazards, aesthetics, degree of installation difficulty, adequacy of potential vegetation coverage area, and DWR levee vegetation management standards and inspection criteria. Several design alternatives were eliminated from further consideration during this process. One design template, full turf matting, was eliminated because of the potential for the structure to entrap wildlife. A few design templates that used concrete materials in various ways, such as cellular blocks and gabion baskets, were eliminated due to the high cost of maintenance and the potential for these structures to limit growth of vegetation. One other design template was modified to incorporate language from another template so that it would capture both in a single template. In the end, five of the thirteen design templates scrutinized by the SERP Subcommittee were eliminated from further consideration, and a total of seven design templates were incorporated into the proposed program to be used depending on the nuances of each erosion site.

4.2.2 SECTION 404(B)(1) DESIGN ALTERNATIVES

In addition to the design alternatives discussed above, two more design alternatives, a fully bio-engineered (no rock) erosion repair design and a fully hard-bank (all rock/concrete) erosion repair design, were evaluated in the section 404(b)(1) Alternatives Analysis (DWR 2012). Neither of these design alternatives has been carried forward into the PEIR analysis, however, because they would be contrary to the public interest and would not meet the purpose and objectives of the SERP.

The section 404(b)(1) analysis concluded that the fully bio-engineered erosion repair design would not feasibly satisfy the program objectives because (1) the repair site would be exposed to further erosion during the plant establishment period, (2) fully bio-engineered structures would not perform well on slopes greater than 2:1 (H:V), and (3) fully bio-engineered structures are not suitable at repair sites along high-order streams where erosion forces are high and critical infrastructure is at risk (USACE n.d.), which is generally the case within the SERP coverage area. The analysis also concluded that the fully hard-bank erosion repair design would not meet program objectives because use of fully hard-bank structures to repair erosion sites would require compensatory mitigation off-site rather than self-mitigating on-site through the project design templates developed by the SERP Subcommittee. Furthermore, it is uncertain whether the full array of biological functions and services impacted at repair sites

with fully hard-bank structures could be fully offset through restoration or enhancement efforts in the project vicinity or even in the same watershed.

4.2.3 OFF-SITE ALTERNATIVES

Typically, alternative sites to a proposed project are considered under CEQA and in section 404(b)(1) alternatives analyses. For SERP, however, flood protection must be provided at the location of the potential flood risk, which is at erosion site along the Sacramento River and its tributaries identified as SERP Waterways. Erosion repairs must take place where the erosion has occurred and presents the greatest risk for flooding. As a result, erosion repairs cannot feasibly achieve the program objectives unless undertaken at the specific erosion sites where potential flood risk is highest. For this reason, alternative sites for the program's erosion repair activities are infeasible and are not evaluated further.

4.3 DESCRIPTIONS AND ANALYSIS OF THE PROGRAM ALTERNATIVES

4.3.1 DESCRIPTION OF PROGRAM ALTERNATIVES EVALUATED

Based on scoping and agency consultation, as well as the alternatives formulation and evaluation process conducted by the SERP Subcommittee, the following program alternatives were identified for evaluation in this DEIR:

- **No-Project Alternative**—CEQA Guidelines section 15126.6(e)(2) states that a discussion of the "No Project" alternative must consider "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans." The No-Project Alternative assumes that the SERP would not be initiated, and no collaborative programmatic repair program would be put in place by DWR. Instead, erosion repairs would continue to be identified by DWR, permitted individually by the applicable regulatory agencies, and implemented when permits were obtained, as is currently done. DWR would continue the status quo, implementing a range of unrelated erosion repairs on a project-by-project basis.

  Under this alternative, a number of minor repairs would be conducted by various maintenance yards, and would qualify as categorical exemptions under CEQA. Therefore, by definition, these minor repairs would have less-than-significant impacts on the physical environment. DWR would also typically be able to complete CEQA evaluations and obtain federal and state agency authorizations each year to repair one or two levee sections that meet the size requirements of SERP under this alternative. The agency authorizations obtained through this process would stipulate avoidance, minimization, conservation, and compensation measures to reduce potentially significant impacts on the environment to a less-than-significant level. However, more repairs than these would be needed each year. Because of the lengthy process associated with CEQA compliance and permit acquisition,

a number of these sites would be left unrepaired and would likely be further eroded during severe weather patterns. This would result in the need for more emergency repairs each year relative to the proposed project, and emergency repairs would be made using only rock. The No-Project Alternative would not meet most DWR project objectives and was determined to be infeasible. It was included in the analysis, however, as required by CEQA Guidelines section 15126(e).

- **Large-Scale Erosion Repair Program Alternative**—A large-scale programmatic erosion repair program would be developed, similar to the SERP, to permit one to three projects per year, with a combined maximum area or length of disturbance equal to the SERP. Therefore, the Large-Scale Erosion Repair Program in a given year could include one project with up to 7.5 acres or 15,000 linear feet in size, or two to three individual projects of any size, as long as the maximum combined area or length permitted in that year did not exceed 7.5 acres or 15,000 linear feet. The bioengineering designs proposed under the SERP could be used for the Large-Scale Erosion Repair Program Alternative, but at a larger scale. Construction equipment and methods would be similar to the proposed program. This alternative meets most project objectives and is considered to be a feasible alternative.

- **Native Soil Disturbance Minimization Alternative**—This alternative would permit the same number of erosion repair projects as the SERP (up to 15), with the same acreage and linear-foot limitations per site as the SERP, but in areas where disturbance of native soil for site preparation could be avoided, revetment could be installed directly on the native soil with no grading or excavating required, and plantings would be permitted only in the levee fill. Under this alternative, disturbance of native soil would not be precluded where the erosion repair required the disturbance of this soil to ensure efficacy of the design from an engineering standpoint; however, erosion repair methods not requiring disturbance of native soil would be favored. The same number of acres or linear feet of disturbance would occur under this alternative as under the SERP, but some of the repairs would avoid disturbance of native soil. In these cases, because vegetation planting would be restricted to levee fill, the repairs would generally result in vegetation plantings farther away from the aquatic habitat than would occur under the SERP. Construction equipment and methods would be similar to the proposed program except as described above. This alternative meets most project objectives and is considered to be a feasible alternative.

4.3.2 Analysis of Alternatives Evaluated

A qualitative analysis addressing each environmental resource evaluated in the DEIR is discussed next for each of the three alternatives to the proposed program. The analysis is comparative, identifying whether the alternative would result in a “greater,” “lesser,” or “similar”

impact relative to the proposed program, shown in brackets at the end of the discussion for each resource.

NO-PROJECT ALTERNATIVE

Air Quality and Climate Change

Implementation of the No-Project Alternative would maintain the status quo. Minor erosion repair projects would be implemented by maintenance yards through categorical exemptions under CEQA and would not require resource agency authorizations; although larger erosion repair projects would be required to obtain resource agency authorizations before repairs could be performed because of their potential impact on the environment. Air quality and climate change impacts associated with implementing these types of erosion repairs are expected to be similar to that described for the proposed program. As discussed in Section 3.2, “Air Quality and Climate Change,” a single repair project would result in emissions of nitrogen oxides (NO_X) that would exceed the local Feather River AQMD and Butte County AQMD thresholds of significance for NO_X. Emissions of reactive organic gases (ROG), respirable particulate matter less than or equal to 10 microns in diameter (PM_{10}), and fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$) would not exceed local Feather River AQMD standards with implementation of the rules and measures required in the various jurisdictions. In addition, as discussed in Section 5.1.5, “Analysis of Cumulative Impacts,” greenhouse gas (GHG) emissions associated with construction of repairs would be minimal, would occur over a limited duration, and would be reduced below business-as-usual, project-related GHG emissions. However, under both the SERP and the No-Project Alternative, impacts associated with these types of projects would be similar because mitigation could be applied to each project to reduce air quality and climate change impacts to a less-than-significant level. On the other hand, delays associated with the CEQA compliance and permitting processes under the No-Project Alternative also could increase the number and extent of emergency repairs, which, because of the imminent flood threat, would be conducted without mitigation measures to reduce potential impacts to air quality to a less-than-significant level. Consequently, impacts to air quality, including greenhouse gas emissions, may not be reduced to less than significant in some circumstances. In the event of a flood, which is increased under the No-Project Alternative, air quality impacts would be substantial because of the increased construction activities. *[Greater]*

Biological Resources

Implementation of the No-Project Alternative would maintain the status quo. Minor erosion repair projects would be implemented by maintenance yards through categorical exemptions under CEQA and would not require resource agency authorizations; although larger erosion repair projects would be required to obtain resource agency authorizations before repairs could be performed because of their potential impact on the environment. Construction-related

impacts on biological resources under the No-Project Alternative would be less than significant because either (1) the size of the repair would be so small that no possibility would exist for the repair to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or substantially reduce the number or restrict the range of a rare or endangered plant or animal, or (2) multiple authorizations and interagency coordination would be required before repairs could occur and such authorizations would stipulate avoidance, minimization, conservation, or compensation measures that would reduce potential impacts on biological resources to a less-than-significant level. Therefore, continued actions taken by DWR to repair erosion sites would not result in significant impacts to biological resources.

Although repair actions may not result in significant impacts to biological resources under the No-Project Alternative, projects that would require multiple authorizations and interagency coordination could experience delays in implementing repairs, during which time the eroded areas may worsen (expand in size or severity), thereby jeopardizing public safety by increasing flood risk and potentially adversely affecting riparian vegetation and endangered species habitat. Although the degree to which continued erosion at these sites would impact biological resources is unknown, it would be greater than under the SERP because repairs could involve greater and more complex construction methods as eroded areas worsen. Delays also could necessitate more emergency repairs, which may be permitted without avoidance, minimization, conservation, or compensation measures to reduce potential impacts to biological resources to a less-than-significant level. Although after-the-fact compensatory mitigation may be required to offset impacts that occurred during emergency repair activities, this mitigation may not be adequate to fully offset impacts that occurred to biological resources during the emergency repair. Consequently, impacts to biological resources may not be reduced to less than significant in some circumstances. *[Greater]*

Cultural Resources

Under the No-Project Alternative, maintenance yards would identify and implement minor erosion repairs that would qualify under a CEQA categorical exemption, and larger erosion repairs at individual sites would be permitted on a project-by-project basis. The sites that would qualify for a categorical exemption under CEQA would, by definition, not have the potential to result in significant impacts. The minor erosion repairs would be highly unlikely to have significant impacts on cultural resources because they typically would not involve the disturbance of native soils, substantially reducing the possibility of disturbing a significant prehistoric or historic archeological resource. Like the proposed program, the larger erosion repairs permitted on a project-by-project basis under the No-Project Alternative would require disturbance of native soil. This would increase the possibility of modifying important examples of California history or prehistory. Section 106 NHPA consultation could occur if these large

repairs triggered the involvement of a federal agency (e.g., USACE Clean Water Act authorization), resulting in a Memorandum of Agreement (MOA) or a Programmatic Agreement (PA) that stipulates measures to treat any significant cultural resource. The probability and severity of this impact would be similar to that anticipated under the SERP. *[Similar]*

Under the No-Project Alternative, obtaining authorizations and completing resource agency consultations required for some erosion repair sites would take time, potentially causing the erosion sites to increase in size and severity, thereby increasing flood risk. Although the degree to which continued erosion at sites awaiting repair authorizations and coordination with the resource agencies would increase impacts related to known and previously undiscovered cultural resources cannot be determined, the overall impact likely would be greater than under the SERP. Delays associated with the CEQA compliance and permitting processes under the No-Project Alternative also could increase the number and extent of emergency repairs, which, because of the imminent flood threat, would be conducted without mitigation measures to reduce potential impacts to cultural resources to a less-than-significant level. Consequently, impacts to cultural resources may not be reduced to less than significant in some circumstances. *[Greater]*

Geology, Soils, and Paleontological Resources

As stated above, under the No-Project Alternative, minor repairs would be implemented by maintenance yards with categorical exemptions under CEQA, but larger erosion repair projects would be required to obtain resource agency authorizations before repairs could be performed because of the potential to impact the environment. The sites that would qualify for a categorical exemption under CEQA would, by definition, not have the potential to result in significant impacts related to geology, soils, and paleontological resources. For larger erosions sites where multiple authorizations and interagency coordination would be required before repair, the repairs would be required to be engineered to current levee design standards to address soil conditions and the level of probable ground shaking. Like the SERP, authorizations also would require development and implementation of erosion control plans and storm water pollution prevention plans, incorporating site and project-specific best management practices to prevent erosion and loss of topsoil, and this would reduce potential impacts to geology and soils to a less-than-significant level.

