FINAL

SOUTHPORT SACRAMENTO RIVER EARLY IMPLEMENTATION PROJECT ENVIRONMENTAL IMPACT STATEMENT

PART I: ENVIRONMENTAL EFFECTS ANALYSIS

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IN THE CITY OF WEST SACRAMENTO AND THE COUNTY OF YOLO, CALIFORNIA

MAY 2015

LEAD AGENCY: U.S. ARMY CORPS OF ENGINEERS

ABSTRACT:

The Southport Sacramento River Early Implementation Project would implement flood risk–reduction measures along the Sacramento River South Levee in the city of West Sacramento, Yolo County, California. The area of flood risk-reduction measure implementation extends along the right (west) bank of the Sacramento River south of the Barge Canal downstream 5.6 miles to the South Cross Levee, adjacent to the Southport community of West Sacramento. Potential soil borrow sites are located to the east and west of southern Jefferson Boulevard; adjacent to the construction area; immediately west of the Deep Water Ship Channel; and south of the South Cross Levee. The project would bring the levee up to standard with Federal and state levee design criteria, as well as provide opportunities for ecosystem restoration and facilitate public recreation.

This Final EIS has been prepared in compliance with the National Environmental Policy Act (NEPA).

COMMENTS AND QUESTIONS:

Additional written comments and questions concerning this document should be directed to the following:

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ES.1 Introduction

The West Sacramento Area Flood Control Agency (WSAFCA) is proposing the Southport Sacramento River Early Implementation Project (Southport project, or simply project), which would implement flood risk–reduction measures along the Sacramento River South Levee in the Southport community of West Sacramento. The U.S. Army Corps of Engineers (USACE) has prepared this final environmental impact statement (Final EIS) in its role as the project's lead agency under the National Environmental Policy Act (NEPA). USACE oversees the Southport project under three authorities: Section 404 of the Federal Clean Water Act (CWA) for regulation of dredged or fill material in jurisdictional waters of the United States, Section 10 of the Rivers and Harbors Act of 1899 (RHA) for regulation of navigable waters, and Section 14 of the Rivers and Harbors Act of 1899 (33 U.S. Government Code [USC] 408) for regulation of alteration to Federal works (commonly referred to as *Section 408 permission*).

The draft environmental impact statement/environmental impact report (EIS/EIR) was prepared jointly by USACE, the NEPA lead agency, and WSAFCA, the project applicant and lead agency under the California Environmental Quality Act (CEQA), in compliance with both NEPA and CEQA. The Draft EIS/EIR was written with joint NEPA and CEQA language to improve efficiency and assure consistency in compliance with the two statutes, where appropriate. Since the release of the Draft EIS/EIR, the NEPA and CEQA processes have been separated and are now represented by a stand-alone EIS and a stand-alone EIR, respectively. WSAFCA certified the Final EIR as compliant with CEQA on August 14, 2014.

It should be noted that the language in this EIS has not been modified to NEPA-only; it maintains the joint language used when environmental analysis was initiated on the project. Due to its initial preparation and public circulation as a joint document, the Final EIS contains frequent references to CEQA and responds to public comment on issues relevant to CEQA compliance by WSAFCA. However, the Final EIS reflects compliance with NEPA only.

ES.2 Document Organization and Format

The Final EIS is comprised of two parts. The first part contains the substance of the Draft EIS/EIR; namely, environmental setting, project description and alternatives, environmental effects analysis, and proposed mitigation measures. While its contents are consistent with the data and analysis presented in the Draft EIS/EIR that was circulated for public comment and review November 2013, modifications have been made to reflect new or changed information or changes in response to public comment. Plates from the Draft EIS/EIR that have been revised for the Final EIS have been noted as such in the text.

Part II of the Final EIS summarizes public involvement in development of the Final EIS and contains a description of the document's approach to public comment response. Specifically, each comment received has been considered and responded to individually. References in Part II to a "Chapter" or a

"Section" should be assumed to refer to the Final EIS, Part I. If a comment resulted in a change to the text of Part I of the Final EIS, it is noted within the comment's response.

ES.3 Document Purpose and Structure

ES.3.1 Document Overview

This document is an EIS and is intended to satisfy the requirements of NEPA for disclosing environmental effects and recommended mitigation measures related to a proposed action, and alternatives, prior to making a decision on project approval. Specifically, this document analyzes the Southport project to support a NEPA Record of Decision (ROD).

As discussed above, USACE has prepared this Final EIS for the purposes of compliance with NEPA under three authorities: CWA Section 404 for regulation of dredged or fill material in jurisdictional waters of the United States, RHA Section 10 for regulation of navigable waters, and RHA Section 14 for regulation of alteration to Federal works (commonly referred to as *Section 408 permission*).

ES.3.2 Application of NEPA and CEQA Principles and Terminology

NEPA and CEQA are similar in that both laws require the preparation of an environmental study to evaluate the environmental effects of proposed government activities. However, there are several differences between the two regarding terminology, procedures, environmental document content, and substantive mandates to protect the environment. For this environmental evaluation, the more rigorous of the two laws was applied in cases in which NEPA and CEQA differ.

Table ES-1 compares the terminology of NEPA and CEQA for common concepts.

Table ES-1. Key to General NEPA and CEQA Terminology

NEPA Term	Correlating CEQA Term
Lead Agency	Lead Agency
Cooperating Agency	Responsible Agency
Environmental Impact Statement	Environmental Impact Report
Record of Decision	Notice of Determination
Preferred Alternative	Proposed Project
Project Purpose	Project Objectives
No Action Alternative	No Project Alternative
Affected Environment	Environmental Setting
Effect/Impact	Impact

In some cases in this document, both NEPA and CEQA terminology are used, as in Chapter 1 where the project purpose and need and project objectives are discussed. The terms *environmental consequences, environmental impacts,* and *environmental effects* are considered synonymous in this analysis, and *effects* is used for consistency.

ES.3.3 Resource Analysis Structure

Chapter 3 contains the project-level analyses for the Southport project, following the structure below.

- **Introduction.** This section introduces the scope of the resource analysis.
- **Affected Environment.** This section includes two sections, Regulatory Setting and Environmental Setting.
  - **Regulatory Setting.** This section lists and describes laws, regulations and policies that affect the resource or the assessment of effects on the resource. Often the regulatory framework is the basis for the conclusion of the level of significance and therefore plays a crucial role in effect assessment.
  - **Environmental Setting.** This section provides an overview of the physical environmental conditions in the area at the time of or prior to the publication of the Notice of Preparation that could be affected by implementation of the proposed alternatives in accordance with NEPA regulations (40 Code of Federal Regulations [CFR] 1502.15) and State CEQA Guidelines Section 15125.
- **Environmental Consequences.** This section describes the analysis of effects relating to each resource area for each of the alternatives in accordance with NEPA regulations (40 CFR 1502.16) and with State CEQA Guidelines Section 15126, 15126.2, and 15143.
  - **Assessment Methods.** This section describes the methods, models, process, procedures, data sources, and/or assumptions used to conduct the effect analysis. Where possible, effects are evaluated quantitatively. Where quantification is not possible, effects are evaluated qualitatively.
  - **Determination of Effects.** This section provides the criteria used in this document to define the level at which an effect would be considered significant in accordance with CEQA and adverse in accordance with NEPA. Significance criteria (sometimes called thresholds of significance) used in this EIS are based on the checklist presented in Appendix G of the State CEQA Guidelines; factual or scientific information and data; and regulatory standards of Federal, state, and local agencies. Under NEPA, preparation of an EIS is triggered if a Federal action has the potential to “significantly affect the quality of the human environment,” which is based on the context and intensity of each potential effect. The significance thresholds used in this EIS also encompass the factors taken into account under NEPA to evaluate the context and the intensity of the effects of an action.
  - **Effects and Mitigation Measures.** To comply with NEPA and CEQA, the effects are considered and evaluated as to whether they are direct, indirect, or cumulative. Direct effects are those that are caused by the action and occur at the same time and place. Indirect effects are reasonably foreseeable consequences to the physical environment that may occur at a later time or at a distance from the project area. Cumulative effects for all resource areas are combined and discussed in Chapter 4, “Growth-Inducing and Cumulative Effects.” Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant effects accompany each effect discussion.

    The effects and mitigation measures are listed numerically and sequentially throughout each section. An effect or mitigation statement precedes the discussion of each effect or measure and provides a summary of the topic. The numbering system provides a mechanism for tracking unique effects by resource area.

Each effect is accompanied by a finding or conclusion, as required under NEPA and CEQA. Table ES-2 provides a key for relating the effect findings by relative severity (increasing in degree of adversity to the environment).

Table ES-2. Key to Effect Findings (by Increasing Adversity)

Finding
Beneficial
No Effect
Less than Significant
Significant
Significant and Unavoidable

For the purposes of the analyses in this document, the effect findings are defined more specifically below.

- **Beneficial.** This effect would provide benefit to the environment as defined for that resource.
- **No Effect.** This effect would cause no discernible change in the environment as measured by the applicable significance criterion; therefore, no mitigation would be required.
- **Less than Significant.** This effect would cause no substantial adverse change in the environment as measured by the applicable significance criterion; therefore, no mitigation would be required under CEQA but there may be mitigation per other environmental regulations.
- **Significant.** This effect would cause a substantial adverse change in the physical conditions of the environment. Effects determined to be significant based on the significance criteria fall into two categories: those for which there is feasible mitigation available that would avoid or reduce the environmental effects to less-than-significant levels and those for which there is either no feasible mitigation available or for which, even with implementation of feasible mitigation measures, there would remain a significant adverse effect on the environment. Those effects that cannot be reduced to a less-than-significant level by mitigation are identified as significant and unavoidable, described below.
- **Significant and Unavoidable.** This effect would cause a substantial adverse change in the environment that cannot be avoided or mitigated to a less-than-significant level if the project is implemented. Even if the effect finding is still considered significant with the application of mitigation, the applicant is obligated to incorporate all feasible measures to reduce the severity of the effect.
- **Mitigation Measures.** Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant effects accompany each effect discussion. Similar to the effect descriptions, mitigation measures are listed numerically and sequentially throughout each section. A mitigation measure statement precedes the

discussion of each measure and provides a summary of the measure topic. The numbering system provides a mechanism for tracking unique measures by resource area.

ES.4 Regional Setting, Study Area, and Project Area

The regional setting of the Southport project is the Sacramento River Flood Control Project (SRFCP), beginning as far north as Redding, California, and extending south to the Sacramento–San Joaquin River Delta (Delta) (Plate 1-1). For the analysis of effects (direct, indirect, or cumulative), the regional context of the SRFCP is taken into consideration.

Scoping down in regional setting, the study area (or planning area) is the city of West Sacramento and the lands within WSAFCA's boundaries, which encompass portions of the Sacramento River, the Yolo Bypass, the Sacramento Bypass, and the Sacramento River Deep Water Ship Channel (DWSC), all potential sources of floodwaters for the study area (Plate 1-2). The flood management system associated with these waterways consists of more than 50 miles of levees in Reclamation District (RD) 900, RD 537, the California Department of Water Resources' (DWR's) Maintenance Area 4, and the DWSC. These levees completely surround the city with the exception of intersecting waterways. The study area is the metropolitan area most downstream within the SRFCP, along with the city of Sacramento across the Sacramento River on the left bank. In addition to the area within the city limits (in Yolo County), the study area extends partially into Solano County on the extreme southwestern edge along the DWSC.

For the purposes of this document, the *study area* and *planning area* are considered the same, defined as the area within WSAFCA's planning authority and surrounding areas in which potential actions would occur and where environmental effects would be likely to occur. The *project area* is defined as the area in which potential actions (i.e., alternatives) would occur. The *affected area* is defined as the location of resources that would be directly, indirectly, or cumulatively affected by the project alternatives, and may vary depending on the nature of the resource.

The Southport project extends approximately 5.6 miles along the Sacramento River South Levee from the termination of the USACE Sacramento River Bank Protection Project (SRBPP) at River Mile (RM) 57.2R south to the South Cross Levee, abutting the Southport community of West Sacramento. The project site is depicted in ground-level photos (Plate 1-4). The 3.6-square-mile Southport project area is represented in Plate 1-5 and encompasses 5.6 miles of the existing levee structure along the Sacramento River corridor, the construction footprint in which flood risk–reduction measures would be constructed for all project alternatives, and potential soil borrow sites. Potential borrow sites overlap large portions of the construction footprint, as soil may be extracted from these areas prior to or during construction of the flood risk–reduction measures.

South River Road runs along the top of the levee for the majority of this reach of the river. The road diverts off of the levee top and merges with Gregory Avenue and runs along the landside toe for a short distance to the southern end of the construction area. The landside of the levee is bordered mainly by private agricultural lands containing rural residences. Two small bodies of water referred to as Bees Lakes are located adjacent to the levee landside toe near the middle of the construction area, and two marinas and multiple boat docks are located on the waterside of the levee near Bees Lakes.

A 10-foot-wide drained stability berm is present on the landside levee slope along the extent of the project area. This risk-reduction measure was completed 1990 through 1993 as part of the Sacramento Urban Levee Reconstruction Project. Two critical erosion sites north of Linden Road were repaired with rock slope protection as part of the SRBPP and the Flood Control and Coastal Storm Emergency Act (Public Law [PL] 84-99) Rehabilitation Assistance Program.

The project area also includes several adjacent and nearby locations at which suitable borrow material may be available for use in constructing the project. As shown on Plate 1-5, potential borrow sites are located both close to the levee footprint, to the east and west of southern Jefferson Boulevard, and along the DWSC.

Specific levee deficiencies identified at the Southport project site relate to erosion, geometry, through-seepage, and under-seepage, further described in Section 1.4.1, Overview of Levee Failure Mechanisms and Deficiencies.

ES.5 Purpose and Need

ES.5.1 Purpose and Objectives

To protect human health and safety and prevent adverse effects on property and its economy, the City of West Sacramento (City), as part of WSAFCA, and in partnership DWR, embarked on a comprehensive evaluation of the condition of the levees surrounding the city in 2006 (HDR 2008). The evaluation was necessary to determine the level of flood risk reduction performance provided by the existing levee system, identify the magnitude and severity of deficiencies, and propose potential flood risk–reduction measures. The results of the comprehensive evaluation revealed several deficiencies that require substantial levee modifications to meet current flood protection standards as implemented federally by the USACE as levee design criteria and by the Central Valley Flood Protection Board (CVFPB) at the state level for target levels of protection (described in more detail in Section 1.3, Project Purpose, Objectives, and Need).

WSAFCA's goal is to achieve the state-mandated minimum 200-year level of flood protection for the city by modifying the approximately 50 miles of levees surrounding West Sacramento. A 200-year flood is an event that has a one-in-200 chance of occurring in any given year, or annual exceedance probability (AEP) of 0.5%.

The primary purpose of the Southport project is to reduce flood risk for the entire city of West Sacramento by addressing known levee deficiencies along the Southport reach. Secondary purposes of the Southport project are to provide ecosystem restoration and public recreation opportunities that are compatible with flood risk–reduction measures. The primary purpose has top priority for project planning, implementation, operations, and maintenance.

While the Southport project would not by itself reduce all flood risks affecting the planning area, it would provide incremental flood-risk reduction for the entire city and would address the most immediate risk based on the:

- Nature of Sacramento River West Levee being the longest and most contiguous portion of the planning area perimeter.

- Location of known levee deficiencies and the clarity and feasibility of available measures to address them.

The Southport project by itself would not change the Federal Emergency Management Agency (FEMA) mapping for the city because the project area is only a fraction of the total levee system protecting West Sacramento. However, the Southport project would contribute as one of many links toward a greater overall level of flood protection consistent with Federal and state standards. Future improvements may be implemented by WSAFCA in coordination with the State of California and USACE based on available funding, the outcome of the West Sacramento General Reevaluation Report (GRR), and implementation of the Central Valley Flood Protection Plan (CVFPP) and other flood management programs (or multi-objective programs that include flood management).

Because the Southport project is targeted primarily at addressing known geotechnical deficiencies (such as seepage and slope stability), which are generally regarded as contributing most substantially to risk of levee failure and flooding, not all encroachments or non-compliant vegetation in the project area may be addressed by the Southport project as an explicit purpose. Therefore, as part of the Southport project, WSAFCA proposes to remove only that vegetation that is in the direct disturbance footprint of the project for constructing flood risk–reduction measures to address other deficiencies. Any new levees proposed under the project are being designed to be compliant with USACE levee vegetation policy, but existing levees are not proposed to be brought into compliance beyond the construction disturbance footprint.

ES.5.2 Need for Action

Five needs have been identified for action.

- Study results from the comprehensive levee evaluation have shown that the levees protecting the city, and specifically those in Southport, need improvements to reduce the current level of risk to human health and safety, property, and the adverse environmental and economic effects that serious flooding would cause.
- Study results further have shown that the levees in WSAFCA's area, and, specifically, those in Southport, are deficient when compared against current Federal standards. Action is needed to bring them up to current standards in order to maintain eligibility for Federal assistance (such as that authorized under PL 84-99).
- Improvements are necessary to meet FEMA's minimum acceptable level of performance (commonly referred to as the 100-year flood) as specified by the National Flood Insurance Program (NFIP) (HDR 2008). FEMA's flood risk maps are being revised nationwide under a program called RiskMAP (mapping, assessment, and planning). The Southport project is intended to incrementally reduce risk to meet or exceed the FEMA standards.
- As required by SB 5 (signed by Governor Schwarzenegger in October 2007), the CVFPB will require a 200-year level of flood protection for urban areas by the year 2025 and calls for building limitations after 2015 if adequate progress toward achieving this standard is not met. Flood risk–reduction measures in the Southport area are necessary to meet that requirement.
- There is a need to provide West Sacramento residents with recreation elements that are compatible with implementation of flood risk-reduction measures. The City's planned recreation and open space and goals presently are unmet, and flood risk-reduction elements typically underlie or are adjacent to proposed recreation elements that are part of the City's planning

documents. Surrounding waterways not only are an element of flood risk but also provide opportunity for water-oriented recreation and public open space.

ES.6 Community Outreach, Agency Coordination, and Issues of Known Controversy

ES.6.1 Community Outreach

USACE and WSAFCA have established a proactive multimedia outreach program to broaden awareness of the Southport project and the associated environmental analysis. The approach to the outreach program has been to go beyond the guidelines and requirements of NEPA and CEQA for public noticing to ensure the affected community and other interested stakeholders are informed, engaged, and involved through an accessible, open, and transparent process. Thus far, the outreach program has included the following actions.

- Held three scoping meetings for the Southport project EIS/EIR.
- Conducted public meetings, open houses, and property owner meetings about the design phase.
- Held an introductory meeting about the real estate process.
- Published notices in local newspapers of major circulation.
- Published the Notice of Intent, Revised Notice of Intent, and Notice of Availability in the *Federal Register*.
- Filed a Notice of Preparation, Supplemental Notice of Preparation and Notice of Availability with the California Office of Planning and Research and the Yolo County Clerk/Recorder.
- Posted NEPA notices on the USACE website.
- Posted CEQA and NEPA notices, project information, and draft documents on the City/WSAFCA website.
- Published feature articles in the *City iLights* online newsletter and its predecessor City Lights newsletter.
- Presented and discussed the status of the project at WSAFCA Board meetings and project-specific public meetings.
- Sent direct mailing to residents within proximity of proposed construction activities.
- Placed phone calls to public agencies.
- Held small-group meetings with interested stakeholders.
- Posted notices in public places.
- Conducted presentations at local Rotary Club and Chamber of Commerce luncheons.
- Developed and distributed bill inserts about project status.
- Presented information at the Water Resources Association of Yolo County.

More detailed information concerning the scoping processes is available within the Scoping Report and Supplemental Scoping Report provided in Appendix A.

As the proposed project is further developed, the outreach program will continue in a broad sense through the methods listed above and will expand through more targeted specific outreach to residents and businesses who might be more directly affected by construction or operation of the proposed improvements.

To date, the outreach program has been met with strong participation and engagement from the public, agencies, and nongovernmental organizations. Comments received from the public have been considered to refine the project description and the environmental analysis.

ES.6.2 Agency Coordination

ES.6.2.1 Coordination with Other Federal, State, and Local Agencies

The project has been planned in coordination and cooperation with numerous local, state, and Federal agencies. In Chapter 3, the regulatory setting for each respective resource describes the compliance with applicable Federal, state, regional, and local laws and regulations, including consultation to date with various agencies supplemented by additional regulatory context in Chapter 5. A summary of those coordination efforts follows.

Resource Agency Coordination

Over the course of the project planning and environmental review for the project, WSAFCA and USACE have met with the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and the California Department of Fish and Wildlife (CDFW) during site visits and project meetings to discuss the project, including effects on listed species and mitigation plans. Formal consultation with USFWS and NMFS under Section 7 of the ESA has been initiated by USACE. For the West Sacramento Levee Improvements Program (WSLIP), coordination began in 2008, consisting of informal agency meetings, site visits, telephone calls, and electronic mail to discuss potential project effects on habitat and potential avoidance and minimization measures. Specific to the Southport project, coordination began in 2011. Information has been exchanged to apprise each resource agency of the project status and progress, and to request feedback. USFWS issued a biological opinion (BO) on January 6, 2015, and the NMFS BO was issued on April 23, 2015.

Native American Consultation

In August 2011 and again in September 2012, ICF cultural resources staff contacted the NAHC to request a search of their Sacred Lands File. The NAHC staff responded on September 29, 2011, and again on October 9, 2012, with a list of Native American contacts for Yolo and Sacramento Counties and indicated that the results of the sacred lands database search were negative for the project area.

On October 6, 2011, October 15, 2012, and February 14, 2013, ICF staff sent letters to the Native American contacts on the lists provided by NAHC as well as Native American tribes listed by the Bureau of Indian Affairs. Letters were sent to 22 Native American representatives. The correspondence included a map depicting the project corridor, a brief description of the proposed project, and a request for the contacts to share any knowledge or concerns they may have regarding cultural resources in or adjacent to the study area. Four tribes, the Yocha Dehe Wintun Nation, the United Auburn Indian Community, the Buena Vista Rancheria, and the Wilton Rancheria, responded to letters with a request to consult on the proposed project. On August 6, 2013, an on-site meeting was held with the United Auburn Indian Community, the Wilton Rancheria, a USACE archaeologist, an ICF archaeologist, and a representative from the City of West Sacramento. On August 20, 2013, an on-site meeting was held with the Yocha Dehe Wintun Nation, a USACE archaeologist, an ICF archaeologist, and a representative from the City of West Sacramento. Consultation with these tribes is ongoing. To date, no other tribes have responded.

ES.6.2.2 CEQA Responsible and Trustee Agencies

The Final EIR, certified by WSAFCA as CEQA-compliant on August 14, 2014, will be used by CEQA Responsible and Trustee Agencies to determine the effects of the proposed project. Responsible Agencies are those that have a legal responsibility to approve the project. These agencies are required to rely on the Lead Agency's environmental document in acting on whatever aspect of the project requires their approval but must prepare and issue their own findings regarding the project (State CEQA Guidelines Section 15096). Trustee Agencies are those that have jurisdiction over certain resources held in trust for the people of California but do not have legal authority over approving or carrying out the project. Responsible and Trustee Agencies for the project are presented in Table ES-3.

Table ES-3. Responsible and Trustee Agencies

Agency	Jurisdiction
Trustee Agency	
California Department of Fish and Wildlife	Fish and wildlife
	Native plants designated as rare or endangered
	Game refuges
	Ecological reserves
California Department of Conservation	Williamson Act lands
California State Lands Commission	State-owned "sovereign" lands
Responsible Agency	
California Department of Fish and Wildlife	Fish and wildlife
	Native plants designated as rare or endangered
	Game refuges
	Ecological reserves
California State Lands Commission	State-owned "sovereign" lands
Central Valley Flood Protection Board	Levee modifications
California Air Resources Board	Air quality
Regional Water Quality Control Board (#5)	Water quality and discharges to water bodies
California Department of Water Resources	State water and flood management interests
Yolo County/State Mining and Geology Board	Surface mining and reclamation activities associated with borrow
City of West Sacramento	Land use designations
Reclamation District #900	Levee operations and maintenance
Reclamation District #537	Levee operations and maintenance

ES.6.3 Issues of Known or Expected Controversy

NEPA requires that project proponents identify issues of known controversy that have been raised in the scoping process and throughout the development of the project. Potentially controversial issues that were discovered during public scoping and that may arise in the development and execution of the project are discussed below.

ES.6.3.1 Property Acquisition

A specific issue of concern involves potential conflicts with private property that is within or near the construction area. In some cases, permanent property acquisition may be needed for project construction, operation, and maintenance; and temporary construction easements may be needed for construction staging and equipment access. Temporary restrictions on access to private property may also be necessary. These effects are described in Chapter 3, Section 3.11, Land Use and Agriculture.

ES.6.3.2 Construction-Related Effects

As the levee system in the project area is close to residential areas and other developed land uses, actions proposed by the project are likely to result in construction-related effects. These effects include those under the topics of public safety, noise, traffic, and air quality and are specifically described in Chapter 3. A specific discussion about effects on residents is contained in Section 3.12, Environmental Justice, Socioeconomic, and Community Effects.

ES.6.3.3 Levee Encroachments and Vegetation

The Southport project alternatives are likely to include removal, relocation, or replacement of features in, on, or under the levee or adjacent operations and maintenance (O&M) corridors such as structures, pipelines, walls, stairs, utilities, and other elements such as vegetation.

USACE published technical guidance and reinforcement of policies restricting woody vegetation on Federal project levees. Implementation of such guidance has stirred controversy in the Sacramento region as cursory assessments have shown that much vegetation may require removal, resulting in effects on fish and wildlife habitat, including habitat for endangered and threatened species, and social values like recreation and aesthetics. This issue is described further in this chapter under Sections 1.3.1, Project Purpose, and 1.4.1.5, Encroachments and Non-compliant Vegetation; in Chapter 2; and under the effects discussions for vegetation, fish, wildlife, visual resources, and recreation in Chapter 3. Other encroachments are addressed in the land use, utilities, and housing sections of Chapter 3.

ES.6.3.4 Growth Inducement

West Sacramento has experienced extensive growth over the last decade. This growth has been generally consistent with the *City of West Sacramento General Plan* but has slowed considerably as a result of current economic conditions. Although not specifically a key topic of concern identified during the project scoping period, the Southport project's potential to induce growth, or remove a potential barrier to growth, is discussed at length in Chapter 4, "Cumulative and Growth-Inducing Impacts."

ES.7 General Information about Alternatives

ES.7.1 Approach to Alternatives

NEPA and CEQA require that an EIS and EIR, respectively, consider a reasonable range of alternatives that would attain most of the basic project objectives while avoiding or substantially lessening the significant environmental effects of a proposed project. Analysis of a range of reasonable alternatives sharply defines the issues and allows comparison among the options.

Consistent with NEPA standards, the five Southport project action alternatives contained in this document are analyzed at an equal level of detail. As required under NEPA and CEQA, a no action or no project alternative also has been included; consistent with NEPA terminology, it will be referred to in this EIS as the *No Action Alternative*.

ES.7.2 Alternatives Screening Process

For each deficiency noted in Chapter 1, a number of measures and alternatives may be used to reduce flood risk. WSAFCA applied seven criteria to evaluate the flood risk-reduction measures and possible alternatives and eliminate those that would not adequately meet the criteria. These criteria were refined from the program-level screening criteria established for the WSLIP and include those applied to select the I Street Bridge EIP completed in 2008 and the CHP Academy and The Rivers EIPs completed in 2011. The criteria were prioritized in a two-tier structure. The first tier is essentially a *pass/fail* decision, with a *fail* rating eliminating an alternative from further consideration. The second tier may be rated on a variable scale of degree (i.e., a relative ranking like *high/medium/low*) rather than *pass/fail*. Public feedback through the environmental process is considered for all criteria.

An alternatives analysis per the guidelines of 404(b)(1) for a CWA Section 404 Individual Permit would be conducted separately.

The seven criteria used for the alternatives screening process are listed below.

Tier 1

- **Ability to meet the project purpose and objectives to reduce risk (pass/fail).** The objective of the project is to address deficiencies of through- and under-seepage, erosion, levee geometry, and slope stability. Alternatives that provide the greatest reduction in subsurface water pressure (measured as the exit gradient of water moving through the soil), decrease the threat from erosion, and improve slope stability and geometry relative to current levee standards are the most favored. Evidence of seepage has been observed at these sites during high-water events, and the waterside slope is characterized by overly steepened and highly erodible banks. Alternatives that do not substantially and comprehensively reduce these risks would be eliminated from further consideration.

  As presented in Chapter 1, the project objectives are to:

  - Reduce flood-risk toward a state-mandated target of 200-year protection from Sacramento River flows for the Southport reach from the SRBPP to the South Cross Levee (southern city limit), in compliance with state mandates for 200-year protection for urbanized areas.

 - Address known deficiencies along the Southport reach as observed during high-flow events in the Sacramento River, including waterside erosion, geometry, through-seepage, and under-seepage (also discussed in Chapter 1, Section 1.2, Setting and Study Area).
 - Construct a project as soon as possible to reduce flood risk as quickly as possible.
 - Construct a project that is politically, socially, economically, and environmentally acceptable.
 - Facilitate compatibility with the CVFPP and West Sacramento GRR such that proposed activities would be "no regrets" and not inconsistent with any future plans.
 - Provide ecosystem and habitat restoration, as well as preserving and enhancing riparian and other native habitats, where compatible with construction, operation, and maintenance of flood risk–reduction infrastructure, and consistent with the Parks Master Plan and Bicycle and Pedestrian Master Plan.
 - Provide improved or new public outdoor recreation and open space opportunities, where compatible with construction, operation, and maintenance of flood risk–reduction infrastructure, and consistent with the Parks Master Plan and the Bicycle and Pedestrian Master Plan.

- **Consistency with CVFPP and GRR (pass/fail)**. An alternative must represent a "no regrets" project that is not inconsistent with and would not preclude broader flood management plans currently under development through the CVFPP and West Sacramento GRR.
- **Avoidance of hydraulic effects (pass/fail)**. Hydrology and hydraulic modeling has demonstrated that the urbanized reach of the Sacramento River through West Sacramento and Sacramento is highly sensitive to changes in channel capacity based on the dynamics of the Sacramento River with the American River and Sacramento Bypass and Yolo Bypass system. Increases in channel capacity (associated with setback levee alternatives) beyond a certain threshold may have a significantly measurable negative effect of raising water surface elevations, which is unacceptable and would fail an alternative.

Tier 2

- **Facilitation of multi-use objectives (high/medium/low)**. Federal, state, and local policies promote goals of integrating multiple objectives to leverage funding, integrate and coordinate projects, and achieve economies of scale. The community benefits from the coordination of flood risk management activities with other planned projects as it would enable WSAFCA and the City to realize other goals in concert with flood risk management goals and provide potential economies of scale, while minimizing disruption. Alternatives that facilitate realization of other objectives in the project area are favored. While the project is focused on flood management, alternatives should provide opportunities for recreation and ecosystem restoration. Alternatives would be evaluated for completeness in terms of multi-use opportunities.
- **Land Use compatibility (high/medium/low).** The current and planned future land use of the areas on or adjacent to the proposed flood risk–reduction measure implementation should be taken into consideration. While it is recognized that alternatives may affect current land uses or planned land use designations, displacement of existing structures should be balanced with cost considerations. If known projects exist or have been approved by the City along the affected levee reach, alternatives should be evaluated with consideration of the degree to which they disrupt or interfere with such land uses.

- **Avoidance, minimization, and mitigation of environmental effects (high/medium/low).** This is a standard, yet important, criterion to ensure that an alternative does not have onerous environmental effects relative to other alternatives. Locations along the river support habitat critical to threatened or endangered species. In addition, the river corridor has a rich history of human use and contains cultural resources significant to that history. The environmental review and permitting process for effects on these types of resources can be lengthy and delay construction of flood risk–reduction measures. Therefore, alternatives that avoid effects on these resources are preferable. Where complete avoidance of effects is not possible, the project is intended to be self-mitigating through inclusion of environmentally beneficial components (such as habitat features) that offset remaining adverse project effects.
- **Cost (high/medium/low).** Alternatives are evaluated relative to one another for construction, operations, and maintenance costs and compared with the means of applicable Federal, state, and local funding and crediting programs.

ES.8 Action Alternatives

The five action alternatives analyzed in this EIS are:

- Alternative 1: Adjacent Levee
- Alternative 2: Setback Levee
- Alternative 3: Slope Flattening
- Alternative 4: Reduced Length Setback Levee
- Alternative 5: Setback Levee with Slope Flattening (applicant-preferred alternative [APA])

Applicant Preferred Alternative

Alternative 5 is considered the APA because it represents WSAFCA's preferred combination and configuration of measures that meet the project objectives. Some of the key factors include addressing the documented levee deficiencies with high confidence in technical feasibility, minimizing environmental effects, optimizing restoration opportunities, and providing cost-effective value. Another factor in favor of Alternative 5 is that Bees Lakes would remain hydraulically isolated from the river channel (i.e., not opened to surface water flow) as it would be under Alternative 2. Opening Bees Lakes to flow raises issues associated with effects on existing biological resources, complications with access to the existing marinas, increased potential for fish stranding when high waters recede from the floodplain, and addressing water quality issues in the Bees Lakes surface waters.

Environmentally Superior Alternative

Identified per CEQA Guidelines Section 15126.6(e)(2), Alternative 5 is also the environmentally superior alternative because it minimizes effects on potentially jurisdictional waters and balances emissions, real estate acquisition and land use change, environmental benefits, habitat effects, and construction-related disturbances. While it may not have the fewest environmental effects across every resource category, it is the least impactful as a composite across all resource categories.

ES.8.1 Common Elements

The reach of the Southport project stretches from the termination of the SRBPP at River Mile 57.2R south to the South Cross Levee, as shown in Plate 1-5. Within the project area, seven segments have been defined, lettered A through G from south to north. The segments range from Segment A at the South Cross Levee to Segment G near the SRBPP. These seven segments, described in Section 1.2, roughly define areas of differing existing subsurface conditions, land cover types, and deficiencies that constrain or influence the field of available flood risk–reduction measures that may be employed in that segment. Thus, each alternative comprises a combination of measures that may differ by segment; in technical reports prepared in support of the Southport project, these alternatives are often referred to as combined measure alternatives, or CMAs. The measures analyzed within the five action alternatives are shown in Plate ES-1 (revised).