However, as discussed previously, the need for multiple authorizations and interagency coordination may cause delays in implementing repairs, during which time erosion repair sites may increase in size and severity, thereby jeopardizing public safety by increasing flood risk. Although the degree to which continued erosion at sites awaiting repair authorizations and coordination with the resource agencies would increase impacts related to geology, soils, and paleontological resources is unknown, the overall impact likely would be greater than under the SERP. Delays associated with the CEQA compliance and permitting processes under the No-

Project Alternative also could increase the number and extent of emergency repairs, which, because of the imminent flood threat, would be conducted without mitigation measures to reduce potential impacts related to geology, soils, and paleontological resources to a less-than-significant level. Consequently, impacts to geology, soils, and paleontological resources may not be reduced to less than significant in some circumstances. *[Greater]*

Hydrology and Water Quality

A major consequence of erosion sites within levee systems is the deposition of soil and associated contaminants into waterways. Soil and associated contaminants that enter receiving water through stormwater runoff and erosion can increase turbidity, stimulate algal growth, increase sedimentation of aquatic habitat, and introduce compounds that are toxic to aquatic organisms. Although soil erosion and the subsequent effect on water quality are inevitable within a levee system, without a program-level permit that would allow for expedited response to small erosion sites, the length of time in which soil and associated contaminants could enter waterways would increase. Erosion sites grow larger over time, and soil becomes less stable within alternating periods of high and low flows, depositing soil into waterways, and thereby affecting water quality. Therefore, water quality impacts under the No-Project Alternative likely would be greater than under the SERP. Delays associated with the CEQA compliance and permitting processes under the No-Project Alternative also could increase the number and extent of emergency repairs, which, because of the imminent flood threat, would be conducted without mitigation measures to reduce potential impacts to hydrology and water quality to a less-than-significant level. Consequently, impacts to hydrology and water quality may not be reduced to less than significant in some circumstances. *[Greater]*

Noise

Implementation of the No-Project Alternative would maintain the status quo. Minor erosion repair projects would be implemented by maintenance yards through categorical exemptions under CEQA and would not require resource agency authorizations; although larger erosion repair projects would be required to obtain resource agency authorizations before repairs could be performed because of their potential impact on the environment. The number of small erosion sites requiring repairs under the No-Project Alternative would be the same as under the proposed program. The noise impacts associated with implementation of these repairs would be similar to those discussed for the SERP. Therefore, although construction traffic could cause a potentially significant impact from noise, noise impacts associated with construction activities could be decreased to a less-than-significant level with implementation of Mitigation Measure 3.7-1, “Implement Measures to Reduce Temporary Noise Levels from Construction of the SERP.” Under both the SERP and the No-Project Alternative, temporary noise-related impacts associated with these types of projects would be reduced because traffic routes would be identified for each specific project, and this mitigation would reduce impacts to

a less-than-significant level. On the other hand, delays associated with the CEQA compliance and permitting processes under the No-Project Alternative also could increase the number and extent of emergency repairs, which, because of the imminent flood threat, would be conducted without mitigation measures to reduce potential noise impacts to a less-than-significant level. Consequently, noise impacts may not be reduced to less than significant in some circumstances. *[Greater]*

Impact Summary

Under the No-Project Alternative, impacts would be greater than those under the SERP for air quality and climate change; biological resources; cultural resources; geology, soils, and paleontological resources; hydrology and water quality; and noise.

LARGE-SCALE EROSION REPAIR PROGRAM ALTERNATIVE

Air Quality and Climate Change

The types of impacts on air quality and climate change under the Large-Scale Erosion Repair Alternative would be similar to those described under the SERP. Construction-related emissions from a single erosion site repair would result in emissions of NO_X that would exceed the local Feather River AQMD and Butte County AQMD threshold of significance. The larger erosion repairs would have a similar impact on air quality and climate change as the repairs under the SERP. The same mitigation that would be applied to the SERP to reduce emissions of NO_X to a less-than-significant level would be applicable under this alternative. Construction-related emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ would be less than significant. *[Similar]*

Biological Resources

Impacts on biological resources would be mitigated in the same manner as under the SERP. Self-mitigating design templates would be used, and environmental commitments to biological resources would be incorporated for each project. The Large-Scale Erosion Repair Program Alternative would, however, require Clean Water Act section 404 permits and section 401 certifications, Endangered Species Act consultations, and streambed alteration agreements on a project-by-project basis. Additionally, the larger projects likely would not qualify as routine maintenance, and therefore may require encroachment permits from the CVFPB. The permitting agencies would review each project, including the environmental commitments, and could require additional avoidance, minimization, conservation, or compensation as stipulations to any authorizations provided for a project. Temporary construction impacts to special-status plant and wildlife species and their habitats could occur for a longer duration than under the SERP because of the increased magnitude of the repair project(s). Because the Large-Scale Erosion Repair Program Alternative would include environmental commitments, self-mitigating design templates, and possibly the implementation of additional

avoidance, minimization, conservation, or compensation as stipulated by the resource agencies, construction would have a less-than-significant impact on biological resources. However, because the construction could take longer than under the SERP, the temporal impacts are considered greater than those of the SERP.

Delays to repairs of larger erosion sites could occur as a result of the project-by-project permitting, including ESA consultations, during which time the eroded areas would be susceptible to further damage. Destruction of habitat could be exacerbated as a result of ongoing erosion, as under existing conditions. Whether consultations would result in avoidance, minimization, and compensation measures that would be adequate to address these original impacts cannot be determined because the additional damage would be the result of erosion that occurred during the permitting process, not resulting from the action of the entity doing the repairs. Therefore, this impact could be greater than that generated under the SERP. *[Greater]*

Cultural Resources

Like the SERP, this alternative would require disturbance of native soil. This would increase the possibility of modifying important examples of California history or prehistory. Impacts on cultural resources would be mitigated in the same manner as under the SERP. Section 106 NHPA consultation would occur resulting in a MOA or a PA with stipulations to treat any significant cultural resource. The potential for modification of a significant resource, such as a shipwreck or a prehistoric archaeological site, would be similar to that under the SERP.

However, the permitting process for the Large-Scale Erosion Repair Alternative would not be as simplified as for the SERP; therefore, larger sites needing repair could continue to erode for a longer period of time, which could result in greater damage to identified and unidentified cultural resources at those individual repair sites. *[Greater]*

Geology, Soils, and Paleontological Resources

Under the Large-Scale Erosion Repair Alternative, repair of larger erosion sites would continue at the same rate and extent as under existing conditions because permitting would still be necessary on a site-by-site basis. During this extended period of consultation, eroded areas would be susceptible to further damage and increased soil erosion. Although the degree to which soil erosion would increase during authorization and coordination activities cannot be determined, it likely would be greater than under the SERP. In addition, repair of larger erosion sites would increase the potential for disturbance of paleontological resources. *[Greater]*

Hydrology and Water Quality

As discussed previously, a major consequence of erosion within levee systems is the deposition of soil and associated contaminants into waterways. Soil and associated

contaminants that enter receiving water through stormwater runoff and erosion can increase turbidity, stimulate algae growth, increase sedimentation of aquatic habitat, and introduce compounds that are toxic to aquatic organisms. Although soil erosion and the subsequent effect on water quality would be inevitable within a levee system, without a program-level permit that would allow for expedited response to small erosion sites, the length of time in which soil and associated contaminants could enter waterways would be increased. Therefore, the severity of this impact would be greater than under the SERP. *[Greater]*

Noise

Construction traffic could cause greater noise impacts at sensitive receptors under the Large-scale Erosion Repair Program Alternative because more trips would be concentrated in a single area, rather than dispersing trips among several projects and locations. Furthermore, larger erosion sites would have additional staging areas and haul routes in a single project area and would be likely to require longer construction periods than under the SERP, thereby increasing the potential for noise impacts. The noise reduction measures for the SERP (i.e., Mitigation Measure 3.7-1, “Implement Measures to Reduce Temporary Noise Levels from Construction of the SERP”) also would be applicable to the Large-scale Erosion Repair Program Alternative. With implementation of these mitigation measures, noise impacts associated with construction activities would decrease to a less-than-significant level. However, the noise effects at nearby sensitive receptors could still be greater than that under the SERP. *[Greater]*

Impact Summary

Under the Large-Scale Erosion Repair Program Alternative, impacts to environmental resources addressed in this DEIR would be greater than under the SERP: biological resources; cultural resources; geology, soils, and paleontological resources; hydrology and water quality; and noise. Air quality and climate change impacts would be similar.

Native Soil Disturbance Minimization Alternative

The Native Soil Disturbance Minimization Alternative would have the same effects as the SERP, with the exception that in areas where avoiding disturbance of native soil for site preparation would be feasible, revetment would be installed directly on the native soil with no grading or excavating, and any vegetation plantings would occur only in levee fill. Because of only the minor difference between these two alternatives, impacts to air quality and climate change; geology, soils, and paleontological resources; hydrology and water quality; and noise clearly would be similar, and thus these issues are not evaluated further. This alternatives discussion focuses on biological resources and cultural resources, and areas of meaningful differences between the two alternatives.

Biological Resources

Impacts on biological resources under the Native Soil Disturbance Minimization Alternative would be mitigated in the same manner as under the SERP, except that the level of habitat enhancement achieved may not be as great because some designs would offer less opportunity to create in-water and woody shaded riverine habitat. Therefore, although the potential impacts to biological resources would be similar to that under the SERP, the degree of habitat enhancement under this alternative would be somewhat reduced overall, and more off-site and/or compensatory mitigation measures likely would be needed relative to the SERP. Therefore, impacts to biological resources are considered greater under this alternative than under the SERP. *[Greater]*

Cultural Resources

Avoiding disturbance of native soil would reduce potential impacts on significant historic and prehistoric archeological resources. Because this alternative would not completely restrict disturbance of native soil, allowing for grading and excavation of the repair site when required to ensure efficacy of the design, the potential would continue to exist for the adverse modification of a significant historic or prehistoric archeological resource. However, this potential would be reduced under the Native Soil Disturbance Minimization Alternative relative to the SERP. *[Lesser]*

Impact Summary

Under the Native Soil Disturbance Minimization Alternative, impacts would be similar to those under the SERP for air quality and climate change; geology, soils, and paleontological resources; hydrology and water quality; and noise; greater for biological resources; and less for cultural resources.

4.4 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The CEQA Guidelines require identification of an environmentally superior alternative. In general, the environmentally superior alternative is the alternative that would generate the fewest or least severe adverse impacts on the environment. If the No-Project Alternative is environmentally superior, CEQA requires identification of the “environmentally superior alternative other than the no project alternative,” among the alternatives evaluated.

Table 4-2 identifies whether each of the alternatives would have “greater,” “lesser,” or “similar” impacts relative to the SERP for each of the environmental resources evaluated in this DEIR.