The levee flood risk–reduction measure footprint comprises the following elements: a waterside O&M easement (where available), the levee from toe to toe, a seepage berm (if included as a measure), and the landside O&M and utility easement. The waterside O&M easement is assumed to be 20 feet wide, and the landside O&M easement is assumed to be 50 feet wide. The utility corridor is included largely within the landside O&M area, or within the new roadway alignment included in Alternatives 2, 4, and 5. In Segment G, the landside O&M easement was assumed to vary between the proposed flood risk–reduction measure toe and the existing residential lot lines, a distance varying from approximately a few feet to 100 feet. Vehicle access to the O&M easements would be restricted to use by RD 900 and DWR for inspection, maintenance and flood fighting purposes. The O&M roadways would be gated to prevent public vehicular access and signs installed indicating that public vehicular use is prohibited.

For the purpose of environmental analysis, project construction is assumed to occur over 2 years, with construction of Segments C, D, E, F, and G preceding construction of Segments A and B. Under each alternative, flood risk–reduction measure construction activities would primarily occur during the typical construction season, April 15 to October 31, although extension of the CVFPB encroachment permit may be sought if weather conditions permit.

Each of the five action alternatives also includes elements of recreation improvements, and Alternatives 2, 4, and 5, which primarily use a setback levee, include an expanded wildlife habitat restoration element. The recreation and restoration elements associated with each alternative are described in more detail in Chapter 2.

To avoid and minimize construction-related effects, WSAFCA will implement several environmental commitments to reduce or offset short-term, construction-related effects, as delineated in Section 2.4, Environmental Commitments.

ES.8.2 Alternative 1—Adjacent Levee

Alternative 1 involves the importation of up to 2.2 million cubic yards of embankment fill material for the construction of adjacent levees landward of the Sacramento River levee, while maintaining South River Road in its present alignment—atop the existing levee in most of the segments and on the landside toe of the levee in Segment A and the southern portion of Segment B (Plates 2-2a and 2-2b). The alignment for the adjacent levee alternative reflects generally a 35-foot shift from the existing levee centerline, dependent on whether a 2:1 or 3:1 landside slope is prescribed. Table ES-4 provides detail for the treatments proposed for each segment.

Table ES-3. Alternative 1 Flood Risk–Reduction Measures

Segment	Construction Year	Alternative 1 Measures
A	2	Adjacent levee, slurry cutoff wall, and rock slope protection
B	2	Adjacent levee, slurry cutoff wall, landside seepage berm, and rock slope protection
		Adjacent levee, landside seepage berm, and rock slope protection
C	1	Adjacent levee, landside seepage berm, and rock slope protection
D	1	Adjacent levee, slurry cutoff wall, landside seepage berm, and rock slope protection
		Setback levee and slurry cutoff wall
E	1	Setback levee and slurry cutoff wall
		Setback levee and landside seepage
F	1	Adjacent levee and landside seepage berm
		Adjacent levee, landside seepage berm, and rock slope protection
G	1	Adjacent levee, slurry cutoff wall, and rock slope protection

ES.8.2.1 Alternative 1 Flood Risk–Reduction Measures

Adjacent Levee

Under Alternative 1, an adjacent levee would be built along the extent of Segments A, B, C, D, F, and G. Segments C, D, F, and G would be constructed during Year 1; Segments A and B would be constructed during Year 2. Adjacent levee construction would be completed as described in Section 2.2.9.

Setback Levee

At Segment E and the northern portion of Segment D, a setback levee with an offset of 150 feet from landside to waterside toes would be constructed bordering the Bees Lakes area perimeter during Year 1. Setback levee construction would be completed as described in Section 2.2.9.

Slurry Cutoff Wall

During Year 1 of construction, a 30-foot-deep by 3-foot-wide slurry cutoff wall would be installed along the proposed adjacent levee the length of Segment D and most of Segment E, and an 84-foot-deep by 3-foot-wide slurry cutoff wall installed in Segment G. A 40-foot-deep slurry cutoff wall would also be constructed along the length of Segment A and into the southernmost end of Segment B during Year 2. Slurry cutoff wall construction would be completed as described in Section 2.2.9.

Seepage Berm

After adjacent levee construction and slurry cutoff wall installation are complete, a 300-foot-wide seepage berm would be constructed landward of the new levee at Segments C, F, and a portion of Segment E during Year 1 and at Segment B during Year 2. Seepage berm construction would be completed as described in Section 2.2.9.

Rock Slope Protection

After adjacent levee, setback levee, slurry cutoff wall, and seepage berm construction is complete, rock slope protection would be placed along Segments C, D, F, and G during Year 1 and along Segments A and B during Year 2. Additional rock slope protection would be placed at erosion sites in Segments D and E. Rock slope protection construction would be completed as described in Section 2.2.9.

ES.8.3 Alternative 2—Setback Levee

Alternative 2 involves the construction of an adjacent levee in Segments A, the southernmost portion of Segment B, and Segment G. Approximately 3.6 miles of setback levees would be constructed beginning in Segment B and continuing into Segments C, D, E, and F. Alternative 2 would also include the breach and degrading of the existing levee for the purpose of restoration of the Sacramento River floodplain (Plates 2-3a and 2-3b [revised]). Portions of the existing levee would be removed to allow water to flow in and out of the floodplain. The floodplain would be lowered through excavation of borrow areas in a portion of Segment B and Segments C and F to provide surfaces and associated vegetation that would be inundated more frequently than the higher existing floodplain surfaces. Alternative 2 would open the Bees Lakes area in Segment E to seasonal flow, hydraulically connecting it to the Sacramento River. Table ES-5 provides detail for the measures proposed for each segment of the levee.

Table ES-5. Alternative 2 Flood Risk–Reduction Measures

Segment	Construction Year	Alternative 2 Measures
A	2	Adjacent levee, slurry cutoff wall, and rock slope protection
B	2	Adjacent levee, slurry cutoff wall, and rock slope protection
		Adjacent levee, slurry cutoff wall, landside seepage berm, and rock slope protection
		Setback levee, slurry cutoff wall, and landside seepage berm
C	1	Setback levee, slurry cutoff wall, and landside seepage berm
D	1	Setback levee and slurry cutoff wall
E	1	Setback levee and slurry cutoff wall
		Setback levee, landside seepage berm, and slurry cutoff wall
F	1	Setback levee, slurry cutoff wall, and landside seepage berm
G	1	Adjacent levee, slurry cutoff wall, and rock slope protection

Alternative 2 also includes relocation of a portion of South River Road and construction of Village Parkway and its connections to South River Road. Construction of Alternative 2 project features would require importation of up to 2.4 million cubic yards of embankment fill material.

ES.8.3.1 Alternative 2 Flood Risk–Reduction Measures

Setback Levee

Under Alternative 2, a setback levee, with an offset of 150 feet from landside to waterside toe, would be built along the extent of Segments C, D, E, and F during Year 1. A setback levee would be built in the northern portion of Segment B during Year 2. The setback levee centerline would be positioned a minimum of 400 feet from the existing levee centerline. Setback levee construction would be completed as described in Section 2.2.9.

Adjacent Levee

An adjacent levee would be constructed at Segment G during Year 1, and an adjacent levee would be constructed through the extent of Segment A and approximately halfway through Segment B during Year 2. The adjacent levee would transition into the setback levee at the northern end of Segment F and in the middle of Segment B. Adjacent levee construction would be completed as described in Section 2.2.9.

Slurry Cutoff Wall

During Year 1 of construction, a 30-foot-deep by 3-foot-wide slurry cutoff wall would be installed along the proposed setback levees the lengths of Segments C, D and E. A 24-foot-deep by 3-foot-wide wall would be installed in southernmost Segment F, and an 84-foot-deep by 3-foot-wide wall installed in the remaining portion of Segment F and continuing into Segment G. A 30- to 40-foot-deep slurry cutoff wall would also be constructed along the length of Segments A and B during Year 2. Slurry cutoff wall construction would be completed as described in Section 2.2.9.

Seepage Berm Construction

A 300-foot-wide seepage berm would be constructed after setback levee construction on the landside of the new levee at Segments C, F, and a portion of Segment E during Year 1 and at a portion of Segment B during Year 2. Seepage berm construction would be completed as described in Section 2.2.9.

Rock Slope Protection

After setback levee, slope-flattening, adjacent levee, slurry cutoff wall, and seepage berm construction are complete, rock slope protection would be placed along Segment G and a small portion of Segment F during Year 1 and along Segment A and a portion of Segment B during Year 2. Additional rock slope protection would be placed at five erosion sites in Segment C, one erosion site in Segment D, one erosion site in Segment E, and one erosion site in Segment F. Rock slope protection construction would be completed as described in Section 2.2.9.

Offset Floodplain Area

The offset floodplain area refers to the expanded floodway waterside of the proposed setback levee that is created when portions of the existing levee are breached and material excavated and graded to allow Sacramento River water to flow into the offset area. The offset floodplain area mitigates the losses of existing habitat values due to project effects, as well as maximizes the potential habitat value in the Sacramento River floodplain. Project activities in this area would include floodplain and habitat restoration and borrow excavation.

Where excavated material is appropriate for reuse as borrow material, it would be used in construction of the flood risk-reduction measures. After excavation, disturbed areas would be finished and graded to allow creation of restored habitats. Once construction of the setback levee is complete, the existing levee would be degraded and breached in several locations to allow inlet and outlet of floodplain-inundating flows.

The target habitats in the offset floodplain area consist of riparian forest, shaded riverine aquatic habitat, seasonal wetlands, and upland grasslands. Elevations in the offset floodplain area would vary from approximately +7.0 feet NAVD 88 to +20.0 feet NAVD 88 in order to provide broad habitat variability for a range of environmental and hydrodynamic conditions. Based on the historic flow data (1970–2010), river flows are expected to be sufficient enough to result in inundation of the offset area to +10 feet NAVD 88 an average of 77 days per year (Appendix B.6). This annual average varies considerably from year to year, with the standard deviation of 65 days and a maximum of 239 days; the offset area would thus be expected to drain completely every year. The months with the highest average flow are January, February, and March.

Upper terraces would support riparian habitat that transitions from willow scrub at lower elevations to mixed riparian forest at higher elevations. Native riparian plant species would be installed as container plants and pole cuttings at a regular spacing interval throughout the offset floodplain area. Both overstory and understory species would be installed to mimic the natural structure of riparian forests along the Sacramento River. Supplemental irrigation would be provided for several years during the plant establishment period and then discontinued, with the source possibly pumped from the river or by agreement with an owner of an adjacent water supply. To avoid trampling or disturbance of the plantings during the establishment period, signs would be posted at appropriate intervals providing notice that access to the restoration areas is not allowed. Exclusionary fencing for these purposes likely would not be allowed by the CVFPB.

The existing levee would be breached in several locations, and a network of seasonal wetland channels, termed *low-flow swales*, would be excavated in the offset floodplain area that would inundate during high-water events on the Sacramento River to provide habitat for special-status native fish species, including Sacramento splittail and Chinook salmon. To mimic some natural floodplain conditions that species like splittail depend on for spawning and rearing, the channels would be constructed at an elevation that provides shallow, low-velocity, off-channel habitat in the spring during smaller flood events, approximately +7 feet NAVD 88. Channel margins would be gently sloping to maximize edge habitat during flood events. IWM structures could be installed in some of the channels to provide cover from predators. In larger flood events during the winter and spring, the upper riparian terraces would be inundated and provide additional areas of habitat for fish as well as contribute to the productivity of the aquatic ecosystem.

The created channels would follow the slope of the river and have several connections to the main river channel in order to maximize connectivity and minimize potential stranding as floodwaters recede. The channels would fully dewater by the early summer in order to discourage use by nonnative fish.

Areas of upland grassland in the offset floodplain area would serve as potential floodplain rearing habitat for native fish as well as foraging habitat for raptors during periods of low water.

If excess restored habitat is identified that would not be needed to meet the project's mitigation obligations, a mitigation bank or other offsite mitigation preserve could be considered for establishment in the offset floodplain area. A mitigation bank restores, enhances, creates and/or preserves water resources or other significant natural areas and assumes responsibility for their long-term maintenance, earning mitigation credits that are recognized by the regulatory agencies. Mitigation bankers can then sell these mitigation credits to permittees and others who must compensate for having impacted water resources or other natural areas. The sale of credits legally transfers the liability for the mitigation from the permittee to the mitigation banker. A mitigation bank in the Southport offset floodplain would likely yield riparian floodplain mitigation and/or endangered species conservation credits, and possibly restored and enhanced shaded riverine aquatic (SRA)/channel margin habitat credits.

In contrast, a mitigation preserve would yield an area (or areas) of protected habitat that is obligated to a third-party permittee to provide compensatory mitigation. The permittee retains full responsibility for its establishment and maintenance. Compensatory mitigation generated in the offset area, either via credits or preserved acres, could be used for project mitigation. It can also be purchased or utilized by a third-party entity requiring compensatory mitigation or exchanged with other mitigation preserves via a regulatory agency approved transaction to secure types of required project mitigation that is not suitable for development in the offset area. Section 2.2.5.1 describes the proposed habitat restoration activities in detail.

ES.8.4 Alternative 3—Slope Flattening

Alternative 3 involves the contouring of the Sacramento River levee to alleviate over-steepened banks while maintaining South River Road in its present alignment atop the existing levee (Plates 2-4a and 2-4b). A cutoff wall is proposed in Segments A, D, E, G, and the southern portion of Segment B. A landside seepage berm is proposed in Segments B, C, and F. The alignment for the slope-flattening alternative reflects a slight landward shift (approximately 50 feet) of the existing levee centerline to account for slope-flattening to maximum limits (described below). Alternative 3 also involves the importation of up to 1.1 million cubic yards of embankment fill material for the construction of project features. Table ES-6 provides detail for the treatments proposed for each segment.

Table ES-6. Alternative 3 Flood Risk–Reduction Measures

Segment	Construction Year	Alternative 3 Measures
A	2	Waterside slope-flattening, slurry cutoff wall, and rock slope protection
B	2	Waterside slope-flattening, slurry cutoff wall, landside seepage berm, and rock slope protection
		Waterside slope-flattening, landside seepage berm, and rock slope protection
C	1	Waterside slope-flattening, landside seepage berm, and rock slope protection
D	1	Waterside slope-flattening, slurry cutoff wall, and rock slope protection
E	1	Waterside slope-flattening and slurry cutoff wall
F	1	Waterside slope-flattening and landside seepage berm
		Waterside slope-flattening, landside seepage berm, and rock slope protection
G	1	Waterside slope-flattening, slurry cutoff wall, and rock slope protection

ES.8.4.1 Alternative 3 Flood Risk–Reduction Measures

Slope Flattening

Slope-flattening construction would be completed as described in Section 2.2.9. The waterside slope would be trimmed and reshaped to a 3:1 slope resulting in a slight landward shift (approximately 50 feet) of the existing levee centerline. Slope-flattening construction would be completed in Segments C through G during Year 1 and in Segments A and B during Year 2. Soil degraded during slope-flattening construction would be stockpiled at proposed seepage berm locations.

Slurry Cutoff Wall

During Year 1 of construction, a 30-foot-deep by 3-foot-wide slurry cutoff wall would be installed along the existing levees the lengths of Segments D and E, and an 84-foot-deep by 3-foot-wide wall installed in Segment G. A 40-foot-deep slurry cutoff wall would also be constructed along the length of Segment A and into the southernmost portion of Segment B during Year 2. Slurry cutoff wall construction would be completed as described in Section 2.2.9.

Seepage Berm

A 300-foot-wide seepage berm would be constructed landward of the new levee at Segments C and F during Year 1 and at Segment B during Year 2. Seepage berm construction would be completed as described in Section 2.2.9.

Rock Slope Protection

Rock slope protection construction would be completed as described in Section 2.2.9. After slope-flattening, slurry cutoff wall, and seepage berm construction are complete, rock slope protection would be placed along Segments C, D, F, and G during Year 1 and along Segments A and B during Year 2. Additional rock slope protection would be placed at an erosion site in Segment E.

ES.8.5 Alternative 4—Reduced Length Setback Levee

Utilizing a setback levee shorter than that proposed under Alternative 2, Alternative 4 involves the construction of approximately 2.3 miles of setback levees, beginning in the northernmost portion of Segment B and continuing throughout Segments C, D and E. Unlike Alternative 2, Alternative 4 project elements would include construction of an adjacent levee in Segment F and would maintain hydraulic isolation of the Bees Lakes area in Segment E from the Sacramento River with the construction of a ring levee. As a result of the reduced length of the setback area, the offset area created through breaching and degrading the existing levee to restore the historical Sacramento River floodplain would be smaller than that proposed in Alternative 2 (Plates 2-5a and 2-5b [revised]). Table ES-7 provides detail for the treatments proposed for each segment.

Table ES-7. Alternative 4 Flood Risk–Reduction Measures

Segment	Construction Year	Alternative 4 Measures
A	2	Adjacent levee, slurry cutoff wall, and rock slope protection
B	2	Adjacent levee, slurry cutoff wall, and rock slope protection
		Adjacent levee, slurry cutoff wall, landside seepage berm, and rock slope protection
		Adjacent levee, landside seepage berm, and rock slope protection
		Setback levee and landside seepage berm
C	1	Setback levee and landside seepage berm
D	1	Setback levee and slurry cutoff wall
E	1	Setback levee and slurry cutoff wall
		Setback levee and landside seepage berm,
F	1	Setback levee and landside seepage berm
		Adjacent levee, landside seepage berm, and rock slope protection
G	1	Adjacent levee, slurry cutoff wall, and rock slope protection

Alternative 4 also involves the importation of up to 2.0 million cubic yards of embankment fill material for the construction of project features. The relocation of South River Road and construction of Village Parkway and its connections to South River Road for Alternative 4 would be similar to these elements as described for Alternative 2.

ES.8.5.1 Alternative 4 Flood Risk–Reduction Measures

Setback Levee

Under Alternative 4, a setback levee, with an offset of 150 feet from landside to waterside toe, would be built beginning in the northernmost portion of Segment B, and continue into Segments C, D, E and the southernmost portion of Segment F during Year 1. The setback levee centerline would be positioned a minimum of 400 feet from the existing levee centerline. Setback levee construction would be completed as described in Section 2.2.9.

Adjacent Levee

An adjacent levee would be constructed in the remaining extent of Segment F and in Segment G during Year 1, and an adjacent levee would be constructed in Segment A and the remaining extent of Segment B during Year 2. Adjacent levee construction would be completed as described in Section 2.2.9.

Slurry Cutoff Wall

During Year 1 of construction, a 30-foot-deep by 3-foot-wide slurry cutoff wall would be installed along the proposed setback levees in Segment D and southern portion of Segment E, terminating at the origin of the seepage berm in Segment E. An 84-foot-deep by 3-foot-wide wall would be installed in Segment G. A 40-foot-deep slurry cutoff wall would also be constructed along the length of Segments A and the southernmost portion of B during Year 2. Slurry cutoff wall construction would be completed as described in Section 2.2.9.

Seepage Berm Construction

A 300-foot-wide seepage berm would be constructed after setback levee construction on the landside of the new levee at Segments C, F, and a portion of Segment E during Year 1 and at a portion of Segment B during Year 2. Seepage berm construction would be completed as described in Section 2.2.9.

Rock Slope Protection

After setback levee, adjacent levee, slurry cutoff wall, and seepage berm construction are complete, rock slope protection would be placed along Segments F and G during Year 1 and along Segments A and B during Year 2. Additional rock slope protection would be placed at five erosion sites in Segment C, one erosion site in Segment D, and one erosion site in Segment E. Rock slope protection construction would be completed as described in Section 2.2.9.

Offset Floodplain Area

Offset floodplain area construction would be similar to Alternative 2; however, the offset floodplain area constructed would be reduced to reflect the reduced length of the setback levee in Segments B and F. In addition, the Bees Lakes area would remain hydraulically isolated from the offset floodplain area as described below under Road Construction, Marina Access, and Bees Lakes.

ES.8.6 Alternative 5—Setback Levee with Slope Flattening (APA)

Alternative 5 is the APA. Similar to Alternative 2, Alternative 5 involves the construction of approximately 3.6 miles of setback levees in Segments B through F, an adjacent levee in Segment G, and the breach and degrading of the existing levee to restore the historical Sacramento River floodplain (Plates 2-6a and 2-6b [revised]). Unlike Alternative 2, Alternative 5 project elements would include slope flattening with rock slope protection in Segment A instead of an adjacent levee with rock slope protection and, as described under Alternative 4, would maintain the hydraulic isolation of the Bees Lakes area in Segment E from the Sacramento River through construction of a ring levee, creating two offset areas. Additionally, unlike Alternative 2, Alternative 5 includes breaching of the existing levee over two construction years, allowing only a single levee breach in each of the north and south offset areas during Year 1, in Segments F and C, respectively, and creating a 1-year backwater condition in the offset areas. The remaining breaches, one each in Segments B, C, and F, would be constructed in Year 2. Table ES-8 provides detail for the treatments proposed for each segment.

Table ES-8. Alternative 5 Flood Risk–Reduction Treatments

Segment	Construction Year	Alternative 5 Measures
A	2	Waterside slope flattening, slurry cutoff wall, and rock slope protection
B	2	Adjacent levee, slurry cutoff wall, and rock slope protection
		Adjacent levee, slurry cutoff wall, landside seepage berm, and rock slope protection
		Setback levee, slurry cutoff wall, and landside seepage berm, breach of existing levee
C	1	Setback levee, slurry cutoff wall, and landside seepage berm, breach of existing levee
	2	Breach of existing levee
D	1	Setback levee and slurry cutoff wall
E	1	Setback levee and slurry cutoff wall
		Setback levee, landside seepage berm, and slurry cutoff wall
F	1	Setback levee, slurry cutoff wall, and landside seepage berm, breach of existing levee
	2	Breach of existing levee
G	1	Adjacent levee, slurry cutoff wall, and rock slope protection

Alternative 5 also involves the importation of up to 2.4 million cubic yards of embankment fill material for the construction of project features. The relocation of South River Road and construction of Village Parkway and its connections to South River Road for Alternative 5 would be similar to these elements as described for Alternative 2.

ES.8.6.1 Alternative 5 Flood Risk–Reduction Measures

Flood risk–reduction measure construction would be performed as described under Alternative 2 for Segments B through G. Alternative 5 proposes to construct slope flattening with a slurry cutoff wall in Segment A as described under Alternative 3. A full description of these flood risk–reduction measures is provided in Section 2.2.9. Additional rock slope protection would be placed at five erosion sites in Segment C, one erosion site in Segment D, one erosion site in Segment E, and one erosion site in Segment F.

Offset Floodplain Area

Offset floodplain area design would be similar to that described under Alternative 2. However, the Bees Lakes area would remain hydraulically isolated from the offset floodplain area as described below under Road Construction, Marina Access, and Bees Lakes. Additionally, levee breaching under this alternative would be done over 2 construction years. The downstream breaches in both Segments C and F would be created in the first year, allowing a 1-year backwater condition in the offset areas that would assist vegetation establishment. Under Alternative 5, construction of the offset areas would begin with creation of the Year 1 breaches as soon as the river stage is low enough to prevent inundation of the offset area during the construction season. Grading of the Segment C, D, E and F offset area would then be undertaken as described under Alternative 2, followed by installation of restoration plantings and associated irrigation system installation as described below in Offset Floodplain Area Restoration Project Construction. Following construction of the upstream breaches in Segments C and F and the breach in Segment B in Year 2, grading and planting of the offset area in Segment B would commence. Inundation frequency and duration of the final offset area would be as described for Alternative 2.

Backwater Interim Condition

The interim condition would allow restoration plantings to establish during the fall, winter, and spring following construction Year 1 without exposure to through-flows from the Sacramento River, increasing the likelihood of long-term planting success. Following breaching of the existing levee in Segments C and F in Year 1, the offset areas would fill as the level of the Sacramento River rises and would drain through the single breach in each offset area as river stage decreases. The areas would be graded to encourage drainage as river stage decreases, and temporary and permanent erosion control measures such as jute netting, coconut fiber with net, live brush mattresses, and native turf would be selected as appropriate to protect graded areas in accordance with the project's stormwater pollution prevention plan (SWPPP).

ES.9 No Action Alternative

Identification and analysis of a no action alternative are required pursuant to NEPA, and a no project alternative is required for CEQA. The purpose of the no action or no project alternative is to serve as a benchmark against which the effects of the action alternatives may be evaluated. For NEPA, *no action* is defined as those conditions that would result if USACE were to issue neither Section 408 permission nor permits under Section 404 of the CWA and Section 10 of the RHA.

Because the action alternatives all would require Section 408 permission from USACE for WSAFCA to implement a project, the No Action Alternative consists of continuation of current conditions and O&M practices that reasonably would be expected to occur in the foreseeable future if the Southport project were not implemented.

For CEQA, the no project analysis must discuss the existing conditions at the time the notice of preparation is published, as well as what would be reasonably expected to occur in the foreseeable future if WSAFCA were not to adopt and implement a project. Thus, to comply with both NEPA and CEQA, the Southport No Action Alternative analysis discusses effects in the context of both a reasonably foreseeable future condition and of the existing environmental conditions.

ES.9.1 No Flood Risk–Reduction Measures Implemented under the No Action Alternative

Under the No Action Alternative, WSAFCA would not implement flood risk–reduction measures beyond current routine O&M. Current O&M activities are described in Section 2.2.3.3, *Common Elements and Assumptions*. The levees surrounding the city would continue to require risk-reduction measures to meet current levee design criteria and FEMA's minimum acceptable level of performance, as well as continue being deficient relative to the state's requirement for urbanized areas. In addition, the associated risk to human health and safety and property and the adverse economic effect that serious flooding could cause would continue, and the risk of a catastrophic flood would remain high. Again, however, regular O&M of the levee system would continue as currently executed by the local maintaining entities.

Because of uncertainties in local, state, and Federal funding; future state and Federal authorization; and other approvals, it is not reasonable to predict construction of levee repairs in the foreseeable future within a reasonable timeframe (see below for further discussion). Therefore, for the purpose of evaluating effects under the No Action Alternative, this EIS/EIR assumes that a project to achieve 200-year level of performance would not be implemented, the purpose and objectives would not be met, and the current level of flood risk would continue.

Despite the possibility of eventual state- or federally led implementation of repairs, for the purpose of evaluating effects under the No Action Alternative, this EIS/EIR assumes that flood risk–reduction measures would not occur. This assumption provides the most conservative approach for disclosure and comparison of potential effects. Therefore, as stated above, the No Action Alternative assumes the project purpose and objectives would not be met, and the current level of flood risk would continue.

ES.9.2 Levee Vegetation Policy and No Action

Compliance with USACE levee vegetation policy in the Sacramento Valley is complex because of the overlays of flood management objectives, protected fish and wildlife habitat, environmental regulations, overlapping jurisdictional authorities, and recreation and other social values.

In light of these circumstances, the No Action Alternative reflects multiple possible future scenarios. At this time, it is considered too speculative to adopt and consider a single one of these scenarios as the sole or most likely outcome. Therefore, this document acknowledges and analyzes the following conditions in regard to the USACE levee vegetation policy as it relates to the No Action Alternative for the actions under consideration.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).

- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM (as described in Chapter 1). A system-wide improvement framework (SWIF) may be developed in the future and could present a plan toward meeting USACE levee vegetation policy.

The potential effects of all three of these scenarios are discussed in this EIS/EIR. While full or partial compliance with USACE levee vegetation policy is expected as the foreseeable future condition, the project action alternatives are compared to a scenario in which there is no application of the ETL to disclose the full potential range of effects on the current environmental conditions.

ES.9.3 Recreation and Restoration under No Action

The No Action Alternative would delay implementation of certain elements of the Parks Master Plan and the Bicycle and Pedestrian Path Master Plan (SmithGroup JJR 2003; Callander Associates 1991). The recreation corridors proposed in these plans include bike and pedestrian trails that lie on top of the levee and other recreation features that occupy the waterside and landside of the levee. Because the levee along this reach of the Sacramento River will need to be improved eventually, and because these construction activities likely would require the temporary removal or relocation of any recreation facilities on or near the levee, it is possible and even probable that funds would not be expended to construct some or all of these recreation features prior to flood risk–reduction measure construction activities.

Similarly, without structural modifications to the levee system, habitat restoration opportunities in the floodplain are highly limited and likely would not be implemented absent construction of flood management measures.

ES.10 Environmental Commitments Summary Table

Environmental commitments are measures incorporated as part of the project description, meaning they are proposed as elements of the proposed action and are to be considered in conducting the environmental analysis and determining effects and findings. The purpose of environmental commitments is to reflect and incorporate best practices into the project that avoid, minimize, or offset potential environmental effects. Table ES-9 provides a summary of environmental commitments for the Southport project.

Table ES-9. Environmental Commitments

Environmental Commitment	Timing	Responsible Party
Nesting or Roosting Raptors Survey	Prior to construction	WSAFCA, in coordination with CDFW
Protection of Regulated and Riparian Trees	Prior to and during construction	WSAFCA, in coordination with CDFW and the City of West Sacramento
Invasive Plant Species Prevention	During and following construction	WSAFCA, in coordination with the Yolo County Agricultural Commissioner
Noise-Reducing Construction Practices	During construction	WSAFCA, in coordination with its contractor
Property Acquisition Compensation and Temporary Resident Relocation Plan	Prior to and during construction	WSAFCA, in coordination with its contractor
Traffic Control and Road Maintenance Plan	During construction	WSAFCA, in coordination with City and county public works departments
Coordination to Ensure Minimal Overlap in Disturbances to Traffic during Construction	Prior to and during construction	WSAFCA, in coordination with the City
Construction Area Closure Notification	Prior to construction	WSAFCA
Minimize Construction-Related Effects on Navigation	During construction	WSAFCA
Preserve Marina Access	During construction	WSAFCA
Minimize Effects Associated with Recreation Enhancements	During construction	WSAFCA
Stormwater Pollution Prevention Plan	Prior to construction	WSAFCA, in coordination with its contractor
Bentonite Slurry Spill Contingency Plan (Frac-Out Plan)	Prior to construction	WSAFCA, in coordination with its contractor
Spill Prevention, Control, and Countermeasure Plan	Prior to construction	WSAFCA, in coordination with its contractor
Turbidity Monitoring in Adjacent Water Bodies	During construction	WSAFCA
Groundwater Well Protection Measures	During construction	WSAFCA
Soil Supply Protection Measures	Prior to, during, and following construction	WSAFCA
Soil Hazards Testing and Soil Disposal Plan	Prior to construction	WSAFCA, in coordination with its contractor
Giant Garter Snake and Its Habitat Effects Minimization	Prior to and during construction	WSAFCA, in coordination with its contractor and CDFW
Roadway Noise and Light Reduction	Prior to construction	WSAFCA, in coordination with its contractor and the City
Mosquito and Vector Control Management Plan	During and following construction	WSAFCA, in coordination with its contractor and the Sacramento-Yolo Mosquito and Vector Control District
Aquatic Invasive Species Prevention	Prior to and during construction	WSAFCA, in coordination with CDFW
Construction-Related Damage Assessment	Prior to, during, and after construction	WSAFCA, in coordination with its contractor

ES.11 Effects Summary Table

Table ES-10 provides a summary of effects and mitigation measures for the Southport project, which are fully analyzed and discussed in Chapter 3, "Affected Environment and Environmental Consequences." Within each section of Chapter 3, as shown in Table ES-10, the effects are listed numerically and sequentially throughout each section. An effect statement precedes the discussion of each effect and provides a summary of the effect topic. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant effects accompany each effect discussion. Similar to the effect descriptions, mitigation measures are listed numerically and sequentially throughout each section. The numbering system provides a mechanism for tracking unique effects and mitigation measures by resource area, using an acronym for each resource (e.g., Flood Management is shorted to FM; Recreation to REC). The effects are identified, for example, as "FR-1", and the mitigation measures as "FR-MM-1", etc.

Each effect is accompanied by a finding or conclusion, as required under NEPA and CEQA, defined below:

- **Beneficial.** This effect would provide benefit to the environment as defined for that resource.
- **No Effect.** This effect would cause no discernible change in the environment as measured by the applicable significance criterion; therefore, no mitigation would be required.
- **Less than Significant.** This effect would cause no substantial adverse change in the environment as measured by the applicable significance criterion; therefore, no mitigation would be required under CEQA but there may be mitigation per other environmental regulations.
- **Significant.** This effect would cause a substantial adverse change in the physical conditions of the environment. Effects determined to be significant based on the significance criteria fall into two categories: those for which there is feasible mitigation available that would avoid or reduce the environmental effects to less-than-significant levels and those for which either there is no feasible mitigation available or for which, even with implementation of feasible mitigation measures, there would remain a significant adverse effect on the environment. Those effects that cannot be reduced to a less-than-significant level by mitigation are identified as significant and unavoidable, described below.
- **Significant and Unavoidable**. This effect would cause a substantial adverse change in the environment that cannot be avoided or mitigated to a less-than-significant level if the project is implemented. Even if the effect finding still is considered significant with the application of mitigation, the applicant is obligated to incorporate all feasible measures to reduce the severity of the effect.