Overall, the proposed program would have the least environmental impacts of the alternatives. Small erosion sites would be repaired efficiently and more quickly, thereby minimizing further

Table 4-2 Comparison of Proposed Program and Alternatives Impact Levels				
Environmental Resource	**Proposed Program**	**No-Project Alternative**	**Large-Scale Repair Program Alternative**	**Native Soil Disturbance Minimization Alternative**
Air Quality and Climate Change	Less than significant after mitigation	Greater	Similar	Similar
Biological Resources	Less than significant	Greater	Greater	Greater
Cultural Resources	Less than significant after mitigation	Greater	Greater	Lesser
Geology, Soils, and Paleontological Resources	Less than significant	Greater	Greater	Similar
Hydrology and Water Quality	Less than significant	Greater	Greater	Similar
Noise	Less than significant after mitigation	Greater	Greater	Similar
Source: Compiled by AECOM in 2011				

ongoing erosion at the sites. Furthermore, project implementation would include features that would enhance and monitor riparian vegetation, where feasible.

Although the Native Soil Disturbance Minimization Alternative also would provide for some enhancement of riparian vegetation and would have less potential to impact cultural resources, impacts to cultural resources still would be potentially significant without mitigation, and this alternative would be likely to require more off-site compensatory mitigation than the proposed program.

Off-site compensatory mitigation, although providing benefits to biological resources (e.g., connectivity of habitat), does not enhance the existing riparian and endangered species habitat on-site, and whether greater benefits would occur to biological resources off-site cannot be determined. In addition, USFWS, NMFS, and CDFW strongly prefer on-site mitigation to off-site mitigation. Under the No-Project Alternative, the time required to obtain the necessary permits could be substantial, which could result in continued severe erosion and delays in providing flood risk reduction to the public. This increased erosion could result in increased impacts on biological resources; geology, soils, and paleontological resources; and hydrology and water quality, which would be greater than those under the SERP.

Delays to repairs also would occur under the Large-Scale Erosion Repair Program Alternative, resulting in similar impacts as under the No-Project Alternative and greater impacts compared to the SERP. The SERP would include a streamlined permitting process for erosion sites and a

habitat component that would minimize the loss of riparian vegetation and enhance habitat where possible. The No-Project Alternative, Large-Scale Erosion Repair Alternative, or Native Soil Disturbance Minimization Alternative would have greater overall impacts than the SERP.

Although the Native Soil Disturbance Minimization Alternative would generally meet the objectives identified by DWR and the SERP Subcommittee for the program, the SERP would meet all objectives and provide comparatively more opportunity for habitat enhancement. The SERP would help maintain the flood management integrity of the SRFCP, prevent further erosion at identified erosion sites, minimize the loss of riparian vegetation, and enhance the riparian vegetation corridor, where feasible. Thus, the SERP is the environmentally superior alternative.

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5 OTHER CEQA-REQUIRED SECTIONS

5.1 CUMULATIVE IMPACTS

5.1.1 INTRODUCTION

This DEIR provides an analysis of cumulative impacts of the SERP taken together with other past, present, and probable future projects producing related impacts, as required by the CEQA Guidelines (14 California Code of Regulations [CCR] section 15130). The goal of such an exercise is twofold: first, to determine whether the overall long-term impacts of all such projects would be cumulatively significant and, second, to determine whether the SERP would result in a "cumulatively considerable" (and thus significant) *incremental* contribution to any such cumulatively significant impacts. (See the CEQA Guidelines [CCR sections 15064(h), 15065(c), 15130(a), 15130(b), and 15355(b)].) In other words, the required analysis first creates a broad context in which to assess the project's incremental contribution to anticipated cumulative impacts, viewed on a geographic scale beyond the Phase 1 SERP coverage area. The analysis then determines whether the project's incremental contribution to any significant cumulative impacts from all projects is itself significant (i.e., "cumulatively considerable" in CEQA parlance).

Cumulative impacts are defined in the CEQA Guidelines (CCR section 15355) as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." A cumulative impact occurs from "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (CCR section 15355[b]).

Consistent with the CEQA Guidelines (CCR section 15130[a]), the discussion of cumulative impacts in this DEIR focuses on significant and potentially significant cumulative impacts. The CEQA Guidelines (CCR section 15130[b]) state that:

The discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by the standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.

The CEQA Guidelines identify two basic methods for establishing the cumulative environment in which the project is to be considered: the use of a list of past, present, and probable future

projects (the “list approach”) or the use of adopted projections from a general plan, other regional planning document, or certified EIR for such a planning document that is designed to evaluate regional or area-wide conditions (the “plan approach”).

Because the SERP consists of a unified approach to environmental permitting and review of erosion repairs within the Sacramento River Flood Control Project (SRFCP) area, the plan approach is used to allow a cumulative analysis on this regional scale. This EIR provides program-level analysis of potential impacts associated with the SERP under CEQA. The work proposed under Phase 1 crosses six California counties (Sacramento, Yolo, Solano, Sutter, Colusa, and Butte). Each county has adopted a general plan that identifies goals and policies intended to guide decisions on future growth, development, and conservation of resources. Within the counties, local municipalities also influence various aspects of land use through their own general plans and local codes.

The issue areas identified by the SERP NOP in Appendix A as having no impact would not result in cumulatively considerable incremental contributions to significant cumulative impacts because there would be no impact and, therefore, no incremental contribution. Therefore, those issue areas identified as having no impact at the project-level (i.e., agricultural resources, land use and planning, mineral resources, population and housing, public services) are not discussed further in the cumulative impact discussion below. Although it was determined that issue areas identified in Appendix A as having less-than-significant impacts did not need to be addressed at a project-level in this DEIR, those issue areas have the potential to make a cumulatively considerable incremental contribution to a cumulatively significant impact. Because cumulative impacts were not addressed in Appendix A, these issue areas are addressed below as part of the cumulative discussion.

5.1.2 CUMULATIVE CONTEXT

Sacramento, Yolo, Solano, Sutter, Colusa, and Butte counties and the cities within these counties as a whole are facing numerous regional issues pertaining to air quality degradation, traffic generation, habitat loss, water quality degradation, and other urban-related environmental changes. The Central Valley Flood Protection Plan (CVFPP) is also an important regional document for the State Plan of Flood Control (SPFC). This section provides the context upon which cumulative impacts can be evaluated.

SACRAMENTO COUNTY

Sacramento County encompasses approximately 994 square miles in the middle of the 400-mile-long Central Valley, which is California’s prime agricultural region. The county is bordered by Contra Costa and San Joaquin counties to the south, Amador and El Dorado counties to the east, Placer and Sutter counties to the north, and Yolo and Solano counties to the west. Sacramento County extends from the low Sacramento–San Joaquin Delta (Delta) lands

between the Sacramento and San Joaquin rivers north to about 10 miles beyond the California Capitol and east to the foothills of the Sierra Nevada. Sacramento County lies at the geographic center of the region and spans both agricultural land uses as well as the most urbanized areas of the region. The geographic boundaries of Sacramento County include seven incorporated cities: Citrus Heights, Elk Grove, Folsom, Galt, Isleton, Rancho Cordova, and Sacramento (Sacramento County 2009). The county has grown from 1,041,219 in 1990 to 1,223,499 in 2000, and the population of the county as of January 1, 2009, was estimated to be 1,433,187 (DOF 2009).

YOLO COUNTY

Yolo County encompasses approximately 1,000 square miles, of which 960 square miles are located in the unincorporated county. The county is bordered by Solano County to the south, Sacramento County to the east, Colusa County to the north, and Napa County to the west. Yolo County as a whole is generally rural with over 96 percent of the county area designated for agricultural and open space uses. Four incorporated cities are located in Yolo County: Davis, West Sacramento, Winters, and Woodland (Yolo County 2009).

The county has grown from 141,210 in 1990 to 168,660 in 2000, and the population of the county as of July 1, 2011, was estimated to be 201,645 (DOF 2012).

SOLANO COUNTY

Solano County encompasses about 900 square miles, including about 75 square miles of water. The county is bordered by Contra Costa County to the south, Yolo and Sacramento counties to the east and northeast, Yolo County to the north, Marin County to the southwest, and Napa and Sonoma counties to the west. Approximately 77,500 acres of the county consist of the incorporated cities of Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo (Solano County 2008).

The unincorporated area of the county has been rural since the county was established, with most land in use for either agricultural purposes (crop cultivation and grazing) or natural resources. Rural residential development has occurred in other locations throughout the county.

The county has grown from 339,471 people in 1990 to 378,930 people in 2000. The population of the county as of July 1, 2011, was estimated to be 413,635 persons (DOF 2012).

SUTTER COUNTY

Sutter County is situated in the Sacramento Valley, with the southern boundary located approximately 10 miles north of the city of Sacramento. The county comprises 607 square miles of land and is generally bordered by the Sacramento River to the west, the Feather and

Bear rivers and Placer County to the east, Butte County to the north, and Sacramento County to the south (Sutter County 2008).

The unincorporated area of the county consists of several rural communities including Meridian, Sutter, Robbins, and the communities of Rio Oso, Trowbridge, Nicolaus, and East Nicolaus, all clustered near the convergence of the Bear and Feather rivers in the southeast portion of the county (Sutter County 2008). In addition to the rural communities, Sutter County includes two incorporated cities: Yuba City and Live Oak.

Although residential uses are clustered in the cities and rural communities, approximately 8,800 acres of residential uses are scattered throughout the remainder of the county. Most of these residential uses are located in unincorporated areas surrounding Yuba City and Live Oak and outside of the boundaries of the rural communities. Other clusters of residential land use occur along major transportation corridors, such as State Route (SR) 99 and SR 20, as well as along the Sacramento and Feather rivers and surrounding the Sutter Buttes. Other smaller concentrations of industrial and public areas are also located throughout the unincorporated county (Sutter County 2008).

The county has grown from 64,415 people in 1990 to 78,930 people in 2000. The population of the county as of July 1, 2011, was estimated to be 96,351 persons (DOF 2012).

COLUSA COUNTY

Colusa County comprises 1,156 square miles of land. The county is bordered to the west by Lake County, to the east by Sutter County and the Sacramento River, to the north by Glenn County, to the northeast by Butte County, and to the south by Yolo County. The County consists of the incorporated cities of Colusa and Williams and the unincorporated communities of Arbuckle, Century Ranch/Lodoga, College City, Grand Island/Grimes, Leesville, Maxwell, Princeton, Sites, and Stonyford (Colusa County 2012). The county has grown from 16,275 people in 1990 to 18,804 people in 2000. The population of the county as of July 1, 2011, was estimated to be 21,564 persons (DOF 2012).

BUTTE COUNTY

Butte County is located in the northeastern part of the Sacramento Valley and extends into the northern Sierra Nevada foothills and mountains that rise to the east of the Valley floor. The county comprises approximately 1,680 square miles and can be divided into three general topographical areas: a valley area, a foothill region east of the valley area, and a mountain region east of the foothills. Butte County is bounded to the west by Glenn and Colusa counties, with the Sacramento River and Butte Creek forming portions of the western boundary. To the north and northwest, the county adjoins Tehama County; to the east, Plumas County; and to

the south and southeast, Sutter and Yuba counties. The South Fork of Honcut Creek forms the southeast boundary with Yuba County (Butte County 2009).

Butte County is predominantly rural. With the exception of Paradise and the Magalia/Upper Ridge areas, the county's largest urban areas are located in the western part of the county. Urban development in Butte County has been concentrated in the areas formed by the county's five incorporated communities: Biggs, Chico, Gridley, Oroville, and Paradise. More recent development activity has taken place on the periphery of these established communities (Butte County 2007).

The county has grown from 182,120 people in 1990 to 203,171 people in 2000. The population of the county as of July 1, 2011, was estimated to be 220,570 persons (DOF 2012).