1 **Table ES-10. Summary of Effects and Mitigation Measures for the Southport Project**

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
3.1, Flood Risk Management and Geomorphic Conditions					
FR-NA-1: Continued Elevated Risk of Levee Failure	No Action—all vegetation scenarios	Significant (all vegetation scenarios)			
FR-1: Change in Flood Risk Associated with Water Surface Elevations	1, 3	Local: less than significant	Upstream: less than significant Downstream: no effect	NA	None
FR-1: Change in Flood Risk Associated with Water Surface Elevations	2, 4, 5	Local: less than significant	Upstream: less than significant Downstream, hydraulic: no effect Downstream, general: less than significant	NA	None
FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage	1, 2, 3, 4, 5	Beneficial	No effect	NA	None
FR-3: Alteration of Existing Drainage Pattern of Site or Area	1, 2, 3, 4, 5	Significant	Significant	Less than significant	FR-MM-1: Coordinate with Owners and Operators, Prepare Drainage Studies as Needed, and Remediate Effects through Project Design
FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees	1, 2, 3, 4, 5	Channel bed incision: no effect Bank erosion: beneficial	Channel bed incision: no effect Bank erosion: less than significant	NA	None

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
FR-5: Decrease in Levee Erosion through Rock Slope Protection	1, 2, 3, 4, 5	Beneficial	No effect	NA	None
FR-6: Decrease in Through- and Under-Seepage	1, 2, 3, 4, 5	Beneficial	No effect	NA	None
FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition	1	No effect	No effect	NA	None
FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition	2	Significant	No effect	Less than significant	FR-MM-2: Monitor Depositional Feature Integrity and Stability Postconstruction, and Remediate Effects through Restoration Activities FR-MM-3: Monitor Geomorphic Stability and Vegetation Community after High Flow Events and Remediate Effects through Restoration Activities if Necessary
FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition	3, 4, 5	Significant	No effect	Less than significant	FR-MM-2: Monitor Depositional Feature Integrity and Stability Postconstruction, and Remediate Effects through Restoration Activities
3.2, Water Quality and Groundwater Resources					
No effects	No Action—all vegetation scenarios				
WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table	1, 2, 3, 4, 5	Significant	Significant	Less than significant	WQ-MM-1: Implement Provisions for Dewatering

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
WQ-5: Release of Contaminants into Adjacent Surface Water Bodies from Disturbance of Existing Ambient Contaminants	2	Significant	Significant	Less than significant	WQ-MM-2: Implement Measure to Remediate Arsenic and Debris in Bees Lakes
WQ-5: Release of Contaminants into Adjacent Surface Water Bodies from Disturbance of Existing Ambient Contaminants	4, 5	Less than significant	Less than significant	NA	None
3.3, Geology, Seismicity, Soils and Mineral Resources					
No effects	No Action—all vegetation scenarios				
GEO-1: Negative Effects on Levee Stability	1, 2, 3, 4, 5	Beneficial See Section 3.1	No effect	NA	None
GEO-2: Negative Effects on Streamflow Erosion of Levees	1, 2, 3, 4, 5	Beneficial See Section 3.1	No effect	NA	None
GEO-3: Potential Earthquake Damage to Flood Management Structures	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
GEO-5: Potential Structural Damage from Encountering Expansive Soils	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas	1, 2, 3, 4, 5	Unknown, potentially significant	Unknown, potentially significant	Less than significant	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
3.4, Transportation And Navigation					
No effects	No Action—all vegetation scenarios				
TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic	1, 2, 3, 4, 5	Significant and unavoidable	No effect	NA	None
TRA-2: Temporary Road Closures	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
TRA-5: Temporary Changes to Navigation	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
TRA-6: Permanent Changes in Circulation Patterns	2, 4, 5	Less than significant	No effect	NA	None
3.5, Air Quality					
No effects	No Action—all vegetation scenarios				
AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan	1, 2, 3, 4, 5	Less than significant	No effect	NA	None

Effect	Alternative	NEPA/CEQA Finding		Finding with Mitigation	Mitigation Measure
		Direct	Indirect		
AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA	1, 2, 3, 4, 5	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA	1, 2, 3, 4, 5	Significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds

Effect	Alternative	NEPA/CEQA Finding: Direct	NEPA/CEQA Finding: Indirect	Finding with Mitigation	Mitigation Measure
AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Non-Attainment Area under NAAQS and CAAQS	1, 2, 3, 4, 5	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations	1, 2, 3, 4, 5	No effect	Significant	Less than significant	AIR-MM-2: Implement Fugitive Dust Control Plan
AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations	1, 2, 3, 4, 5	No effect	Less than significant	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10
AIR-7: Create Objectionable Odors Affecting a Substantial Number of People	1, 2, 3, 4, 5	Less than significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents
3.6, Climate Change					
CC-NA-1: Generate GHG Emissions That May Have a Significant Effect on the Environment or Conflict with Applicable GHG Reduction Plans	No Action—no ETL	No effect	No effect		
	No Action—modified ETL	No effect	Less than significant		

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
	No Action—full ETL	No effect	Less than significant		
CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment	1, 2, 3, 4, 5	No effect	Less than significant	Less than significant	CC-MM-1: Implement Measures to Minimize GHG Emissions during Construction
CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions	1, 2, 3, 4, 5	No effect	Less than significant	NA	None
3.7, Noise					
No effects	No Action—all vegetation scenarios				
NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise	1, 2, 3, 4, 5	Significant	No effect	Significant and unavoidable	NOI-MM-1: Employ Noise-Reducing Construction Practices
NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration	1, 2, 3, 4, 5	Significant	No effect	Significant and unavoidable	NOI-MM-2: Employ Vibration-Reducing Construction Practices
NOI-3: Exposure of Sensitive Receptors to Traffic Noise from the Extension of Village Parkway	2, 4, 5	Significant	No effect	Less than significant	M.M. 4-8-1 from the Southport Framework Plan draft EIR.
3.8, Vegetation and Wetlands					
VEG-NA-1: Disturbance or Removal of Riparian Trees in Compliance with the USACE Levee Vegetation Policy	No Action—no ETL	No effect			
	No Action—modified ETL	Significant			
	No Action—full ETL	Significant			

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction	1, 2, 3, 4, 5	Significant	Significant	Significant and unavoidable	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor
VEG-2: Loss of Waters of the United States as a Result of Project Construction	1, 2, 3, 4, 5	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-5: Compensate for the Loss of Waters of the United States
VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction	1, 2, 3, 4, 5	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-6: Compensate for Loss of Protected Trees

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction	1, 2, 3, 4, 5	Potentially significant	No effect	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-7: Retain Qualified Botanists to Conduct Floristic Surveys for Special-Status Plants during Appropriate Identification Periods VEG-MM-8: Avoid or Compensate for Substantial Effects on Special-Status Plants
VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	1	Potentially significant	Potentially significant	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/ Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor
VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	2, 3, 4, 5	No effect	No effect	NA	None
VEG-7: Opportunity for Habitat Restoration in Enlarged Floodplain Following Project Construction	2	Beneficial	Beneficial	NA	None

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
3.9, Fish and Aquatic Resources					
FISH-NA-1: Loss of Riparian and SRA Cover Fish Habitat in Compliance with the USACE Levee Vegetation Policy	No Action—no ETL	No effect			
	No Action—modified ETL	Significant			
	No Action—full ETL	Significant			
FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities	1, 2, 3, 4, 5	Significant	Significant	Less than significant	FISH-MM-1: Limit In-Water Construction Activities to Periods of the Year that Minimize Effects on Fish
FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Construction	1, 3	Significant	Significant	Significant and unavoidable	FISH-MM-2: Implement Onsite and Offsite Compensation Measures to Replace Riparian and SRA Cover Losses
FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Construction	2, 4, 5	Significant	Significant	Significant and unavoidable	FISH-MM-2: Implement Onsite and Offsite Compensation Measures to Replace Riparian and SRA Cover Losses FISH-MM-3: Incorporate Riparian and Wetland Vegetation in the Design of the Levee Breaches
FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
FISH-5: Contamination of Aquatic Habitat Associated with Excavation and Exposure of Contaminated Borrow Material	2, 4, 5	Less than significant	Less than significant	NA	None
FISH-6: Fish Stranding in Offset Area Associated with Floodplain Inundation	2, 4, 5	Significant	No effect	Less than significant	FISH-MM-4: Develop and Implement a Drainage and Grading Plan that Minimizes Losses of Fish from Stranding

Effect	Alternative	NEPA/CEQA Finding: Direct	NEPA/CEQA Finding: Indirect	Finding with Mitigation	Mitigation Measure
FISH-7: Increases in Aquatic Habitat Associated with Offset Floodplain Area	2, 4, 5	Beneficial	No effect	NA	FISH-MM-4: Develop and Implement a Drainage and Grading Plan that Minimizes Losses of Fish from Stranding
3.10, Wildlife					
WILD-NA-1: Disturbance or Loss of VELBs and their Habitat in Compliance with the USACE Levee Vegetation Policy	No Action—no ETL	No effect			
	No Action—modified ETL	Significant			
	No Action—full ETL	Significant			
WILD-NA-2: Loss of Swainson's Hawk Nesting and Foraging Habitat in Compliance with the USACE Levee Vegetation Policy	No Action—no ETL	No effect			
	No Action—modified ETL	Significant			
	No Action—full ETL	Significant			
WILD-NA-3: Disturbance or Loss of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors in Compliance with the USACE Levee Vegetation Policy	No Action—no ETL	No effect			
	No Action—modified ETL	Significant			
	No Action—full ETL	Significant			

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
WILD-NA-4: Disturbance or Loss of Bats and Bat Roosts in Compliance with the USACE Levee Vegetation Policy	No Action—no ETL	No effect			
	No Action—modified ETL	Significant			
	No Action—full ETL	Significant			
WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)	1, 2, 3, 4, 5	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-1: Establish a Minimum 20-Foot-Wide Buffer around the Elderberry Shrub WILD-MM-2: Transplant Elderberry Shrubs That Cannot Be Avoided or Implement Dust Control Measures during Construction WILD-MM-3: Compensate for Removal and Transplantation of VELB Habitat
WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat	1, 3, 4, 5	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-4: Conduct a Preconstruction Survey for Western Pond Turtle and Exclude Turtles from Work Area
WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat	2	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-4: Conduct a Preconstruction Survey for Western Pond Turtle and Exclude Turtles from Work Area WILD-MM-13: Prepare and Implement Capture and Relocation Plan for Western Pond Turtles in Bees Lakes

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat	1, 2, 3, 4, 5	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-5: Install and Maintain Construction Barrier Fencing around Suitable Giant Garter Snake Habitat WILD-MM-6: Minimize Potential Effects on Giant Garter Snakes during Construction in Suitable Habitat WILD-MM-7: Compensate for Permanent Loss of Giant Garter Snake Habitat
WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat	1, 2, 3, 4, 5	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys WILD-MM-9: Compensate for Permanent Removal of Swainson's Hawk Foraging Habitat
WILD-5: Disturbance or Loss of Western Burrowing Owls and Their Habitat	1, 2, 3, 4, 5	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-10: Conduct Preconstruction Surveys for Active Burrowing Owl Burrows and Implement the 2012 California Department of Fish and Game Guidelines for Burrowing Owl Mitigation, If Necessary WILD-MM-11: Coordinate with Resource Agencies and Develop an Appropriate Compensation Plan for Burrowing Owl

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors	1, 2, 3, 4, 5	Significant	Significant	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys
WILD-7: Loss or Disturbance of Bats and Bat Roosts	1, 2, 3, 4, 5	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-12: Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measure
WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
WILD-9: Disruption of Wildlife Movement Corridors	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	1, 2, 3, 4, 5	No effect	No effect	NA	None
3.11, Land Use and Agriculture					
No effects	No Action—all vegetation scenarios				

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction	1, 2, 3, 4, 5	Significant	No effect	Significant and unavoidable	None feasible
LU-3: Loss of Important Farmland and Agricultural Production Value	1, 2, 3, 4, 5	Significant	No effect	Significant and unavoidable	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan LU-MM-1: Provide Compensatory Agricultural Land Protection LU-MM-2: Avoid Important Farmland in Borrow Areas
3.12, Socioeconomics, Environmental Justice, and Community Effects					
No effects	No Action—all vegetation scenarios				
EJSOC-1: Temporary Increase in Regional Economic Activity during Construction	1, 2, 3, 4, 5	No effect	Beneficial	NA	None
EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction	1, 2, 3, 4, 5	Significant and unavoidable	Significant and unavoidable	NA	None
3.13, Visual Resources					
VIS-NA-1: Degrade the Visual Character and Quality of the Levee Corridor in Compliance with the USACE Levee Vegetation Policy	No Action—no ETL	No effect			

Effect	Alternative	NEPA/CEQA Finding Direct	Indirect	Finding with Mitigation	Mitigation Measure
	No Action—modified ETL	Less than Significant			
	No Action—full ETL	Significant			
VIS-1: Result in Temporary Visual Effects from Construction	1, 2, 3, 4, 5	Significant	No effect	Significant and unavoidable	VIS-MM-1: Use Native Wildflower Species in Erosion Control Grassland Seed Mix VIS-MM-2: Develop a Soil Borrow Strategy and Site Reclamation Plan VIS-MM-3: Limit Construction near Residences to Daylight Hours
VIS-2: Adversely Affect a Scenic Vista	1, 2, 3, 4, 5	Significant and unavoidable	No effect	NA	None
VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings	1, 2, 3, 4, 5	Significant and unavoidable	No effect	NA	None
VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views	1, 2, 3, 4, 5	Significant and unavoidable	No effect	NA	None
3.14, Recreation					
REC-NA-1: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor in Compliance with the USACE Levee Vegetation Policy	No Action—no ETL	No effect			
	No Action—modified ETL	Significant			
	No Action—full ETL	Significant			

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
REC-1: Temporary Disruption of Recreation Opportunities during Construction	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
REC-2: Temporary Obstruction of Access to Marina or Boat Launch Facilities during Construction	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
REC-3: Temporary Disruption of Recreational Boating Activities during Construction	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor	1, 3	Significant	No effect	Significant and unavoidable	No feasible mitigation
REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor	2, 4, 5	Less than significant	No effect	NA	None
REC-5: Incompatibility with Planning Documents	1, 2, 3, 4, 5	No effect	Less than significant	NA	None
3.15, Utilities and Public Services					
No effects	No Action—all vegetation scenarios				
UTL-1: Potential Temporary Disruption of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction	1, 2, 3, 4, 5	Significant	Significant	Less than significant	UTL-MM-1: Coordinate with Water Supply Users before and during All Water Supply Infrastructure Modifications and Implement Measures to Minimize Interruptions of Supply
UTL-2: Decrease in Domestic and Irrigation Water Supply	1, 2, 3, 4, 5	No effect	Significant	Less than significant	UTL-MM-2: Restore Affected Domestic and Irrigation Water Service to Pre-project Conditions
UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction	1, 2, 3, 4, 5	Significant	No effect	Less than significant	UTL-MM-3: Verify Utility Locations, Coordinate with Utility Providers, Prepare a Response Plan, and Conduct Worker Training

Effect	Alternative	NEPA/CEQA Finding Direct	NEPA/CEQA Finding Indirect	Finding with Mitigation	Mitigation Measure
UTL-4: Increase in Solid Waste Generation due to Project Construction	1, 2, 3, 4, 5	No effect	Less than significant	NA	None
UTL-5: Increase in Emergency Response Times during Project Construction	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
3.16, Public Health and Environmental Hazards					
HAZ-NA-1: Improve Access for Levee Maintenance and Flood-fighting	No Action—no ETL	No effect			
	No Action—modified ETL	Beneficial			
	No Action—full ETL	Beneficial			
HAZ-1: Incidental Release of Hazardous Materials during Construction	1, 2, 3, 4, 5	Less than significant	Less than significant	NA	None
HAZ-2: Exposure of Hazardous Materials Encountered at Project Site	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
HAZ-3: Safety Hazards from the Construction Site and Vehicles	1, 2, 3, 4, 5	Less than significant	No effect	NA	None
HAZ-4: Exposure of People or Structures to Flood Risk-Related Hazards	1, 2, 3, 4, 5	Beneficial	No effect	NA	None
HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation	1, 2, 3, 4, 5	Potentially significant	No effect	Less than significant	HAZ-MM-1: Coordinate and Implement Pipeline Avoidance and Protection Measures
HAZ-6: Changes in Exposure to Mosquitos	2	Beneficial	No effect	NA	None
HAZ-6: Changes in Exposure to Mosquitos	4, 5	Less than significant	No effect	NA	None
HAZ-7: Safety Hazards from Offset Area Operation	2, 4, 5	Less than significant	Less than significant	NA	None

Effect	Alternative	NEPA/CEQA Finding		Finding with Mitigation	Mitigation Measure
		Direct	Indirect		
3.17, Cultural Resources					
No effects	No Action—all vegetation scenarios				
CUL-1: Effects on Architectural (Built Environment) Resources (the Sacramento River Levee)	1, 2, 3, 4, 5	Significant	Significant	Significant and unavoidable	CUL-MM-1: Detailed Recordation of the Affected Levee
CUL-2: Change in the Significance of an Archaeological Resource	1, 2, 3, 4, 5	Significant	No effect	Significant and unavoidable	CUL-MM-2: Complete Archaeological Inventory and Evaluation prior to Construction and Implement Treatment or Preservation for Eligible and Adversely Affected Resources CUL-MM-3: Implement Inadvertent Discovery Procedures
CUL-3: Disturbance of Native American and Historic-Period Human Remains	1, 2, 3, 4, 5	Significant	No effect	Significant and unavoidable	CUL-MM-4. Implement Human Remains Discovery Procedures
CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material	1, 2, 3, 4, 5	Significant	No effect	Significant and unavoidable	CUL-MM-5: Implement Cultural Resource Management Protocols for Borrow Areas

NA = not applicable.

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List of Acronyms and Abbreviations

$\mu g/m^3$	micrograms per cubic meter
µS/cm	microSiemens per centimeter
AADT	average annual daily traffic
AB	Assembly Bill
ACHP	Advisory Council on Historic Preservation
ADT	average daily traffic
AEP	annual exceedance probability
af	acre-feet
Alquist-Priolo Act	Alquist-Priolo Earthquake Fault Zoning Act
APA	applicant-preferred alternative
APE	area of potential effects
Assessment	Area-Wide Assessment
ASTM	American Society for Testing and Materials
ATC	American Tower Corporation
ATVs	all terrain vehicles
B.P.	Before Present
BAAQMD	Bay Area Air Quality Management District
basin plan	water quality control plan
BDCP	Bay Delta Conservation Plan
BGEPA	Bald and Golden Eagle Protection Act
bgs	below ground surface
BMPs	best management practices
BO	biological opinion
Board	State Board of Reclamation Commissioners
BOD	biochemical oxygen demand
BSSCP	bentonite slurry spill contingency plan
CAA	Federal Clean Air Act
CAAQS	California ambient air quality standards
CHP	California Highway Patrol
Caltrans	California Department of Transportation
CAR	Coordination Act Report
cbec	cbec, inc. eco engineering
CBSC	California Building Standards Code
CCAA	California Clean Air Acts
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDOC	California Department of Conservation
CDPH	California Department of Public Health
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code

CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CH_4	methane
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
City	City of West Sacramento
CIWMP	countywide integrated waste management plan
cm	centimeters
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNG	compressed natural gas
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
Common Features	American River Common Features Project
Comprehensive Study or Comp Study	Sacramento and San Joaquin River Basins California Comprehensive Study
CO-OPS	NOAA Center for Operational Oceanographic Products and Services
CPTs	cone penetration test equipment
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CVFPB	Central Valley Flood Protection Board
CVFMP	Central Valley Flood Management Planning
CVFPA	Central Valley Flood Protection Act
CVFPP	Central Valley Flood Protection Plan
CVIFMS	Central Valley Integrated Flood Management Study
CVP	Central Valley Project
CWA	Federal Clean Water Act
dB	decibel
dBA	A-weighted decibel
Delta	Sacramento–San Joaquin River Delta
DO	dissolved oxygen
DPM	diesel particulate matter
DPR	California Department of Parks and Recreation
DPS	distinct population segment
DSC	Delta Stewardship Council
DSM	deep soil mixing
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
DWSC	Sacramento Deep Water Ship Channel
ECs	environmental commitments
EFH	essential fish habitat
EIPs	Early Implementation Projects

EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EO	Executive Order
EOP	Emergency Operations Plan
EPA	U.S. Environmental Protection Agency
ESA	Federal Endangered Species Act
ESU	Evolutionarily Significant Unit
ETL	Engineering Technical Letter 1110-2-583, Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRMs	flood insurance rate maps
FMMP	Farmland Mapping and Monitoring Program
FPIIB	Flood Project Integrity and Inspection Branch
FPPA	Farmland Protection Policy Act
FRWLP	Feather River West Levee Project
ft/mile	feet per mile
ft/s	feet per second
ft/year	feet per year
ft^2	square feet
FTA	Federal Transit Administration
FWCA	Fish and Wildlife Coordination Act
GC	Government Code
General Construction Permit	General Permit for Construction Activities
General Dewatering Permit	General Order for Dewatering and Other Low Threat Discharges to Surface Waters
GHGs	greenhouse gases
GPS	Global Positioning System
GRR	West Sacramento General Reevaluation Report
GWP	global warming potential
ha	hectare
HAER	Historic American Engineering Record
HCP	Habitat Conservation Plan
I-80	Interstate 80
ICBO	International Conference of Building Officials
ICF	ICF International
in/sec	inches per second
IPCC	Intergovernmental Panel on Climate Change
IWM	instream woody material
JFP	Folsom Joint Federal Project
JPA	Joint Powers Authority
km	kilometers
kV	kilovolt

LCM	life-cycle management
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
LIDAR	Light Detection and Ranging
L_{min} and L_{max}	minimum and maximum sound levels
LNG	liquefied natural gas
LNWI	Lower Northwest Interceptor
LOS	level of service
L_{xx}	percentile-exceeded sound levels
m/km	meters/kilometer
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MBK	MBK Engineers
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant level
mg/L	milligrams per liter
mgd	million gallons per day
MLD	most likely descendant
MOU	memorandum of understanding
mph	miles per hour
MRZ	mineral resource zone
MT CO_2e	metric tons of CO_2e
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NAVD 88	North American Vertical Datum of 1988
NCCP	natural community conservation plan
NCCP/HCP	natural community conservation plan/habitat conservation plan
NCCPA	Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NGVD 29	National Geodetic Vertical Datum of 1929
NHC	Northwest Hydraulic Consultants
NHPA	National Historic Preservation Act
NLIP	Natomas Levee Improvements Program
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOD	Notice of Determination
NOI	Notice of Intent
NOP	Notice of Preparation
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTUs	Nephelometric turbidity units
NWIC	Northwest Information Center

O&M	operations and maintenance
OHWM	ordinary high water mark
OMB	Federal Office of Management and Budget
PA	programmatic agreement
Parks Master Plan	City of West Sacramento Parks Master Plan
PCBs	polychlorinated biphenyls
PG&E	The Pacific Gas and Electric Company
PGA	probabilistic peak horizontal ground acceleration
PIR	problem identification report
PL	Public Law
PM	particulate matter
PM10	PM less than 10 microns in diameter
PM2.5	PM less than 2.5 microns in diameter
ppm	parts per million
PPMP	pollution prevention and monitoring program
ppt	parts per thousand
ppv	peak particle velocity
PRC	Public Resources Code
RD	Reclamation District
RECs	recognized environmental conditions
Regional Water Board	Central Valley Regional Water Quality Control Board
RM	River Mile
ROD	Record of Decision
ROG	reactive organic gases
rpm	rotations per minute
RV	recreational vehicle
RWQCB	Regional Water Quality Control Board
SACOG	Sacramento Area Council of Governments
SAFCA	Sacramento Area Flood Control Agency
SAM	Standard Assessment Methodology
SB	Senate Bill
SBFCA	Sutter Butte Flood Control Agency
SEIS/SEIR	Supplemental Environmental Impact Statement and Subsequent Environmental Impact Report
SF_6	sulfur hexafluoride
SFBAAB	San Francisco Bay Area Air Basin
SIPs	state implementation plans
SJVAB	San Joaquin Valley Air Basin
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMARA	California Surface Mining and Reclamation Act of 1975 (PRC Section 2710 et seq.)
SFNA	Sacramento Federal Nonattainment Area
SO_2	sulfur dioxide
Southport project, or, simply, project	Southport Sacramento River Early Implementation Project
SPCCP	spill prevention, control, and counter-measure plan

SPRR	Southern Pacific Railroad
SPT	standard penetration test
SRA	shaded riverine aquatic
SRBPP	Sacramento River Bank Protection Project
SRCSD	Sacramento Regional County Sanitation District
SRFCP	Sacramento River Flood Control Project
SRPS	South River Pump Station
State Water Board	State Water Resources Control Board
SVAB	Sacramento Valley Air Basin
SWAMP	Surface Water Quality Ambient Monitoring Program
SWIF	system-wide improvement framework
SWMP	stormwater management plan
SWP	State Water Project
SWPPP	stormwater pollution prevention plan
SYMVCD	Sacramento-Yolo Mosquito and Vector Control District
System Evaluation	Sacramento River Flood Control System Evaluation
TACs	toxic air contaminants
TDS	total dissolved solids
TMDL	total maximum daily load
TNW	traditional navigable water
TRLIA	Three Rivers Levee Improvement Authority
TSS	total suspended sediment
ULDC	Urban Levee Design Criteria
US 50	U.S. Highway 50
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UYLIP	Upper Yuba River Levee Improvement Project
V/C	volume-to-capacity
VELB	valley elderberry longhorn beetle
VFZ	vegetation-free zone
WDRs	waste discharge requirements
West Sacramento Project	Sacramento Metropolitan Area, California, Feasibility Report
WRDA	Water Resources Development Act
WSAFCA	West Sacramento Area Flood Control Agency
WSLIP	West Sacramento Levee Improvements Program
WWTP	Wastewater Treatment Plant
YSAQMD	Yolo-Solano Air Quality Management District

Chapter 1
Introduction

The West Sacramento Area Flood Control Agency (WSAFCA) is proposing the Southport Sacramento River Early Implementation Project (Southport project, or simply project), which would implement flood risk–reduction measures along the Sacramento River South Levee in the Southport community of West Sacramento.

Note: In this document, city *(lowercase) refers to the geographic area of West Sacramento, while* City *(capitalized) refers to the governmental entity of West Sacramento.* West Sacramento *is also used in some instances, typically referring to the geographic area. WSAFCA's planning area is the area within the city limits, including developed and undeveloped lands.*

To protect human health and safety and prevent adverse effects on property and the economy, the City of West Sacramento (City), as part of WSAFCA, and in partnership with the California Department of Water Resources (DWR), embarked on a comprehensive evaluation of the condition of the levees protecting the city in 2006 (HDR 2008). The evaluation was necessary to determine the level of performance provided by the existing levee system, identify the magnitude and severity of deficiencies, and propose potential flood risk–reduction measures. The results of the comprehensive evaluation revealed several deficiencies that require substantial improvements to meet current performance standards as implemented federally by the U.S. Army Corps of Engineers (USACE) as levee design criteria and at the state level by the Central Valley Flood Protection Board (CVFPB) as target levels of flood protection (described in more detail in Section 1.3, Project Purpose, Objectives, and Need).

Note: In this document, flood protection *refers to a state-mandated target standard (as in* 200-year level of flood protection*) or specific terminology in a title (as in* Central Valley Flood Protection Plan*).* Level of performance *typically refers to a levee's ability to meet various Federal or state flood risk reduction targets.* Flood risk–reduction measures *typically refers to infrastructure or activities that physically reduce the likelihood of flooding, whereas* flood risk management *typically refers to measures or activities to reduce the consequences of flooding. See also Section 3.1.1.2 for* Flood Risk Defined.

In light of the flood risk to West Sacramento, the West Sacramento Levee Improvements Program (WSLIP) was formed as a framework for planning, funding, and building projects under WSAFCA's sponsorship to incrementally reduce flood risk. This project is proposed by WSAFCA under WSLIP.

DWR administers a program for constructing Early Implementation Projects (EIPs), termed as such as advance efforts in coordination with the comprehensive Central Valley Flood Protection Plan (CVFPP). EIPs are funded by bonds approved by the voters of California under the ballot initiatives Propositions 84 and 1E. Three such projects have been constructed by WSAFCA, beginning with the I Street Bridge EIP in 2008 followed by the California Highway Patrol (CHP) Academy and The Rivers EIPs in 2011. The proposed project would be the fourth EIP by WSAFCA.

It is anticipated that WSAFCA will continue to pursue EIPs until USACE determines the Federal interest in a project being studied under the West Sacramento General Reevaluation Report (GRR), as described in Section 1.5, Related Actions, Programs, and Planning Efforts. The GRR is being led by USACE, Sacramento District. EIPs are being advanced by WSAFCA to more expeditiously address flood risk before the GRR is completed and an anticipated recommendation is made by Congress for project authorization and eventual appropriation—typically a lengthy process that may take 10 or more years. WSAFCA anticipates that: (i) rehabilitation of remaining segments of the levee system (i.e., those not addressed by the projects implemented by WSAFCA) will be implemented by USACE; (ii) WSAFCA will seek Federal credit for work completed in advance of Federal authorization; and (iii) contingent upon approval of Federal credit, the non-Federal costs WSAFCA incurs will be credited against the remaining non-Federal share of the cost of the project approved under the GRR.

To implement the project, WSAFCA is requesting permission from USACE pursuant to Section 14 of the Rivers and Harbors Act of 1899 (Title 33 of the United States Code [USC], Section 408, [33 USC 408]), hereinafter referred to as Section 408, for the alteration of the Federal flood management project. USACE's authority to grant permission for the Southport project under Section 408 triggers the requirement for USACE to comply with the National Environmental Policy Act (NEPA). The project is also subject to Section 10 of the Rivers and Harbors Act (RHA) and Section 404 of the Federal Clean Water Act (CWA), whose authorities lie under USACE. A more detailed discussion of relevant laws, policies, plans, and regulations is included in Chapter 5, "Regulatory Framework and Compliance."

1.1 Document Purpose and Structure

1.1.1 Document Overview

USACE has prepared this final environmental impact statement (Final EIS) in its role as the project's lead agency under NEPA. The draft environmental impact statement/environmental impact report (EIS/EIR) was prepared jointly by USACE, the NEPA lead agency, and WSAFCA, the project applicant and lead agency under the California Environmental Quality Act (CEQA), in compliance with both NEPA and CEQA. The Draft EIS/EIR was written with joint NEPA and CEQA language to improve efficiency and assure consistency in compliance with the two statutes, where appropriate. Since the release of the Draft EIS/EIR, the NEPA and CEQA processes have been separated and are now represented by a stand-alone EIS and a stand-alone EIR, respectively. WSAFCA certified the Final EIR as compliant with CEQA on August 14, 2014.Specifically, this document analyzes the Southport project to support a NEPA Record of Decision (ROD). For certain resources, a program-level analysis more appropriately provides planning context for the project-level actions; therefore, the analysis of flood management and geomorphology, cumulative, and growth-inducing effects, for example, tends to be more programmatic to ensure that system-wide, watershed-level effects of the project-level actions are being considered such that an individual alteration of a portion of the Federal control project does not compromise the performance of the overall project (or have other broad environmental consequences).

1.1.2 NEPA and CEQA Requirements

The Council on Environmental Quality's (CEQ's) regulations for implementing NEPA specify that a Federal agency preparing an EIS must consider the effects of the proposed action and alternatives on the environment; these include effects on ecological, aesthetic, historical, and cultural resources and economic, social, and health effects. Environmental effects are categorized as direct, indirect, and cumulative. An EIS also must discuss possible conflicts with the objectives of Federal, state, regional, and local land use plans, policies, and controls for the area concerned; energy requirements and conservation potential; urban quality; the relationship between short-term uses of the environment and long-term productivity; and irreversible or irretrievable commitments of resources. An EIS must identify relevant, reasonable mitigation measures not already included in the proposed action or alternatives that could avoid, minimize, rectify, reduce, eliminate, or compensate for the project's adverse environmental effects. (40 Code of Federal Regulations [CFR] 1502.14(f), 1502.16(h), 1508.25(b)(3).)

The State CEQA Guidelines explain that the environmental analysis for an EIR must evaluate impacts associated with the project and identify mitigation for any potentially significant impacts. All phases of a proposed project, including construction and operation, are evaluated in the analysis. Section 15126.2 of the State CEQA Guidelines states:

> An EIR shall identify and focus on the significant environmental effects of the proposed project. In assessing the impact of a proposed project on the environment, the lead agency should normally limit its examination to changes in the existing physical conditions in the affected area as they exist at the time the notice of preparation is published, or where no notice of preparation is published, at the time environmental analysis is commenced. Direct and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both the short-term and long-term effects. The discussion should include relevant specifics of the area, the resources involved, physical changes, alterations to ecological systems, and changes induced in population distribution, population concentration, and human use of the land (including commercial and residential development), health and safety problems caused by the physical changes, and other aspects of the resource base such as water, historical resources, scenic quality, and public services. The EIR shall also analyze any significant environmental effects the project might cause by bringing development and people into the area affected.

An EIR also must discuss inconsistencies between the proposed project and applicable general plans and regional plans (State CEQA Guidelines Section 15125[d]).

An EIR must describe any feasible measures that could minimize significant adverse impacts, and the measures are to be fully enforceable through permit conditions, agreements, or other legally binding instruments (State CEQA Guidelines Section 15126.4[a]). Mitigation measures are not required for effects that are found to be less than significant.

1.1.2.1 NEPA Lead Agency

USACE has prepared this Final EIS for the purposes of compliance with NEPA under three authorities: Section 404 of the CWA for regulation of dredged or fill material in jurisdictional waters of the United States, Section 10 of the Rivers and Harbors Act of 1899 for regulation of navigable waters, and Section 14 of the Rivers and Harbors Act of 1899 (33 USC 408) for regulation of alteration to Federal works (commonly referred to as *Section 408 permission*). Through this three-part Federal nexus, NEPA and CEQ's NEPA implementing regulations require Federal agencies to evaluate the environmental effects of a proposed Federal action. In this case, USACE's role as the decision-making authority potentially under three Federal actions triggers USACE's designation as lead agency under NEPA. Because WSAFCA's Southport project is not a USACE civil works project, USACE's responsibilities are limited to these three approvals, the necessary NEPA compliance in granting those approvals, compliance with other applicable laws such as the federal Endangered Species Act (ESA) and National Historic Preservation Act (NHPA), and consideration of future crediting based on the outcome of the GRR. USACE has no responsibilities for funding, design, or project implementation and construction.

As noted previously, separate from the approvals listed above, USACE is preparing a GRR to determine whether there is a Federal interest in improving or modifying the federally authorized flood risk management infrastructure that protects the city. A determination of Federal interest could lead to congressional authorization of a project and eventual congressional funding of USACE improvements to the levee system (unlike the Southport project, which is locally and state-funded). Various provisions of Federal law allow USACE to evaluate locally led construction and, under certain circumstances, grant credit to the local project proponent for funds spent on the locally led construction. Later, if a federally led project is authorized and funded by Congress, USACE can allow those credits to be used by the local agency to reduce the otherwise required cost share to be paid by the local agency for the Federal project.