CENTRAL VALLEY FLOOD PROTECTION PLAN

The CVFPP is a critical document to guide California's participation (and influence federal and local participation) in managing flood risk along the Sacramento River and San Joaquin River systems. The CVFPP proposes a systemwide investment approach for sustainable, integrated flood management in areas currently protected by facilities of the SPFC. The State conducted planning and investigations for the 2012 CVFPP from 2009 through 2011, representing the most comprehensive flood evaluations for the Central Valley. The Central Valley flood management system includes levees along the major rivers and streams of the valley floor and around the islands of the Delta, a major bypass system for the Sacramento River and its tributaries, several bypass segments along the San Joaquin River, and reservoirs on almost all major rivers and streams draining to the Central Valley. The regional and system improvements considered in the CVFPP are intended to address a number of potential physical threats to the existing flood management system. These threats are described in the Flood Control System Status Report (DWR 2011). For levees in the system, threats include problems associated with geometry, seepage, structural instability, erosion, settlement, penetrations, vegetation, rodent damage, and encroachments.

5.1.3 GEOGRAPHIC SCOPE

The geographic area that could be affected by the Phase 1 SERP varies depending on the type of environmental resource being considered. The Phase 1 SERP represents approximately 300 miles of levees and includes six counties (see Exhibit 2-1 of Chapter 2, "Project Description," for the Phase 1 SERP coverage area). A maximum of 15 individual erosion repair projects would be implemented annually during the Phase 1 SERP, for a total of up to 75 projects over 5 years. The individual erosion repairs would be defined generally as the footprint of new materials to protect a levee bank and the additional vegetated area that would be disturbed by equipment during construction. The combined total area, if all projects under

the SERP were Tier 2 (0.5 acre), would be 37.5 acres spread throughout the 300 miles of levees in the SRFCP.

When the effects of the SERP are considered in combination with those other past, present, and probable future projects to identify cumulative impacts, the other projects considered may also vary depending on the type of environmental effects being assessed. The general geographic area associated with different environmental effects of the SERP defines the boundaries of the area considered in the cumulative impact analysis. Table 5-1 presents the general geographic areas associated with the different resources addressed in this DEIR analysis.

Table 5-1
Geographic Scope of Cumulative Impacts

Resource Issue	Geographic Area
Air Quality and Climate Change	Sacramento Valley Air Basin for air quality and global, regional, and local (individual repair project sites and vicinity) for climate change
Biological Resources	Individual repair sites and SERP coverage area
Cultural Resources	Individual repair sites and SERP coverage area
Geology, Soils, and Paleontological Resources	Individual repair sites and SERP coverage area
Hydrology and Water Quality	Individual repair sites, Lower Sacramento River reach and tributaries, and SERP coverage area
Noise	Individual repair sites and SERP coverage area

Note: SERP = Small Erosion Repair Program.
Source: Data provided by AECOM in 2010

5.1.4 LIST OF RELATED PROJECTS IN THE PHASE 1 SERP COVERAGE AREA

In addition to the statewide, regional, and local plans and statewide development data identified in the previous section, reasonably foreseeable future projects are included in this cumulative impacts analysis. These projects were considered individually because their effects are more closely related to those of the SERP than other projects.

Each future project considered for this cumulative impacts analysis could have an effect on a portion of the physical environment that also could be affected by the SERP (i.e., the project may interact with the SERP on a cumulative basis). A list of potential reasonably foreseeable future projects was developed using available information regarding planned projects (including agency Web sites).

Potential reasonably foreseeable future projects were evaluated for inclusion in the cumulative effects analysis based on three criteria. To be considered reasonably foreseeable and included in the cumulative impact analysis, the future project must generally meet all of the following criteria:

1. The project would have an effect on a portion of the physical environment that also could be affected by the SERP (i.e., interact on a cumulative basis with the SERP).

2. Sufficiently detailed information about the project is available to allow meaningful analysis without undue speculation.

3. The project is actively under development (i.e., an identified sponsor is actively pursuing project development or construction); initial CEQA and/or National Environmental Policy Act (NEPA) compliance documents, such as a draft EIR or environmental impact statement, have been completed or substantial progress has been made toward completion; and the project is "reasonably foreseeable" given other considerations, such as site suitability, funding and economic viability, and regulatory limitations.

4. The project would not be considered to be part of the SERP if the SERP were adopted.

Only projects meeting all four of the criteria described above were included in the analysis of cumulative impacts as reasonably foreseeable projects. The following projects have been considered:

- CVFPP
- DWR/U.S. Army Corps of Engineers (USACE) Repairs to Critical Erosion Sites (repairs to more than 100 of the most critical sites [of 250 total] have been completed);
- DWR Urban and Nonurban Levee Evaluation Programs (although this data collection program results in only inconsequential effects from levee borings);
- The Sacramento Area Flood Control Agency's (SAFCA's) Natomas Levee Improvement Program (NLIP), which is under construction through at least 2014 and includes the following:
    - NLIP Natomas Cross Canal South Levee Phase 1 Improvements (Phase 1 Project),
    - Post-2010 NLIP Seepage Remediation projects,
    - NLIP Bank Protection Project/Erosion Control projects,
    - Phase 2 Project,

- Phase 3 Project (includes Phases 3a and 3b),
- Phase 4a and 4b Projects, and
- SAFCA Levee Integrity Program (specific construction activities are not yet planned, designed, or funded, and their timing is not known);

- Flood damage reduction projects requiring permission from USACE pursuant to section 14 of the Rivers and Harbors Act of 1899 (33 United States Code [USC] 408, referred to as "section 408," for alteration of federal project levees. See Table 5-2, which identifies projects in the Sacramento River system that are within the Phase 1 SERP coverage area where USACE has completed section 408 authorizations, is currently processing requests for section 408 authorizations, or expects to receive requests for section 408 authorizations in the near future. Because the repairs implemented under the SERP would be considered maintenance, they would not require section 408 authorizations; however, the geographic area and environmental impacts of the section 408 projects listed below could overlap with projects under the SERP;
- Yuba River Basin Project;
- North of Delta Off-Stream Storage (Sites Reservoir);
- Shasta Lake Water Resources Investigation
- North Bay Aqueduct Alternative Intake Project; and
- Bay Delta Conservation Plan/Delta Habitat Conservation and Conveyance Plan/Delta Plan.

5.1.5 ANALYSIS OF CUMULATIVE IMPACTS

The following sections discuss the cumulative effects anticipated from implementation of the SERP, together with the reasonably foreseeable similar projects above and general regional development in Sacramento, Yolo, Solano, Sutter, Colusa, and Butte counties, for each of the six environmental issue areas evaluated in this DEIR, as well as all other environmental issue areas identified as less than significant in the Initial Study (Appendix A). The analysis conforms with section 15130 of the CEQA Guidelines, which specifies that the "discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great a detail as is provided of the effects attributable to the project alone."

Table 5-2 Section 408 Projects			
Flood Damage Reduction Project or System	**Project Title**	**Lead Agency/Agencies**	**Status of Section 408 Request**
Approved Section 408 Projects			
Sacramento River Flood Control Project	Feather River Segment 1 and 3 Improvements	Three Rivers Levee Improvement Authority	Approved
Sacramento River Flood Control Project	Feather River Segment 2 Improvements	Three Rivers Levee Improvement Authority	Approved
Sacramento River Flood Control Project	Natomas Cross Canal and Sacramento River modifications—Phase 2 Project	SAFCA	Approved
Sacramento River Flood Control Project	Feather River Levee Setback at Star Bend	Levee District 1 of Sutter County	Approved
Sacramento River Flood Control Project	Natomas Levee Improvement Program—Phase 3 Project	SAFCA	Approved
Ongoing Section 408 Projects			
Sacramento River Flood Control Project	Natomas Levee Improvement Program—Phase 4a Project	SAFCA	Approved
Sacramento River Flood Control Project	Natomas Levee Improvement Program—Phase 4b Project	SAFCA	Decision anticipated 2013
Sacramento River Flood Control Project	River Islands Project	Califia, LLC	Approved
Sacramento River Flood Control Project	2010 Improvements	West Sacramento Flood Control Agency	Approved
Sacramento River Flood Control Project	2011 Improvements	West Sacramento Flood Control Agency	Approved
Anticipated Future Section 408 Projects			
Sacramento River Flood Control Project	Bay Delta Conservation Plan	California Department of Water Resources	Decision anticipated 2014
Source: Compiled by AECOM in 2011			

AIR QUALITY

The Phase 1 SERP coverage area is located in the Sacramento Valley Air Basin (SVAB). The SVAB comprises all of Butte, Colusa, Glenn, Western Placer, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba counties and the eastern portion of Solano County. Past development in the SVAB combined with meteorological conditions has clearly resulted in significant cumulative impacts to air quality. As described in Section 3.2, “Air Quality and Climate Change,” the SVAB is in nonattainment status for ozone and respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}).

The SERP is overseen by five air districts: Butte County Air Quality Management District (AQMD), Feather River AQMD, Colusa County APCD, Yolo-Solano AQMD, and Sacramento Metropolitan AQMD. Each air district attains and maintains air quality conditions through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. Strategies include preparing plans for the attainment of ambient air quality standards, adopting and enforcing rules and regulations concerning sources of air pollution, and issuing permits for stationary sources of air pollution.

Temporary Construction Impacts

As discussed in Section 3.2, “Air Quality and Climate Change,” emissions of pollutants generated during construction are temporary, but can contribute to exceedance of local thresholds. Emissions from site preparation (e.g., clearing and grading), material transport, bank stabilization, erosion control feature installation, vegetation planting, and other miscellaneous activities associated with repair of small erosion sites and similar projects would result in the temporary generation of reactive organic gases (ROG), oxides of nitrogen (NO_X), PM_{10}, and fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$). Several air districts in the Phase 1 SERP coverage area have not adopted mass emission thresholds for construction-generated criteria air pollutants and precursors. Instead, some of these air districts require that standard equipment exhaust (i.e., ROG and NO_X) and fugitive dust control measures (i.e., PM_{10} and $PM_{2.5}$) be incorporated into project design and implemented during project construction. However, other air districts have established quantitative thresholds of significance that SERP-generated daily construction emissions were evaluated against. As shown in Table 3.2-6 of Section 3.2 “Air Quality and Climate Change,” daily construction NO_X emissions associated with SERP’s construction activities would exceed the Butte County AQMD and Feather River AQMD thresholds of significance. Thus, SERP-generated, construction-related emissions of criteria air pollutants and precursors, especially if overlapping with other construction activities of similar projects or other construction projects, would exceed local thresholds of significance. Implementation of the mitigation in Section 3.2, “Air Quality and Climate Change,” would reduce significant impacts to a less-than-significant

level by requiring compliance with local air district recommendations for decreasing emissions of criteria air pollutants and precursors.

Assuming that similar flood risk reduction projects or other similar construction projects would also implement all feasible construction emission control measures consistent with respective air district guidelines, construction emissions on some of the related projects may be less than significant, although it is likely that larger projects would result in significant and unavoidable air quality impacts on their own. This impact cannot be more precisely determined or quantified because the construction schedules for related projects are not known, and it is also unknown at what sites small erosion repair projects would occur under the SERP. However, taken in total and combined with the nonattainment status of the SVAB for ozone and PM_{10}, and other development that would occur in the SVAB, these reasonably foreseeable projects would result in a significant cumulative impact on air quality.

However, as shown in Table 3.2-5 in Section 3.2, the Phase 1 SERP would contribute only nominally to the existing and expected future nonattainment status of the SVAB. Construction at each repair site would require no more than 1–4 weeks of active construction and the maximum acreage disturbed per site would be 0.5 acre or 1,000 linear feet. In addition, the SERP would use barges to transport material to the individual erosion sites whenever feasible. Using barges would further reduce construction-related emissions because it would reduce the amount of individual truck trips required to each site. Therefore, the SERP would not result in a cumulatively considerable incremental contribution to the significant cumulative impact on air quality from emissions of criteria air pollutants and precursors.