WSAFCA intends to apply for credit for any work performed on this project to reduce any later cost-share required for a Federal project. For these reasons, WSAFCA intends to work with USACE to aggressively pursue the GRR to complete the GRR as early as possible (passing certain milestones in the GRR increases the chances of being eligible for credit). While the opportunity for credit does link this project to the GRR, the two actions are completely separate.

1.1.2.2 CEQA Lead Agency

As the public agency that has the principal responsibility for carrying out and approving the project, WSAFCA is the lead agency and implementing agency for the purposes of compliance with CEQA. WSAFCA is a Joint Powers Authority created in 1994 through a Joint Exercise of Powers Agreement by the City, Reclamation District (RD) 900, and RD 537. WSAFCA was established to coordinate the planning and construction of flood risk management facilities and to finance the local share of flood management projects. WSAFCA's member agencies are responsible for the operations and maintenance (O&M) of the detention basins, pump stations, and levees that protect the city.

Pursuant to Section 15126(d) of the State CEQA Guidelines, an EIR must describe and evaluate a reasonable range of alternatives that feasibly would attain most of the basic project objectives and would avoid or substantially lessen any significant impact of the project as proposed.

1.1.3 Application of NEPA and CEQA Principles and Terminology

NEPA and CEQA are similar in that both laws require the preparation of an environmental study to evaluate the environmental effects of proposed government activities. However, there are several differences between the two regarding terminology, procedures, environmental document content, and substantive mandates to protect the environment. For this environmental evaluation, the more rigorous of the two laws was applied in cases in which NEPA and CEQA differ.

Table 1-1 compares the terminology of NEPA and CEQA for common concepts.

Table 1-1. Key to General NEPA and CEQA Terminology

NEPA Term	Correlating CEQA Term
Lead Agency	Lead Agency
Cooperating Agency	Responsible Agency
Environmental Impact Statement	Environmental Impact Report
Record of Decision	Notice of Determination
Preferred Alternative	Proposed Project
Project Purpose	Project Objectives
No Action Alternative	No Project Alternative
Affected Environment	Environmental Setting
Effect/Impact	Impact

In some cases in this document, both NEPA and CEQA terminology are used, as in this chapter where the project purpose and need and project objectives are discussed. The terms *environmental consequences, environmental impacts,* and *environmental effects* are considered synonymous in this analysis, and *effects* is used for consistency.

Technical terms used in this EIS typically are defined in their first instance of use in the text. A list of acronyms and abbreviations precedes Chapter 1. An index follows Chapter 8, "List of Recipients."

The analytical structure for each resource section is described at the beginning of Chapter 3, "Affected Environment and Environmental Consequences."

1.1.4 Elevation Datum Used in This Document

Elevations used in this document are referenced to the North American Vertical Datum of 1988 (NAVD 88) to the greatest extent feasible. It should be noted that many of the studies cited in the alternatives descriptions and analyses originally were conducted in the National Geodetic Vertical Datum of 1929 (NGVD 29) and have been converted where feasible. In some cases, such as where a figure has been borrowed from another study, the elevations have not been converted to preserve the integrity of the source study.

1.2 Setting and Study Area

1.2.1 Regional Setting and Study Area

The regional setting of the Southport project is the Sacramento River Flood Control Project (SRFCP), beginning as far north as Redding, California, and extending south to the Sacramento–San Joaquin River Delta (Delta) (Plate 1-1). The regional setting is important relative to other flood risk–reduction projects occurring within the SRFCP, namely, USACE's Sutter Basin Project, American River Watershed Common Features General Reevaluation, West Sacramento Project, and Yuba Basin Project, and the non-federally led Natomas Levee Improvement Program as well as other projects undertaken by the Sacramento Area Flood Control Agency (SAFCA), projects undertaken by the Three Rivers Levee Improvement Authority (TRLIA), and projects underway by the Sutter Butte Flood Control Agency (SBFCA). These and other projects are described under Section 1.5. For the analysis of effects (direct, indirect, and cumulative), the regional context of the SRFCP is taken into consideration.

Scoping down in regional setting, the study area (or planning area) is the city of West Sacramento and the lands within WSAFCA's boundaries, which encompass portions of the Sacramento River, the Yolo Bypass, the Sacramento Bypass, and the Sacramento River Deep Water Ship Channel (DWSC), all potential sources of floodwaters for the study area (Plate 1-2). The flood management system associated with these waterways consists of more than 50 miles of levees in RD 900, RD 537, DWR's Maintenance Area 4, and the DWSC. These levees completely surround the city with the exception of intersecting waterways. The study area is the metropolitan area most downstream within the SRFCP, along with the city of Sacramento across the Sacramento River on the left bank. The downstream location of the project is important as a component of and in conjunction with the other projects mentioned in the preceding paragraph as part of a comprehensive approach in implementing regional goals for flood risk management (Plate 1-3). In addition to the area within the city limits (in Yolo County), the study area extends partially into Solano County on the extreme southwestern edge along the DWSC.

The DWSC and Barge Canal bisect the city into two subbasins, separating the developing Southport area from the more established neighborhoods of Broderick and Bryte to the north (City of West Sacramento 2000). The DWSC provides a navigable passageway for commercial shipping to reach the Port of West Sacramento (formerly Port of Sacramento) from the Pacific Ocean via San Francisco Bay, the Delta, and connecting waterways. The DWSC water surface elevation is directly influenced by changes in water levels in the Delta at the south end of the Yolo Bypass and is relatively insensitive to stage in the Sacramento River. The Barge Canal and lock system, formerly a Federal facility but now de-authorized, was constructed to provide a navigable, gated connection between the Port of West Sacramento and the Sacramento River. For purposes of bridge administration, the Barge Canal was declared not to be a navigable water of the United States for purposes of the General Bridge Act of 1946 (33 USC 525 et seq.) from the eastern boundary of the Port of Sacramento to a point 1,200 feet east of the William G. Stone Lock. USACE is also currently evaluating the Barge Canal to determine non-navigability due to silting in of the channel approaches from naturally deposited sediment.

Detailed information is available in the setting discussion for each resource in Chapter 3.

For the purposes of this document, the *study area* and *planning area* are considered the same, defined as the area within WSAFCA's planning authority and surrounding areas in which potential actions would occur and where environmental effects would be likely to occur. The *project area* is defined as the area in which potential actions (i.e., alternatives) would occur. The *affected area* is defined as the location of resources that would be directly, indirectly, or cumulatively affected by the project alternatives, and may vary depending on the nature of the resource.

1.2.2 Project Area

The Southport project extends approximately 5.6 miles along the Sacramento River South Levee from the termination of the USACE Sacramento River Bank Protection Project (SRBPP) at River Mile (RM) 57.2R south to the South Cross Levee, abutting the Southport community of West Sacramento. The project site is depicted in ground-level photos (Plate 1-4). The 3.6-square-mile Southport project area is represented in Plate 1-5 and encompasses 5.6 miles of the existing levee structure along the Sacramento River corridor, the construction footprint in which flood risk–reduction measures would be constructed for all project alternatives, and potential soil borrow sites. Potential borrow sites overlap large portions of the construction footprint, as soil may be extracted from these areas prior to or during construction of the flood risk–reduction measures.

South River Road runs along the top of the levee for the majority of this reach of the river. The road diverts off of the levee top and merges with Gregory Avenue and runs along the landside toe for a short distance to the southern end of the construction area. The landside of the levee is bordered mainly by private agricultural lands containing rural residences. Two small bodies of water referred to as Bees Lakes are located adjacent to the levee landside toe near the middle of the construction area, and two marinas and multiple boat docks are located on the waterside of the levee near Bees Lakes.

A 10-foot-wide drained stability berm is present on the landside levee slope along the extent of the project area. This risk-reduction measure was completed 1990 through 1993 as part of the Sacramento Urban Levee Reconstruction Project. Two critical erosion sites north of Linden Road were repaired with rock slope protection as part of the SRBPP and the Flood Control and Coastal Storm Emergency Act (Public Law [PL] 84-99) Rehabilitation Assistance Program.

The project area also includes several adjacent and nearby locations at which suitable borrow material may be available for use in constructing the project. As shown on Plate 1-5, potential borrow sites are located both close to the levee footprint, to the east and west of southern Jefferson Boulevard, and along the DWSC.

Specific levee deficiencies identified at the Southport project site relate to erosion, geometry, through-seepage, and under-seepage, further described in Section 1.4.1, Overview of Levee Failure Mechanisms and Deficiencies.

1.3 Project Purpose, Objectives, and Need

1.3.1 Project Purpose

WSAFCA's goal is to achieve the state-mandated minimum 200-year level of flood protection for the city by modifying the approximately 50 miles of levees surrounding West Sacramento. A 200-year flood is an event that has a one-in-200 chance of occurring in any given year, or annual exceedance probability (AEP) of 0.5%.

The primary purpose of the Southport project is to reduce flood risk for the entire city of West Sacramento by addressing known levee deficiencies along the Sacramento River South Levee in the project area. Secondary purposes of the Southport project are to provide ecosystem restoration and public recreation opportunities that are compatible with flood risk–reduction measures. The primary purpose has top priority for project planning, implementation, operations, and maintenance.

While the Southport project would not by itself reduce all flood risks affecting the planning area, it would provide incremental flood risk reduction for the entire city and would address the most immediate risk based on the:

- Nature of Sacramento River West Levee being the longest and most contiguous portion of the planning area perimeter.
- Location of known levee deficiencies and the clarity and feasibility of available measures to address them.

The Southport project by itself would not change the Federal Emergency Management Agency (FEMA) mapping for the city because the project reach is only a fraction of the total levee system protecting West Sacramento. However, the Southport project would contribute as one of many links toward a greater overall level of performance consistent with Federal and state standards. Future projects may be implemented by WSAFCA in coordination with the State of California and USACE based on available funding, the outcome of the GRR, and implementation of the CVFPP and other flood management programs (or multi-objective programs that include flood management).

It further should be noted that the Southport project is targeted primarily at addressing known geotechnical deficiencies (such as seepage and slope stability), which are generally regarded as contributing most substantially to risk of levee failure and flooding, meaning not all encroachments or non-compliant vegetation in the project area may be addressed by the Southport project as an explicit purpose. Therefore, as part of the Southport project, WSAFCA proposes to remove only that vegetation that is in the direct disturbance footprint of the project for constructing flood risk–reduction measures to address other deficiencies. It should be noted that any new levees proposed under the project are being designed to be compliant with USACE levee vegetation policy, but existing levees are not proposed to be brought into compliance beyond the construction disturbance footprint.

1.3.2 Project Objectives

The following objectives provide additional detail in support of the project purpose.

- Reduce flood risk toward a state-mandated target of 200-year protection from Sacramento River flows for the Southport reach from the SRBPP to the South Cross Levee (southern city limit), in compliance with State Senate Bill (SB) 5 mandates for 200-year protection for urbanized areas.
- Address known deficiencies along the Southport reach as observed during high-flow events in the Sacramento River, including waterside erosion, geometry, through-seepage, and under-seepage (also discussed in Section 1.2, Setting and Study Area).
- Provide ecosystem and habitat restoration, as well as preserving and enhancing riparian and other native habitats, where compatible with construction, operation, and maintenance of flood risk–reduction infrastructure, and consistent with the City of West Sacramento Parks Master Plan (Parks Master Plan) and Bicycle and Pedestrian Master Plan.
- Provide improved or new public outdoor recreation and open space opportunities, where compatible with construction, operation, and maintenance of flood risk–reduction infrastructure, and consistent with the Parks Master Plan and the Bicycle and Pedestrian Master Plan.
- Construct a project as soon as possible to reduce flood risk as quickly as possible.
- Construct a project that is politically, socially, economically, and environmentally acceptable.
- Facilitate compatibility with the CVFPP and West Sacramento GRR such that proposed activities would be "no regrets" and not inconsistent with any future plans.

Pursuant to Section 15126(d) of the State CEQA Guidelines, an EIR must describe and evaluate a reasonable range of alternatives that feasibly would attain most of the basic project objectives and would avoid or substantially lessen any significant impact of the project as proposed; these are the objectives within which the range of alternatives is defined.

1.3.3 Need for Action

Five needs have been identified for action.

- Study results from the comprehensive levee evaluation have shown that the levees protecting the city, and specifically those in Southport, need improvements to reduce the current level of risk to human health and safety, property, and the adverse environmental and economic effects that serious flooding would cause.
- Study results further have shown that the levees in WSAFCA's area, and, specifically, those in Southport, are deficient when compared against current Federal standards. Action is needed to bring them up to current standards in order to maintain eligibility for Federal assistance (such as that authorized under PL 84-99).
- Improvements are necessary to meet FEMA's minimum acceptable level of performance (commonly referred to as the 100-year flood) as specified by the National Flood Insurance Program (NFIP) (HDR 2008). FEMA's flood risk maps are being revised nationwide under a program called RiskMAP (mapping, assessment, and planning). The Southport project is intended to incrementally reduce risk to meet or exceed the FEMA standards.
- As required by SB 5 (signed by Governor Schwarzenegger in October 2007), the CVFPB will require a 200-year level of flood protection for urban areas by the year 2025 and calls for building limitations after 2015 if adequate progress toward achieving this standard is not met. Flood risk–reduction measures in the Southport area are necessary to meet that requirement.
- There is a need to provide West Sacramento residents with recreation elements that are compatible with implementation of flood risk-reduction measures. The City's planned recreation and open space and goals presently are unmet, and flood risk-reduction elements typically underlie or are adjacent to proposed recreation elements that are part of the City's planning documents. Surrounding waterways not only are an element of flood risk but also provide opportunity for water-oriented recreation and public open space.

To further demonstrate the need for action, details about West Sacramento's flood risk and the consequences of levee failure in West Sacramento are described in Chapter 2, "Alternatives." Some of the key infrastructure and facilities in West Sacramento that are at risk of flooding and would be affected by the Southport levee are listed in Table 1-2.

Table 1-2. Key Infrastructure and Facilities in West Sacramento

Linear Transportation Facilities	
Interstate 80	Union Pacific Railroad
U.S. Highway 50	Sierra Pacific Railroad
State Route 84	
Water Supply and Treatment Facilities	
Water Treatment Plant	In-Line Booster Pump Station
Carlin Tank	Central Tank
Northeast Tank	Oak Street
PSIP Tank	Bridgeway Lakes II Tank
Southport Wells	Bryte Bend

Sewer Collection Facilities (Pump Stations)	
Bryte	Jefferson
Northport	Industrial
South	Southport
Coke	Triangle
Largo	Bridgeway Island
Allen	Parlin
Sacramento Regional County Sanitation District – Lower Northwest Interceptor	
Storm System Facilities (Pump Stations)	
5th Street	Deerwood
Harbor	Lighthouse
Raley's	Riske Lane
Washington	Jefferson
Government and Quasi-Government Facilities	
U.S. Postal Service regional distribution center	California Highway Patrol (CHP) Academy
Port of West Sacramento	California State Library archive warehouse
City of West Sacramento City Hall	City of West Sacramento Police Station and Service Center
Fire Administration Office and Fire Stations	Public Works Corporation Yard
Washington Unified School District Facilities	
Petroleum and Agricultural Product Manufacture, Storage, and Distribution	
Shell Equilon	BP/Arco
Kinder Morgan	Ramos Fuel
Agrium	Valley Slurry Seal
Chevron	
Building Material Manufacture and Distribution	
Clark Pacific	Two Rivers Cement LLC
Administrative Offices	
California Department of Water Resources	Raley's Grocery Stores headquarters
California Department of General Services	California State Teachers' Retirement System
Coventry Healthcare	
Other Important Commercial Facilities	
Raley's Bakery	McKesson Drug Distribution Center
Greyhound maintenance facility	AT&T corporation yard
United Parcel Service regional distribution center	Pacific Gas & Electric printing facility
Siemens	Hunter Douglas/Bytheways Inc.
Farmer's Rice Cooperative	Xyratex International
Idexx Veterinary Services	Netflix
KOVR Channel 13/Channel 31	Flowmaster
Tony's Fine Foods	Nor-Cal Beverage
Sports and Entertainment Facility (and disaster recovery center)	
Raley Field	

1.4 Project Background

The following background provides additional context for the objectives of, purpose of, and need for the WSLIP and proposed Southport project.

Beginning in 1989, several studies have been conducted by USACE, DWR, and WSAFCA to evaluate the condition of the various levees protecting the city. These studies have indicated that the levee system is deficient and that the consequences of levee failure from a major flood event would be significant.

Prompted by the studies, WSAFCA in cooperation with other agencies has undertaken several levee projects beginning in 1994 to quickly and incrementally address urgent levee deficiencies that pose serious flood risk. Detail on these projects is provided below under Local Flood Management History. Many of these projects were the result of deficiencies discovered during routine O&M inspections or during high-water events, and repairs were performed on a case-by-case basis.

As a result of knowledge gained from its regional Comprehensive Study (the Sacramento–San Joaquin River Basins Comprehensive Study, also known as the Comp Study) initiated after the 1997 flood, USACE revised its levee criteria regarding through-seepage and under-seepage, problems known to exist in the WSAFCA levee system (U.S. Army Corps of Engineers and The Reclamation Board for the State of California 2002). As part of FEMA's risk mapping program, levees must be reevaluated and re-certified using the revised criteria.