Long-Term Operational Impacts

Implementing the SERP would result in a nominal (e.g., less than 1 pound per day [lb/day]) long-term increase in criteria air pollutants and precursors. Maintenance activities would result in area-source emissions from vegetation management equipment such as chainsaws and trimmers. Modeling was based on the assumption that maintenance activities would be conducted 1 week per year per erosion repair site in the Phase 1 SERP coverage area. As shown in Table 3.2-7 in Section 3.2, modeling results indicate that long-term operation of the SERP would result in regional unmitigated emissions of less than 1 lb/day of ROG, NO_X, PM_{10}, and $PM_{2.5}$, which would not exceed any local air district significance thresholds. The impact associated with the project's operational emissions would be less than significant.

Similar flood projects or other construction projects would result in increases in criteria air pollutants and precursors, and their relative level of contribution is generally related to their size. Long-term operational emissions from these related projects, considered in light of the nonattainment status of the air basin, would result in a significant cumulative impact on air quality from emissions of criteria air pollutants and precursors.. However, emissions

associated with SERP erosion repairs would be nominal, and project-generated emissions also would not exceed local thresholds of significance; therefore, the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact on air quality.

Toxic Air Contaminants

Temporary construction activities under the SERP could expose nearby sensitive receptors to toxic air contaminant (TAC) emissions. Construction activities at individual repair sites would result in generation of diesel particulate matter (diesel PM) emissions from exhaust of off-road heavy-duty diesel equipment for site preparation (e.g., excavation, grading, and clearing), materials transport and handling, installation of bank protection materials, and other miscellaneous activities. Heavy-duty construction equipment would not operate in the immediate proximity of any single sensitive receptor for an extended period of time. Because use of off-road heavy-duty equipment would be temporary, in combination with the dispersive properties of diesel PM, and because primary construction activities would not be active for long periods of time within 300 feet of any sensitive receptors, construction-related TAC emissions would not expose sensitive receptors to substantial concentrations of TACs. Mobile sources of TACs are site-specific and would not combine with similar flood risk reduction projects or other construction projects to expose nearby sensitive receptors to cumulatively significant TAC emissions. Therefore, the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to TACs generated by short-term construction activities.

Carbon Monoxide

Carbon monoxide (CO) concentration is a direct function of vehicle idling time and, thus, traffic flow conditions. Transport of CO is extremely limited because it disperses rapidly with distance from the source under normal meteorological conditions. Under certain specific meteorological conditions, CO concentrations near roadways and/or intersections may reach unhealthy levels with respect to local sensitive land uses, such as residential areas, schools, playgrounds, child care facilities, and hospitals. CO emission factors in future years are expected to be lower than current levels because of more stringent vehicle emissions standards and improvements in vehicle emissions technology. Thus, ambient local CO concentrations under cumulative conditions are expected to continue to decline.

According to the transportation analysis prepared for the SERP, operation of the SERP would not reduce the level of service (LOS) at any signalized intersections to an unacceptable level (LOS E or F) during any time of the day or substantially worsen LOS at any signalized intersections. Long-term local emissions of CO from mobile sources during operations and maintenance activities would not exceed local thresholds of significance. Consequently, the SERP would not result in a cumulatively considerable incremental contribution to a significant

cumulative impact related to increases in traffic volumes on the local roadway network relative to CO concentrations.

Odor Emissions

Construction activities at individual repair sites could expose nearby sensitive receptors to objectionable odors related to short-term construction activities. Construction would result in odors from exhaust emissions from on-site diesel equipment and possible temporary standing water. Such emissions would be site-specific and intermittent and would dissipate rapidly from the source. Emissions of odors would be less than significant for the SERP.

Odor intensity weakens with distance, and it is expected that odors from the individual repair sites, when considered along with potential odors that would be generated by similar flood risk reduction projects or other construction projects, would not result in a significant cumulative impact. Therefore, temporary odors related to construction of individual repair sites would not generate objectionable odors affecting a substantial number of people or result in a cumulatively considerable incremental contribution to a significant cumulative impact related to odor emissions.

Climate Change and Greenhouse Gas Emissions

As stated in Section 3.2, “Air Quality and Climate Change,” the California Office of Planning and Research proposed amendments to the CEQA Guidelines, including Appendix G, to address the impacts of greenhouse gas (GHG) emissions, as directed by Senate Bill 97 (2007). CNRA adopted those guidelines on December 30, 2009, and the guidelines became effective March 18, 2010 (CNRA 2010). The amendments include the following additions to Appendix G. An impact related to global climate change is considered significant if the proposed program would:

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

Assembly Bill (AB) 32 demonstrates California’s commitment to reducing its rate of GHG emissions and associated contribution to climate change without limiting population or economic growth within the state. To meet the GHG emissions targets mandated by AB 32, California would need to generate a lower level of GHG emissions in the future than at the present time. For most projects, however, no simple metric is available to determine whether a single project would substantially increase or decrease overall GHG emissions levels or conflict with the goals of AB 32. None of the applicable air districts has adopted or proposed GHG thresholds.

GHG emissions generated by the project would predominantly be in the form of carbon dioxide (CO_2). While emissions of other GHGs such as methane (CH_4) and nitrogen dioxide (NO_2) are important with respect to global climate change, the emission levels of these GHGs for the sources associated with construction activities are relatively small compared with CO_2 emissions, even considering their higher global warming potential (GWP). Therefore, all GHG emissions for construction and operation are reported as CO_2.

Construction-related GHG emissions associated with activities related to restoration and bank stabilization were calculated using URBEMIS 2007 version 9.2.4. Operational emissions, including direct (e.g., landscaping and maintenance) and indirect (e.g., vehicle trips) emissions were also calculated using URBEMIS 2007 (Rimpo and Associates 2008).

Construction-Generated Greenhouse Gas Emissions

Construction activities associated with individual erosion repairs would occur in several locations with a maximum daily area disturbed of 0.5 acre or 1,000 linear feet. During this time, construction-related GHG emissions would be associated with engine exhaust from heavy-duty construction equipment, material transport trucks, and worker commute trips.

The modeled worst-case construction-generated emissions of GHGs would be 132.3 total mass CO_2 emissions (in metric tons) (Rimpo and Associates 2008). This number represents the construction emissions modeled for 2011 and does not include the full life cycle of GHG emissions that would occur over the production/transport of materials used during construction of the SERP, solid waste that occurs over the life of the SERP, and the end of life of the materials and processes that indirectly result from the SERP. Estimation of the GHG emissions associated with these processes would be speculative, would require analysis beyond the current state of the art in impact assessment, and may lead to a false or misleading level of precision in reporting of project-related GHG emissions. In addition, the URBEMIS 2007 computer model does not account for CO_2 emissions associated with the production of concrete or other materials used in project construction. URBEMIS also does not estimate GHG emissions other than CO_2, such as CH_4 and nitrous oxide, because these levels are expected to be nominal in comparison to the estimated CO_2 levels despite their higher GWP. See Appendix C, “Air Quality Modeling Results,” for detailed model input, assumptions, and threshold calculations.

While any increase in GHG emissions would add to the quantity of emissions that contribute to global climate change, emissions associated with construction of the SERP would occur over a limited period, and emissions would be reduced to the extent feasible by implementation of mitigation in Section 3.2, “Air Quality and Climate Change.”

In May 2012, DWR adopted a Greenhouse Gas Emissions Reduction Plan in an effort to reduce its impact on the environment (DWR 2012). The plan will guide project development

and decision making with respect to energy use and GHG emissions. This plan shows how DWR will make substantial reductions in its GHG emissions in the near-term (present to 2020) and how it will continue to reduce emissions beyond 2020 to achieve long-term (2050) emissions reduction goals. The near-term goal is to reduce emissions by 50 percent below 1990 levels by 2020. The long-term goal is to reduce emissions by 80 percent below 1990 levels by 2050. DWR identified 11 GHG emissions reduction measures to achieve these goals.

DWR would use this plan to streamline the CEQA cumulative impacts to GHG emissions, consistent with CEQA Guidelines section 15183.5. To streamline these impacts, the SERP projects would incorporate relevant reduction measures as identified in the Greenhouse Gas Emissions Reduction Plan. The reduction measures identify replacement of a power station with sources of electricity that involve lower rates of GHG emissions, increasing energy efficiency of equipment, and other measures that would not apply to the proposed program.

However, could apply to the proposed program. CO-1 Construction Best Management Practices (BMPs), would involve implementing practices aimed at minimizing fuel consumption by construction equipment and transportation of materials, among other actions. Appendix D of DWR's Greenhouse Gas Emissions Reduction Plan identifies the construction BMPs, which have some overlap with the requirements of Mitigation Measure 3.2-1 in this EIR. Those that are not already included as a part of Mitigation Measure 3.2-1 are included below as Mitigation 5-1.

CO-2 Improved Statewide Equipment and Fuel Regulations, involves reductions achieved by compliance with current and anticipated air quality regulations. This measure would not be directly imposed by DWR, but would be required as a result of the current regulatory environment as it applies at the time of a project execution.

Mitigation Measure 5-1: Implement Pre-Construction, Final Design, and Construction BMPs.

Pre-construction and Final Design BMPs are designed to ensure that individual projects are evaluated and their unique characteristics are taken into consideration when determining whether specific equipment, procedures, or material requirements are feasible and efficacious for reducing GHG emissions from a project. In addition to mitigation measures defined in the various sections of this DEIR, the following BMPs will be applied as applicable and appropriate:

- **BMP 1**. Evaluate project characteristics, including location, project work flow, site locations, and equipment performance requirements, to determine whether specifications for the use of equipment with repowered engines, electric drive trains, or other high-efficiency technologies are appropriate and feasible for the project or specific elements of the project.

- **BMP 2**. Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines.
- **BMP 3**. Coordinate opportunities to carpool to the construction site.
- **BMP 4**. Reduce electricity use in temporary construction offices by using high-efficiency lighting and requiring that heating and cooling units be Energy Star compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.
- **BMP 5**. For deliveries to project sites where the haul distance exceeds 100 miles and a heavy-duty class 7 or class 8 semi-truck or 53-foot or longer box-type trailer is used for hauling, a SmartWay certified truck will be used to the maximum extent feasible.
- **BMP 6**. Recycle construction debris to reduce construction waste.

Construction BMPs would apply to all construction and maintenance projects that DWR completes or for which DWR issues contracts. All the SERP projects are expected to implement all construction BMPs..

Following completion of individual erosion repairs, all construction emissions would cease. Additionally, the effort to repair small erosion sites before they become larger erosion sites has the benefit of reducing emissions that would result when repairing the larger sites.

In addition, DWR has specified a series of steps to demonstrate consistency with the Greenhouse Gas Emissions Reduction Plan:

1. Identify, quantify, and analyze the GHG emissions from the proposed program and alternatives using a method consistent with that described in DWR internal guidance, “Guidance for Quantifying Greenhouse Gas Emissions and Determining the Significance of their Contribution to Global Climate Change for CEQA Purposes,” as such guidance document may be revised.
2. Determine that construction emissions levels would not exceed the Extraordinary Construction Project threshold of 25,000 metric tons of CO2e for the entire construction phase of the SERP, nor would they exceed 12,500 metric tons of CO2e in any single year of construction.
3. Incorporate into the design or implementation plan for the SERP all project-level GHG emissions reduction measures listed in Section VII or explain why measures that were not incorporated did not apply.

4. Determine that the proposed program does not conflict with DWR's ability to implement any of the specific project GHG Emissions reduction measures listed in Section VII.

5. If implementation of the proposed program would result in additional energy demands on the SWP system of 15 gigawatt hours per year (GWh/yr) or greater, the SERP would get written confirmation from the DWR SWP Power and Risk Office stating that the Renewable Power Procurement Plan would be updated to accommodate the additional load resulting from the proposed program at such time as it ultimately was implemented.

As required under #1, emissions from the proposed program have been quantified and alternatives assessed. Construction emissions would be well below the Extraordinary Construction Project threshold (#2). Applicable reduction measures from the Greenhouse Gas Emissions Reduction Plan have been incorporated (#3). The proposed program would not conflict with DWR's ability to implement any of the reduction measures (#4). The Phase 1 SERP would not result in additional energy demands approaching the threshold included in #5.

Because DWR has prepared a Greenhouse Gas Emissions Reduction Plan that quantifies existing and future emissions, has established an emissions reduction target below which the contribution to GHG emissions impacts would be less than cumulatively considerable, and has identified measures that would collectively achieve the emissions reduction targets, and because the project complies with relevant GHG reduction measures, project-related GHG emissions would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to global climate change. In addition, the summary of projections in the CVFPP PEIR concluded that the net climate change effects of flood protection activities would be beneficial because the GHG emissions from those activities would be more than compensated, most likely by orders of magnitude, by the avoided emissions that would occur from repair of larger erosion sites or reconstruction following a flood.

Operation-Related Greenhouse Gas Emissions

Operational GHG emissions would be generated by area and mobile sources during the life of the SERP. Area-source GHG emissions would be associated with landscaping and maintenance largely related to vegetation establishment, employee commute trips, and other miscellaneous activities. No increase in GHG emissions would be associated with off-site electricity generation or water use. Mobile-source GHG emissions would be generated by the slight increase in vehicle trips associated with maintenance activities. Operational emissions, including direct (e.g., landscaping and maintenance) and indirect (e.g., vehicle trips) emissions were calculated using URBEMIS 2007 and are summarized in Table 5-3.

Table 5-3 Summary of Modeled Operational Emissions of Greenhouse Gases [1]	
Source	**Annual Mass CO_2 Emissions (metric tons/year)**
Operational Emissions of the SERP (Year 2013)	
Area Sources[1]	3.4
Mobile Sources[1]	73.9
Electricity Consumption[2,3]	0.0
Municipal Water Use[2,3]	0.0
Total Operational Emissions[4]	77.3

Notes:
[1] Direct operational emissions (i.e., area and mobile sources) were modeled using the URBEMIS 2007 computer model, based on the same assumptions and input parameters used to estimate emissions of criteria air pollutant. URBEMIS also does not estimate GHG emissions other than carbon dioxide (CO_2), such as methane and nitrous oxide because the emission levels of these pollutants are expected to be nominal in comparison to the estimated CO_2 levels despite their higher global warming potential.
[2] No additional substantial electricity consumption is expected.
[3] No additional substantial water consumption is expected.
[4] Assumes maintenance of up to 15 erosion sites per year.
See Appendix C, "Air Quality Modeling Results," for detailed model input, assumptions, and threshold calculations.
Source: Modeling conducted by AECOM in 2009

An increase in carbon sequestration by riparian vegetation at the project sites is anticipated. Because riparian forest sequesters an estimated 53.7 metric tons per acre within 10 years (COLE Development Group 2011), riparian restoration could reduce emissions in the study area during the first decade following completion of construction activities. The amount of carbon sequestered would be dependent on the number of acres allowed to regrow vegetation and the types of vegetation that repopulated the area. Therefore, because the precise restored acreage is unknown, no quantity of sequestered carbon is presented here, but it would take approximately 15 acres of restored vegetation per year to offset the maintenance emissions presented in Table 5-3 below.

The incremental contribution to climate change by the SERP's construction emissions (132 metric tons) and operational activities (77 metric tons/year) would be minimal and mitigation measures would be implemented to reduce emissions to the extent possible.

The SERP would not conflict with the implementation of AB 32 or the DWR Climate Action Plan, Phase 1: Greenhouse Gas Emissions Reduction Plan. Implementation of the SERP would not result in the generation of substantial temporary construction or long-term operational emissions of GHGs. The SERP would comply with relevant GHG reduction

measures, and project-related GHG emissions would not result in a cumulatively considerable incremental contribution to the significant cumulative impact of global climate change.

BIOLOGICAL RESOURCES

Past development in counties within the Phase 1 SERP coverage area, ranging from land conversions for flood management projects to recent development projects, has resulted in substantial conversions of native habitat to other uses. Although future projects would be expected to mitigate impacts on threatened and endangered species and other sensitive biological resources that are provided with regulatory protections, many types of habitats and species do not have regulatory protection and a net loss of native habitat for plants and wildlife, agricultural lands, and open space areas that provide value to biological resources can be expected to continue.

As discussed in Section 3.3, “Biological Resources,” the Phase 1 SERP coverage area generally includes riparian forest, oak woodland, orchard, and riparian scrub communities that provide wildlife with dispersal and migration corridors and habitat for foraging, cover, nesting, and breeding (including shade and cover for fish and other aquatic species). Primary open-water habitats within the Phase 1 SERP coverage area include the active channels of the Sacramento River, Feather River, Cache Creek, Deer Creek, and Sutter Bypass. These waterways provide multiple habitat functions for a diverse assemblage of native and nonnative fish species. All waterways within the Phase 1 SERP coverage area, including the Sacramento and Feather rivers and their tributaries and sloughs, qualify as jurisdictional waters of the United States.

Construction of individual erosion repairs could result in:

- impacts related to the temporary degradation of habitat for special-status fish, wildlife, and plant species from construction activities;
- loss of individuals and nests;
- disruptions to the nesting, spawning, or migration attempts of 20 special-status fish and wildlife species;
- damage or loss of seven special-status plant species;
- removal of sensitive vegetation communities, including riparian and marsh habitat;
- removal of native oak trees; and
- the temporary loss of USACE jurisdictional habitats (waters of the United States, including wetlands) until planted vegetation becomes established.

The SERP Manual contains mandatory conservation measures to be applied to all individual erosion repair sites, and resource-specific conservation measures to be applied at selected erosion repair sites to minimize impacts on sensitive biological resources; sensitive natural communities; native trees; and special-status fish, wildlife, and plant species. These conservation measures include timing restrictions for in-channel work to avoid impacts on seasonally present fish species; restrictions on vegetation and habitat disturbance; and specific measures for construction equipment operation, staging, material stockpiling and erosion control during construction, hazardous materials, and other mandatory and resource-specific conservation measures (see Appendix B of this DEIR). The SERP is intended to facilitate repair of erosion sites when they are small, which can reduce the chance of greater environmental impacts if the erosion sites are not treated in an expedient manner. In addition to SERP Manual conservation measures, the SERP is part of the 2012 Central Valley Flood Protection Plan (CVFPP), which includes an associated Conservation Framework. Implementation of the SERP Manual conservation measures and the CVFPP Conservation Framework would reduce impacts to native oak trees protected under county or city ordinances and riparian and marsh plant communities to a less-than-significant level. A streambed alteration agreement also would be obtained from the California Department of Fish and Wildlife (CDFW), and all terms and conditions within the agreement would be met. Although no assurances exist that similar flood projects or other construction projects would potentially affect special-status species and sensitive vegetation communities, these projects would require consultation with CDFW, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service to determine appropriate methods for minimizing impacts. The SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to damage or loss of sensitive species, removal of oak trees, or sensitive natural communities.

Compliance with the terms of the regional general permit from USACE; implementation of the SERP Manual size and placement limits described in Section B, “Baseline Assessment Methodology,” the mitigation requirements described in Section G, “Mitigation”; and the mandatory conservation measures described in Section I, “Conservation Measures,” of the SERP Manual also would ensure that potential adverse effects on waters of the United States and waters of the state would be avoided or minimized. Flood risk reduction projects or other construction projects that would affect USACE jurisdictional habitat also would be required to comply with USACE requirements. Therefore, the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to the loss of USACE jurisdictional habitats.

With implementation of the measures listed above, the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to biological resources.

CULTURAL RESOURCES

The cumulative context for cultural resources is defined as the Phase 1 SERP coverage area. Cultural resources in the Phase 1 SERP coverage area generally consist of prehistoric sites, historic sites, historic structures, and isolated artifacts. During the 19th and 20th centuries, localized urbanization and intensive agricultural use in the region caused destruction or disturbance of numerous prehistoric sites, while many structures now considered to be historic were erected. From the latter half of the 20th century to the present, prehistoric and historic structures have been disturbed and destroyed. During this period, the creation and enforcement of various regulations protecting cultural resources have substantially reduced the rate and intensity of these impacts; however, even with these regulations, cultural resources are still degraded or destroyed as cumulative development in the region proceeds.

As described in Section 3.4, “Cultural Resources,” the Phase 1 SERP coverage area encompasses lands that were inhabited for at least the past 10,000 years by prehistoric Native American populations, and the themes of reclamation and flood risk reduction are significant historical themes. Implementation of the SERP would require native soil disturbance at individual repair sites that could result in alteration or destruction of significant prehistoric or historic resources. Mitigation outlined in Section 3.4 requires complying with the programmatic agreement (PA) developed by USACE and the State Historic Preservation Officer (SHPO), consulting with stakeholders, performing technical studies to identify and evaluate cultural resources, and implementing avoidance or treatment protocols. These measures would substantially reduce the level of impacts on identified cultural resources.

Although it is likely that few if any of the SERP levees would be found to meet significance criteria, for purposes of section 106 consultation and this analysis, DWR in coordination with USACE has assumed that the SRFCP levees are historically significant. SERP does not propose the removal of any levee, the construction of any new levee, the alteration of any levee such that land use patterns would change, nor any changes to any land uses in the vicinity of the program. The waterside small erosion repair sites would not adversely affect these levees, and the historically significant characteristics of the levees would be preserved by implementation of SERP; that is, there would be no change to the characteristics of levees that make them historically significant. Minor alterations to SRFCP levees from small erosion repair projects implemented under SERP would not materially impair the historical significance of the levees; therefore, the SERP would not make a cumulatively considerable incremental contribution to a significant cumulative impact on historic levees.

In addition, previously unidentified cultural resources eligible for listing on the National Register of Historic Places and the California Register of Historical Resources have the potential to be affected by ground-disturbing work at individual repair sites. Mitigation measures in Section 3.4, “Cultural Resources,” require monitoring of ground-disturbing activities. In addition, if

potentially significant cultural resources are uncovered during construction, all ground-disturbing activities must cease until the extent, character, and potential significance of the find is determined and an appropriate treatment protocol is developed in compliance with the PA. These mitigation measures would substantially reduce the level of impacts on unidentified cultural resources.

Consequently, the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to cultural resources.

GEOLOGY, SOILS, AND PALEONTOLOGICAL RESOURCES

The Phase 1 SERP coverage area is located within the Sacramento Valley, and together with the San Joaquin Valley, makes up the Central Valley geomorphic province of California. The geologic formations and soil types vary depending on the erosion repair location, and therefore are site-specific. None of the individual repair sites would be located within or adjacent to an Alquist-Priolo Earthquake Fault Zone or underlain by or located adjacent to any other known active faults. The Phase 1 SERP coverage area is located in an area of generally low seismic activity and the individual repair sites would not likely experience surface fault rupture or strong seismic ground shaking. The individual repair sites would be located within areas that could be subject to geologic hazards from liquefaction, unstable soils, and shrink-swell potential. However, erosion repairs would be specifically engineered to account for stability factors and safety coefficients, including liquefaction, unstable soils, and shrink-swell potential. On-site soil investigations would be made by a qualified engineer and individual repairs would be designed to appropriately withstand these hazards. In addition, although some of the repair sites may be within areas with high potential for paleontological resources, the projects would only disturb a small area (1.5 to 7.5 acres total per year), and any excavation in native soils would be unlikely to occur. Similar considerations would be expected to occur associated with other flood risk reduction projects. Therefore, the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to geology, soils, and paleontological resources.

HYDROLOGY AND WATER QUALITY

Local hydrology, drainage, and water quality conditions are often affected by regional activities, in addition to local activities. The Phase 1 SERP coverage area is located in the Sacramento River hydrologic region and includes the entire area drained by the Sacramento River. For planning purposes, this includes all watersheds tributary to the Sacramento River north of the Cosumnes River watershed. The levees within the Phase 1 SERP coverage area from Butte Creek in the north to the Cache Creek north levee in the south are within the Colusa Basin Hydrologic Unit. The Cache Creek south levee, Willow Slough, and Putah Creek are within the Valley Putah-Cache Basin Hydrologic Unit, and the Sacramento River segment to the east is within the Sacramento Delta Hydrologic Unit.

The following evaluation of cumulative hydrology and water quality impacts is determined by examining the extent to which local and regional activities could affect hydrologic conditions in the Phase 1 SERP coverage area. All waterways in the Phase 1 SERP coverage area are tributaries to the Lower Sacramento River reach, which is generally defined as the portion of the river from Princeton (in Colusa County) to the Delta, at Chipps Island. Past and present water supply and agricultural diversions, flood management projects, urban development, and river channelization in the Lower Sacramento River affect hydrology and water quality conditions in the Phase 1 SERP coverage area.

Construction activities associated with small erosion repairs could cause soil erosion and sedimentation of local drainages and waterways. Soil and associated contaminants that enter receiving waters through stormwater runoff and erosion can increase turbidity, stimulate algae growth, increase sedimentation of aquatic habitat, and introduce compounds that are toxic to aquatic organisms. Accidental spills of construction-related substances such as oils, fuels, and levee repair materials could contaminate both surface water and groundwater. As discussed in Section 3.6, “Hydrology and Water Quality,” implementation of the SERP Manual conservation measures would reduce the significant, temporary construction-related drainage and water quality effects under the SERP to a less-than-significant level by requiring preparation and implementation of appropriate BMPs to maintain surface water quality conditions in adjacent receiving waters.

No land use changes or additional impervious surfaces would result from implementation of the SERP that could result in contaminant loading of local drainages or receiving waters or changes to the local drainage patterns that could increase watershed flow rates above the natural background level. Impacts associated with long-term water quality effects and increased stormwater runoff activities would be less than significant.

Although there are no assurances that other reasonably foreseeable future projects affecting the Lower Sacramento River reach would incorporate the same measures as the SERP, each project that would affect soil erosion, sedimentation, and discharge stormwater runoff would be required to comply with the existing statewide National Pollutant Discharge Elimination System discharge permits from the Central Valley RWQCB and/or each county’s erosion control, flood management, and water quality BMP requirements. Therefore, the SERP, in conjunction with other flood risk reduction projects, would not be expected to result in a cumulatively considerable incremental contribution to a significant cumulative impact related to temporary or long-term hydrology and water quality impacts.

NOISE

The cumulative context for noise is the Phase 1 SERP coverage area, where noise receptors and generators are expected to be affected by the SERP. Noise and vibration are localized

occurrences that attenuate rapidly with distance. Therefore, only future development projects and flood control projects in the immediate vicinity of the repair sites that occur at the same time as noise- and vibration-generating activities would have the potential to add to noise and vibration generated by SERP activities, thus resulting in cumulative noise and vibration impacts. The SERP would result in temporary construction activities that could expose sensitive receptors to noise levels in excess of the applicable noise standards and/or result in a noticeable increase in ambient noise levels. Construction activities at individual repair sites would result in a substantial (i.e., more than 3 decibels) temporary increase in ambient noise levels at nearby noise-sensitive land uses. If construction activities are conducted in jurisdictions that do not apply construction noise exemptions to applicable noise standards, those construction activities could exceed the performance noise standards when construction activities are conducted within 700 feet of noise-sensitive uses. Implementation of mitigation in Section 3.7, “Noise,” and compliance with requirements identified in county general plans and codes would limit hours of construction activity to daytime hours, avoiding more noise-sensitive nighttime hours, thus reducing the overall daily noise levels at noise-sensitive receptors. Therefore, potentially significant impacts associated with temporary noise levels from SERP construction would be reduced to a less-than-significant level.

Temporary construction activities under the SERP would increase average daily traffic (ADT) volumes on the local roadway network (i.e., additional haul trucks on the road) and, consequently, would increase noise levels along the affected segments of the levee near erosion repair sites. The SERP would use barges to transport material to the individual erosion sites whenever this method is appropriate and feasible. If individual erosion sites require materials to be transported on the local roadway network, noise-sensitive receptors located near affected roadways would experience increases in traffic noise levels. Noise levels attributable to haul trucks were modeled as shown in Table 3.7-4 using assumptions provided by DWR for typical haul material amounts, truck capacity, and type of project (Tier 1 or 2) (Eckman, pers. comm., 2009).

A quantitative evaluation of increased traffic noise levels along specific routes from haul trucks that would apply to a specific levee segment is not feasible at this time because the individual haul routes for each erosion site have not been identified. In addition, the additive noise contribution from haul-truck trips is expected to contribute nominally to existing levels of traffic noise because it requires a doubling of traffic volume in order to increase traffic noise by 3 dB and the average truck traffic of 14 trips per day would be unlikely to double roadway traffic (Caltrans 1998: N-96). Also, haul trucks would only be operating during daytime hours and/or within the local construction exemption as outlined in Mitigation Measure 3.7-1. Therefore, the SERP would not be expected to result in a cumulatively considerable incremental contribution to a significant cumulative impact related to traffic noise generated by haul trucks.

AESTHETICS

Cumulative impacts on aesthetic resources could occur in the Phase 1 SERP coverage area. The SERP has the potential to adversely affect a scenic vista, scenic highway, or existing visual character. In addition, the SERP has the potential to create glare from construction equipment. However, implementing the SERP would not cause substantial, localized changes to the existing visual character of the Phase 1 SERP coverage area because the size of the repair sites would be small and because revegetation plans for disturbed areas would be part of the design. In addition, the existing levee system would be repaired, reconstructed, or otherwise improved in place. The only scenic highway that could potentially have views of erosion repair sites would be SR 160. However, the repair sites would be small, would be located on the waterside of the levees, and would be similar in character to the existing levees and repair sites. Therefore, implementing the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to the substantial degradation of scenic vistas, scenic resources, or existing visual character.

All erosion repair work under the SERP is expected to take place during daylight hours; therefore, no lighting would be used. Equipment used during the repairs may create some glare; however, because this would be a temporary effect (on the order of 1–2 weeks) and the amount of equipment needed would be minor, this would not create a substantial source of glare that would affect views of the area. It would be highly unlikely that the SERP would generate glare of sufficient intensity to interact with light and glare generated by other projects in a manner that would result in a significant cumulative impact. Therefore, the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to new sources of substantial light and glare.

HAZARDS AND HAZARDOUS MATERIALS

The cumulative context for hazards and hazardous materials impacts is defined as the Phase 1 SERP coverage area. However, health and safety impacts associated with past or current uses of a project site usually occur on a project-by-project basis, rather than in a cumulative manner.

Construction of the SERP (like construction of the related projects) would involve the storage, use, disposal, and transport of hazardous materials (e.g., asphalt, fuel, lubricants, solvents) to varying degrees. Storage, use, disposal, and transport of hazardous materials are extensively regulated by various federal, state, and local agencies. Construction companies that would handle any hazardous substances would be required by law to implement and comply with these existing regulations. Therefore, a cumulatively significant impact would not occur, and the SERP would not result in a cumulatively considerable incremental contribution to a cumulatively significant impact associated with hazardous materials storage and transport.

Approximately 18 schools are located within 0.25 mile of levees within the Phase 1 SERP coverage area where construction might occur. Because the hazardous materials used during construction, such as equipment lubricants and diesel fuels, would be present for a short period (no more than 1–2 weeks), would occur in small amounts, and materials transport is regulated by federal, state, and local laws, the potential for a large enough spill to adversely affect nearby schools is considered extremely low. Therefore, the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to exposure to hazards or hazardous materials near a school.

There are no Cortese-listed sites within the Phase 1 SERP coverage area; however, in some instances, monitoring wells associated with hazardous materials sites could be located near repair sites associated with the SERP. In such circumstances, construction activities in hazardous materials sites or damage to monitoring wells could release hazardous substances into the air and waterways, potentially exposing construction workers, the general public, and the environment to a substantial hazard. Implementation of Mitigation Measure HAZ-1, described in Appendix A, would minimize the potential for exposure of people and the environment to hazardous materials encountered during construction activities. In addition, if hazardous materials were to be encountered on-site during erosion site repairs, the associated impacts would be localized to those repair sites and would not be additive—that is, would not interact on a cumulative basis. Therefore, implementing the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to exposure to existing hazardous materials.

Because there are several airports or private airstrips within 5,000 feet of the Phase 1 SERP coverage area, there is a possibility that cranes used for construction that are greater than 150 feet in height could interfere with airplane flight paths. Mitigation HAZ-2, discussed in Appendix A, would reduce this impact to a less-than-significant level by requiring engineering plans and specifications to be submitted to airport management for any repairs near an airport or private airstrip and modification of the construction equipment used, if necessary. Other projects that could occur near the same airports as the SERP repairs would also be required to mitigate for potential interference with flight paths. Therefore, it is not expected that a significant cumulative impact related to interference with flight paths would occur, and the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact.

The Phase 1 SERP coverage area is located in local responsibility areas that are either unzoned or present only a moderate fire hazard severity risk. Operating construction equipment in these areas has the potential to spark a wildland fire; however, the risk is considered very low with the use of properly maintained and operated equipment. Small erosion repairs would be located within existing levees and waterways, which are not considered wildlands or urbanized areas. It is not expected that a significant cumulative impact

related to ignition of uncontrolled wildland fires during construction would occur, and the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to this issue.

RECREATION

The cumulative context for recreation is defined as the Phase 1 SERP coverage area. A number of state and local parks are located adjacent to the rivers throughout the Phase 1 SERP coverage area (e.g., Colusa-Sacramento River State Recreation Area in Colusa County and Discovery Park in the City of Sacramento). Numerous public boat launch facilities, private marinas, recreational vehicle (RV) parks, and resorts are also located within the Phase 1 SERP coverage area along the Sacramento River.

Implementation of the SERP would not result in new development or population increases, and thus would not result in increased use of existing parks or other recreational facilities. However, erosion repair work could potentially cause disruption to recreational uses of nearby facilities and of the river, depending on the location of the repair site. Therefore, during construction of any erosion repairs near recreational facilities, construction signage and closures or detours would be posted. Construction is expected to last approximately 1–2 weeks at any one site, and therefore any disruptions to recreation would be minor and temporary. Related projects could result in similar construction-related recreation impacts. Effects on recreation resources typically are infrequent, short term, and temporary; however, there is no guarantee that some related projects may not have substantially longer construction periods, thus resulting in a more severe impact, and that they would include mitigation measures to avoid conflicts with recreational use during construction. Therefore, some related projects could result in significant impacts. Because the SERP would ensure that construction activities do not substantially affect recreation access, implementing the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to recreation.

TRANSPORTATION AND TRAFFIC

The cumulative context for transportation and traffic is the Phase 1 SERP coverage area because the majority of impacts from construction-related activities would occur adjacent to each repair site. Regional access to the coverage area would be provided via Interstate 5, SR 99, and SR 160, which run in a north-south direction, and Interstate 80, which runs in an east-west direction. Local access to specific repair sites would be provided via existing roadways and operations and maintenance routes. Adjacent landside areas, maintenance toe roads, and levee crown roads would be used for staging of vehicles, plant materials, and other associated construction equipment.

Construction activities associated with the SERP has the potential to temporarily increase traffic in the areas adjacent to construction zones and over any haul routes. Construction activities would require construction workers to drive to repair sites, and trucks to deliver materials and fill (if needed) and remove debris. As a result, construction could result in substantial (although temporary) increases in traffic on nearby roadways and could exceed a level of service standard for one or more roadways in the coverage area. Mitigation Measure T-1, discussed in Appendix A, would require that a traffic management plan be implemented to minimize interference to local and regional traffic flows from construction activities. This mitigation measure would be sufficient to reduce this impact to a less-than-significant level.

Implementation of repairs would not include design features such as sharp curves or dangerous intersections that would increase hazards, nor would it result in incompatible land uses. However, the use of 30 to 130 large trucks per individual repair to transport equipment and materials to the repair site could affect road conditions on haul routes in the vicinity of the repair site by increasing the rate of road wear and could damage the haul route. Mitigation Measure T-2, discussed in Appendix A, would require that damaged haul routes be restored to pre-project conditions. It is anticipated that similar measures to reduce transportation hazards would be implemented for all related projects. With construction-related transportation safety hazards addressed both on a project-by-project basis and on a broader level by local jurisdictions, a significant cumulative impact is not expected to occur. Therefore, the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to transportation hazards or traffic.

UTILITIES AND SERVICE SYSTEMS

In terms of cumulative impacts, the utility and service providers within the Phase 1 SERP coverage area are responsible for ensuring that adequate capacity and service systems are provided within their jurisdictional boundaries. Utility and service system infrastructure is located throughout the coverage area and is owned, operated, and maintained by the public and private service providers. Solid waste facilities are operated by private entities and public agencies that contract with counties and cities for receipt of solid waste.

The SERP would not involve new residential, commercial, or industrial development that would result in additional demand for water supplies. Some of the erosion repairs would include plantings as part of the design. However, plantings would be designed to survive without supplemental watering because plantings would be installed along the waterline of the repair site or planting would be delayed until the most appropriate season to avoid the need for watering. Therefore, the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to water supply.

Construction associated with the SERP would not generate solid waste that would require disposal at a landfill. In addition, any excess materials generated from the repairs (e.g., soil, rock, plant) would be incorporated into the repair site. In addition, all excess materials would be handled in compliance with federal, state, and local laws and regulations related to solid waste. As a result, a significant cumulative impact related to generation and disposal of construction waste would not occur. Implementing the SERP would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to disposal of construction-generated debris and waste.

5.2 GROWTH-INDUCING IMPACTS

CEQA section 21100(b)(5) specifies that the growth-inducing impacts of a project must be addressed in an EIR. Section 15126.2(d) of the CEQA Guidelines states that a proposed program is growth-inducing if it could “foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment.” For example, direct growth inducement would result if a project involved the construction of new housing, and indirect growth inducement would result if a project established substantial new permanent employment opportunities (e.g., new commercial, industrial, or governmental enterprises), involved a construction effort with substantial short-term employment opportunities that would indirectly stimulate the need for additional housing and services, or removed an obstacle to housing development. Examples of growth-inducing actions include extending water, wastewater, fire, or other types of services in areas not previously served; extending transportation routes into previously undeveloped areas; and establishing major new employment opportunities.

Growth inducement itself is not an environmental effect, but it may foreseeably lead to changes in land use patterns and population densities and related impacts on environmental resources.

The SERP would involve repair of up to 15 small erosion sites annually within the Phase 1 SERP coverage area for the 5 years of Phase 1. Repairs would involve only maintenance of existing structures, and construction activities would be temporary, lasting no more than 1–4 weeks for each site. The repairs would be performed by existing staff members of the DWR maintenance yards. Because of the limited amount of work that would be required and no new jobs would be created, no additional housing would be needed to accommodate workers from outside the area. The SERP efforts would not require any new short- or long-term workers and would not have an effect on the local workforce.

Within the Phase 1 SERP coverage area, population growth and urban development are driven by local, regional, and national economic conditions. Local land use decisions are within the jurisdiction of the six counties and various cities within the Phase 1 SERP coverage area.

Each of these agencies has adopted a general plan consistent with State law. These general plans provide an overall framework for growth and development within the jurisdiction of each agency and consider the level of flood protection provided within those jurisdictions. However, the erosion repairs proposed under the SERP are very small (i.e., 0.5 acre or 1,000 linear feet or less) and would not change the existing designated level of flood protection provided by the existing levees. Erosion repairs would be made to maintain the existing level of flood protection provided by the affected levees. No changes would be made to the designated level of flood protection for any areas protected by Phase 1 levees. Therefore, no additional development would occur as a result of the levee repairs. For these reasons, the SERP would not result in indirect growth-inducing impacts.

The SERP would not include construction of new housing or any other public or private services or utilities. The SERP would restore any haul routes damaged during construction; therefore, this restoration, if needed, would return the affected haul routes to their preconstruction condition. The SERP would not include improvements to access roads or extension of any new transportation routes that would improve access to the Phase 1 SERP coverage area. Therefore, the SERP would not result in direct growth-inducing impacts.

5.3 SIGNIFICANT AND UNAVOIDABLE IMPACTS

CEQA section 21100(b)(2) provides that an EIR shall include a detailed statement setting forth "[i]n a separate section … [a]ny significant effects on the environment that cannot be avoided if the project is implemented." As required by the CEQA Guidelines (section15126.2[b]), an EIR must describe any significant impacts that cannot be avoided, including those that can be mitigated but not reduced to a less-than-significant level. In addition, CEQA Guidelines section15093(a) allows the decision-making agency to determine whether the benefits of a proposed program outweigh the unavoidable adverse environmental impacts of implementing the project. DWR may approve a project with unavoidable adverse impacts if it prepares a Statement of Overriding Considerations setting forth the specific reasons for making such a judgment.

Incorporation of mitigation and conservation measures would reduce all potentially significant impacts of the SERP to a less-than-significant level. Therefore, no significant unavoidable impacts would occur after mitigation.

5.4 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

CEQA requires a discussion of the significant irreversible environmental changes that would be caused by the project should it be implemented (CEQA Guidelines sections 15126.2[c], 15127[a] and 15127[c].) Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that this use could have on future generations.

Irreversible effects result primarily from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., disturbance of a cultural resource).

Several resources, both natural and built, would be expended in the construction and operation of the SERP. Implementation of the Phase 1 SERP would result in the irreversible and irretrievable commitment of energy and material resources during project construction and maintenance, including:

- construction materials, including such resources as soil and rocks; and
- energy expended in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for project construction, operation, and maintenance.

Because the sites being addressed under the SERP are small (no larger than 0.5 acre or 1,000 feet linear extent), the use of these nonrenewable resources is expected to account for only a small portion of the region's resources and would not affect the availability of these resources for other needs within the region. Construction activities at repair sites would not result in inefficient use of energy or natural resources; rather, the SERP is intended to reduce future use of energy and natural resources by repairing erosion sites before they become large and present a greater danger to public safety and the environment. Construction staff from DWR's maintenance yards would use best available engineering techniques, construction and design practices, and equipment operating procedures. Once repaired, the erosion sites are intended to require little or no additional upkeep or maintenance. Therefore, long-term project operation would not result in substantial long-term consumption of energy and natural resources.

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6 REFERENCES

This PEIR incorporates by reference the environmental analysis and other information contained in the 2012 Central Valley Flood Protection Plan Consolidated Final Program Environmental Impact Report, June, 2012, State Clearinghouse #2010102044 (CVFPP FPEIR). The CVFPP FPEIR addresses a broad range of flood protection activities throughout the Central Valley, including those areas that will be addressed by the SERP. It is referenced in this PEIR to provide additional information about broad-scale issues and planning efforts, cumulative activities, macro-level management alternatives, and the associated environmental effects (both beneficial and potentially adverse). Mitigation strategies described in the CVFPP FPEIR have been adapted for purposes of this PEIR as appropriate. The executive summary of the CVFPP FPEIR is included as Appendix G, "Central Valley Flood Protection Plan Consolidated Final Program Environmental Impact Report: Executive Summary." The full text of the CVFPP FPEIR is available online at http://www.water.ca.gov/cvfmp/documents.cfm.

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8 ACRONYMS AND ABBREVIATIONS

µin/sec	microinch per second
40 CFR	Volume 40 of the Code of Federal Regulations
AB	Assembly Bill
ADT	average daily traffic
AEP	annual exceedance probability
APE	area of potential effects
AQAP	*Air Quality Attainment Plan*
ARB	California Air Resources Board
BMP	best management practice
Board	Board of Swampland Commissioner
CAA	Clean Air Act
CAAA	federal Clean Air Act Amendments of 1990
CAAQS	California ambient air quality standards
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDHS	California Department of Health Services
CDPH	California Department of Public Health
Central Valley RWQCB	Central Valley Regional Water Quality Control Board
CEQA	California Environmental Quality Act
CEQA Guidelines	California Environmental Quality Act Guidelines
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CH_4	methane
CHRIS	California Historical Resources Information System
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
CRHR	California Register of Historical Resources
CTR	California Toxics Rule

CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CWA	Clean Water Act
dB	A-weighted decibels
dBA	A-weighted sound levels
dbh	diameter at breast height
DEIR	draft environmental impact report
Delta	Sacramento–San Joaquin River Delta
DFG	California Department of Fish and Game
diesel PM	diesel-fueled engines
DPS	distinct population segment
DWQ	Division of Water Quality
DWR	California Department of Water Resources
EFH	essential fish habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionary significant unit
FEIR	final environmental impact report
FHWA RCNM V1.0	Federal Highway Administration Roadway Construction Noise Model Version 1.0
FHWA RD 77–108	Federal Highway Administration Highway Traffic Noise Prediction Model
FIRM	Flood Insurance Rate Map
FR	*Federal Register*
FTA	Federal Transit Administration
GHG	greenhouse gas
GIS	geographic information system
GWP	global warming potential
HAP	hazardous air pollutant
HCP	habitat conservation plan
HFC	hydrofluorocarbon
HPTP	historic property treatment plan
IRWMP	Integrated Regional Water Management Plan
Ksat	saturated hydraulic conductivity
LCFS	Low Carbon Fuel Standard

L_{dn}	day-night average noise level
L_{eq}	energy-equivalent noise level
LMA	local maintaining agency
L_{max}	maximum noise level
L_{min}	minimum noise level
MBTA	Migratory Bird Treaty Act
MLD	most likely descendant
MMT	million metric tons
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO	nitric oxide
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
NRHP	National Register of Historic Places
NSVPA	Northern Sacramento Valley Planning Area
NTR	National Toxics Rule
OAP	ozone attainment plan
^oF	degrees Fahrenheit
O&M	operations and maintenance
OPR	California Governor's Office of Planning and Research
PA	programmatic agreement
PAH	polycyclic aromatic hydrocarbons
PCE	primary constituent element
PFC	perfluorocarbon
PL	Public Law
PM_{10}	respirable particulate matter with an aerodynamic diameter of 10 micrometers or less
$PM_{2.5}$	fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less
Porter-Cologne Act	Porter-Cologne Water Quality Control Act of 1969
ppm	part per million

ppt	parts per thousand
RGP	regional general permit
RM	River Mile
RMS	root mean squared
ROG	reactive organic gases
RWQCB	regional water quality control board
SAA	streambed alteration agreement
SB	Senate Bill
SEL	Sound Exposure Level
SERP	Small Erosion Repair Program
SF_6	sulfur hexafluoride
SHPO	state historic preservation officer
SIP	state implementation plan
SMAQMD	Sacramento Metropolitan Air Quality Management District
SO_2	sulfur dioxide
SO_X	oxides of sulfur
SPCP	spill prevention and control plan
SRA	shaded riverine aquatic
SRFCP	Sacramento River Flood Control Project
SRRV	Sacramento River Riparian Vegetation
SVAB	Sacramento Valley Air Basin
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TCP	traditional cultural properties
TMDL	total maximum daily load
URBEMIS	Urban Emissions
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
VdB	vibration decibels
VMS	vegetation management strategy