In July 2006, the City, as part of WSAFCA, decided to take a proactive rather than reactive stance with respect to flood risk management. At that time, FEMA was beginning the implementation of a flood insurance rate map (FIRM) program that could lead to the city being mapped within the 100-year floodplain. This inclusion would make flood insurance mandatory for all federally guaranteed loans and restrict development that was expected to bear much of the cost of flood risk–reduction measures. The City and WSAFCA concluded that it was necessary to perform a comprehensive evaluation of all of the levees surrounding the city to determine more definitely the current level of performance, determine the magnitude and severity of any deficiencies, and develop recommended strategies for improvement.

WSAFCA's levees have been evaluated according to the latest USACE criteria for stability, seepage, erosion, geometry, and levee height. Data collected from the evaluation show that much of the existing system does not provide a level of performance adequate to reduce the risk to health and safety to 1% AEP, or sufficient to address a 100-year flood event (the event having a 1% chance of occurring in any given year). In addition, an emergency preparedness mapping study analyzed two hypothetical levee failures and determined the rate and depth at which water would flood the city if a levee failure occurred in the studied reaches. This study predicted flooding depths near 15 feet associated with the 100-year flood event. (HDR 2008, 2009.)

In addition to the findings above, several other factors prompted WSAFCA and the City to embark on the WSLIP and seek levee modifications in partnership with the State of California using bond funds from Propositions 84 and 1E to address urgent flood risk–reduction projects.

- The CVFPP requires 200-year flood protection for urban areas by the year 2025 (initially mandated by SB 5). The time and effort required to fully evaluate approximately 50 miles of levees, develop recommended strategies for improvement, and implement those improvements prompted action without further delay. In addition, in its general plan, the City adopted a goal of achieving 200-year flood protection. (City of West Sacramento 2004.)

- The Federal authorization and appropriation process to approve funding and begin evaluation can be lengthy. Through the civil works process, a GRR is being conducted by USACE and their non-Federal and local sponsors for the West Sacramento Project (as it is commonly known; formerly and formally titled *Sacramento Metropolitan Area, California, Feasibility Report*). The State of California and WSAFCA are serving as the non-Federal sponsors for this effort. (U.S. Army Corps of Engineers and Central Valley Flood Protection Board 2009). In light of these circumstances, WSAFCA launched the WSLIP in a process parallel with identifying smaller-scale improvements that may be candidates for EIPs to address urgent needs. See Section 1.5.12., Central Valley Flood Protection Plan, below for further description of EIPs.
- In May 2007, WSAFCA sought a new annual parcel assessment from property owners to raise local funds for flood risk–reduction measures and repairs. The majority of funding to improve the levees will be obtained through state and Federal assistance; however, local communities are required to pay for a portion of the overall costs. The property owners in the city recognized the flood risks and indicated their willingness to participate in improvements by voting to approve an annual parcel assessment in 2007. This funding source facilitates WSAFCA's advancement of flood risk–reduction projects. In addition, West Sacramento Sales Taxes, Measures U and V ballot propositions, were approved by the citizens of West Sacramento on November 4, 2008. The City plans to allocate some of the sales tax revenue generated by Measures U and V to fund the flood risk–reduction projects.

1.4.1 Overview of Levee Failure Mechanisms and Deficiencies

The City engaged a consultant engineering team, led by HDR, to prepare a problem identification report to determine the type, location, and severity of deficiencies in the WSAFCA flood management system. A draft report was completed in April 2008. In simple terms, floods typically occur from levee failure mechanisms and deficiencies such as when:

- Water overtops a levee (inadequate levee height).
- Water moves through the levee structure (through-seepage).
- Water moves under the levee structure (under-seepage).
- Levee slopes are overly steepened or levees have inadequate substance to resist floodwaters or other forces (slope stability and geometry).
- Water carries soil away from the levee slope (erosion).
- Vegetation and other encroachments, such as structures, may impede levee O&M (levee encroachments and non-compliant vegetation).

The deficiencies present in the Southport reach are through-seepage, under-seepage, slope stability and geometry, erosion, and encroachments and noncompliant vegetation; inadequate levee height is not a deficiency in this reach. These failure mechanisms and deficiencies are more fully described below.

1.4.1.1 Through-Seepage

Through-seepage occurs when water moves outward from the river channel through the levee cross section. The key problem associated with through-seepage is levee breach or collapse, which occurs when the earthen material within the levee is transported by the pressure of the seeping water. Soil piping can also occur as the result of seepage. Soil piping is when a hole in a levee becomes exploited by moving water (which naturally seeks the path of least resistance), causing the hole to increase rapidly and threaten the levee integrity. Several factors contribute to through-seepage, including high water pressure (such as during periods of high water in the river), and pervious earth material (i.e., sandy soils) within or underlying the levee.

1.4.1.2 Under-Seepage

Similar to through-seepage, under-seepage occurs when water moves outward and downward from the river channel below the levee and surrounding land surface. The key problem with under-seepage occurs when the earth particles which comprise the levee foundation are transported from underneath the levee due to the pressure of the seeping water. This undermining of the levee may result in levee instability or collapse. As with through-seepage, soil piping may occur and cause the levee to breach or collapse, and threatens overall levee integrity. Evidence of under-seepage can often be seen as boils on the land surface on the landward side of the levee. The factors that contribute to under-seepage are the same as those discussed above in through-seepage.

1.4.1.3 Slope Stability and Geometry

Slope stability is a desirable quality and refers to the resistance of the levee slope to change (landside or waterside). A slope that has an unfavorable horizontal to vertical ratio can be unstable and vulnerable to slipping or sloughing, exacerbated by high flood water elevations. Generally, the approach to determining slope stability can be divided into two categories: steady state and rapid drawdown. Steady state assumes that the flood stage water surface is present for a significant duration, and the presence of water in the levee and the weakening of the levee interior due to through-seepage can cause the landside slope of the levee to slip and wash away. Rapid drawdown also assumes that the flood stage water surface is present for a significant amount of time, and then is removed quickly as if the river were drained. The water remaining within the levee section weakens the integrity of the levee and when the water surface drops, the waterside slope is vulnerable to slipping and washing away.

1.4.1.4 Erosion

Erosion is the loss of levee material typically from the force of flowing water, which may be exacerbated by high water velocities, waves, wind action, and boat wake. The high variability in levee soil material, water surface elevation, flow velocities, and relationship of the levee to the active channel results in commensurate variation in the point at which the levee is at risk (e.g., at lower flows, the levee toe is at risk to erosion; at high flows, the levee face may be at risk).

1.4.1.5 Encroachments and Non-compliant Vegetation

Federal project levees, like those on the Sacramento River, are subject to USACE O&M standards. These standards are outlined in general policies and technical publications that universally apply to all Federal project levees and in project-specific O&M manuals. Recent general guidance from USACE provides greater specificity for the location, type, and degree of encroachments and vegetation allowable on or in levees. USACE has a levee vegetation policy, detailed in Engineering Technical Letter 1110-2-583, *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures* (ETL), which generally prohibits woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).

Under certain circumstances, encroachments and vegetation can exacerbate local erosion (factoring stage, discharge, and bank configuration, single trees or other encroachments can affect near-bank velocities such that localized scour could occur), limit the ability to observe levee performance, impair O&M practices, and otherwise affect levee integrity. Encroachments may include penetrations (e.g., pipes, conduits, and cables), power poles, pump stations, or similar features.

As discussed above under Project Purpose, it should be noted that not all encroachments or non-compliant vegetation in the project area would be addressed by the Southport project, as the project is primarily targeted to address substantial geotechnical deficiencies contributing to risk of levee failure and flooding (such as seepage and slope stability). Therefore, as part of the Southport project, WSAFCA proposes to remove only that vegetation that is in the direct disturbance footprint of the project for constructing flood risk–reduction measures to address other deficiencies. Any new levees (such as setback levees) proposed under the project would be designed to be compliant with USACE levee vegetation policy.

WSAFCA is working cooperatively with the State of California and USACE for a long-term solution to address other non-compliant vegetation and encroachments, and, because Section 408 permission does not require ETL compliance outside of the disturbed areas, any future activity for ETL compliance is not part of the Southport project nor is a variance being requested at this time. However, all noncompliant vegetation would be removed from within the Southport project construction footprint under all action alternatives and, if replaced, would be replaced in a manner that complies with the ETL and any new levees would be fully ETL-compliant.

Long term beyond the Southport project, WSAFCA supports and has an ultimate goal toward woody vegetation management consistent with the Urban Levee Design Criteria (ULDC) (California Department of Water Resources 2012) adopted as part of the CVFPP, which proposes that levees with preexisting woody vegetation would be managed according to levee vegetation inspection criteria. While the CVFPP vegetation management strategy has not been approved by USACE and is not proposed as part of the Southport project, it is considered part of the no action scenario described in Chapter 2 and is defined below.

The inspection criteria establish a vegetation management zone in which trees are trimmed up to 5 feet above the ground (12-foot clearance above the crown road) and thinned for visibility and access. Brush, weeds, or other such vegetation over 12 inches high are to be removed in an authorized manner. The vegetation management zone includes the entire landside levee slope plus 15 feet beyond the landside toe (or less, if the existing easement is less than 15 feet), the levee crown, and the top 20 feet (slope length) of the waterside levee slope.

Waterside vegetation below the vegetation management zone should remain in place without trimming or thinning, unless it poses an unacceptable threat to levee integrity.

The CVFPP proposes a long-term, adaptive, vegetation life-cycle management (LCM) plan that would lead to the eventual elimination of trees and other woody vegetation through removal of immature trees and woody vegetation. LCM would be implemented in the vegetation management zone, as described above.

This plan would allow existing “legacy” trees and other woody vegetation beyond a certain size to live out their normal life cycles on the levee, unless they pose an unacceptable threat. Under the LCM plan, removing immature trees and woody vegetation less than 4 inches in diameter at breast height would be conducted in consultation with the appropriate resources agencies.

Per the ULDC, before any tree removal, an engineering inspection and evaluation should be conducted to identify trees and woody vegetation (alive or dead) that pose an unacceptable threat to the integrity of the levee.

Note: Additional information on the deficiencies found throughout the WSLIP study area can be found in a problem identification report (PIR) (HDR 2008) and an alternatives analysis (HDR 2009).The deficiencies and alternatives have been refined and focused through progressive stages in the planning process to form the basis of the purpose, need, objectives, and proposed activities that are the foundation of this EIS, and therefore may differ slightly among these documents.

1.4.2 Regional Flood Management History

The SRFCP was authorized by Congress in 1917. The SRFCP was the major project for flood management on the Sacramento River and its tributaries (Plate 1-1). It was sponsored locally by The Reclamation Board of the State of California (The Reclamation Board, reauthorized in 2007 as the CVFPB) and was the first Federal flood management project constructed outside the Mississippi River Valley. Currently, there are several major flood risk management projects being planned or implemented within the SRFCP area (Plate 1-3). Projects relevant to the EIPs are discussed in further detail under Section 1.5.

Prior to European settlement in the mid-nineteenth century, the floodplain of the Sacramento River in the 150 miles between the city of Redding and the Delta varied from 2 to 30 miles wide and annually covered more than 1 million acres. Low, discontinuous levees were built by individual landowners from the 1840s to the 1890s. Those levees concentrated floodflows and contributed to problems that were worsened by upstream hydraulic mining in the Sierra Nevada foothills in the late 1800s. With the authorization of the SRFCP, USACE and the State of California began managing the project as a “regional system,” constructing improvements to approximately 1,100 miles of levees and creating bypasses and floodways.

Although the flood management structures have been extensively improved and upgraded since construction, the underlying foundation of most of the levees and channels pre-dates any state or USACE involvement and retains the original materials that include dredged riverbed sands, soil, and organic matter. At the time of the SRFCP authorization in 1917, the areas being protected by the levees were primarily agricultural with minimal improved infrastructure such as railroads and highways. Many of these areas are now heavily urbanized and densely populated, including the city of West Sacramento.

The Federal government maintains oversight but has no ownership of or maintenance responsibilities for the Federal levee system, except for a few select features that continue to be owned and operated by USACE. Considering these exceptions, the great majority of levees, channels, and related flood management structures are owned, operated, and maintained by the State of California, and local levee and reclamation districts (at the county and sub-county level). Most of the levee and reclamation districts existed prior to the SRFCP authorization in 1917 and have been carrying out maintenance responsibilities. Today, however, most of the levee districts are substantially underfunded and unable to maintain the system to meet current Federal standards. The levees surrounding the city are maintained by RDs 537 and 900, DWR's Maintenance Area 4, and USACE.

In recent decades, a number of evaluations of levee conditions, as well as repair and reconstruction efforts, have taken place. Some have been in specific response to damage resulting from particular flood events; others have been in response to general levee deterioration over time and deferred maintenance. In 1986, 1995, and 1997, there were record flood stages in the Sacramento region. As a result, USACE evaluated the level of performance in the study area with updated hydrology and levee analysis. It was determined that the risk of flooding from the Sacramento River and its tributaries ranges from 1 in 25 (25-year) to more than 1 in 100 (100-year) each year (or 4% to 1% probability), depending on the location.

1.4.3 Local Flood Management History, Programs, and Activities

Consistent with much of the Sacramento Valley as described above, the levees protecting West Sacramento were constructed in the 1840s to 1890s. They later became part of the SRFCP authorized by Congress in 1917. These levees have been strengthened and maintained through several subsequent projects in partnership among USACE, the State of California, the City, and the agencies that maintain the levees.

The 1986 flood exposed structural problems and inability of the existing levees to provide an adequate reduction of risks to health and safety. In response, USACE initiated a system-wide evaluation of the levees comprising the SRFCP. Because of the large scale of the evaluation, the review was split into five phases. The first phase of this evaluation included West Sacramento and was documented through an initial appraisal report entitled *Sacramento Urban Area Levee Reconstruction Project, California* (May 1988). This phase included the review of approximately 110 miles of levee and recommended the repair of 34 miles. (U.S. Army Corps of Engineers and Central Valley Flood Protection Board 2009.)

The *Sacramento Urban Area Levee Reconstruction Project Basis of Design* (November 1989) recommended the repair of two reaches of levee protecting the city of West Sacramento. The first repair reach included two relatively small sites along the right bank of the Sacramento River (in the north part of West Sacramento). The second, and more significant, repair reach included approximately 6 miles of levee along the right bank of the Sacramento River extending from near the Barge Canal entrance downstream to the southern city limit. Construction began in November 1990 for the installation of berms to improve stability and manage seepage along both reaches. (U.S. Army Corps of Engineers and Central Valley Flood Protection Board 2009.)

Also in response to the 1986 flood and specific observed flood risks to the urban area comprising the cities of Sacramento and West Sacramento, USACE, in cooperation with the State of California, initiated the study documented as the *Sacramento Metropolitan Area, California, Feasibility Report* (also known as the West Sacramento Project). This report was published in February 1992 and stated that "prior to the 1986 flood, West Sacramento was thought to have in excess of 100-year level of flood protection" (U.S. Army Corps of Engineers 1992: ES-1). The report went on to state that "the frequency of the 1986 flood for the study area was estimated to be approximately 70 years for both the Yolo Bypass and the Sacramento River." The report also indicated the existing flood risk management system in the project area provided significantly less than a 100-year level of performance. The study identified a 400-year plan as the "plan that maximizes the net benefits" and selected it as the National Economic Development plan (U.S. Army Corps of Engineers 1992: ES-3). The selected program of improvements was estimated to provide the city with a 400-year level of performance, assuming implementation of a 200-year flood management dam on the American River; however, the recommended plan would provide at least a 150-year level of performance if this American River project element was not implemented. The repairs recommended by the study were authorized in the Water Resources Development Act (WRDA) of 1992 (PL 102-580); however, the 200-year flood management dam on the American River was never authorized by Congress. (U.S. Army Corps of Engineers and Central Valley Flood Protection Board 2009.)

Recent milestones in the flood management context of West Sacramento include the following activities.

- In 1992, USACE concluded that the levees along the Sacramento River and Yolo Bypass did not provide adequate reduction of risk to health and safety from a 100-year flood event.
- In 1993, a flood management project was completed as part of the Sacramento Urban Area Levee Reconstruction Project. This project placed a stability berm and related features to address through-seepage along the entire length of the Sacramento River levee bordering the Southport area (referred to in the project area as the Sacramento River South Levee).
- In 1994, the City and reclamation districts formed a Joint Powers Authority, WSAFCA, to coordinate, fund, and construct major flood risk management improvements that were beyond the means of the individual entities (City of West Sacramento 2000).
- In 1995, WSAFCA formed an assessment district to fund the local cost share for the West Sacramento Project. This project was part of the Federal Sacramento Metropolitan Area Project authorized by the WRDA of 1996, as described above. The WSAFCA assessment funded geotechnical and engineering investigations of the Sacramento River levees and the southern boundary cross levee in the Southport area (PB 2007). The West Sacramento Project was designed with the stated goal of providing the city with greater than a 200-year level of protection.
- During the 1997 record flood stage event, the levees surrounding the city sustained minor damage. As design work was nearing completion on the West Sacramento Project, under-seepage was noted along the Sacramento Bypass levee.
- In 1998, stability issues became apparent along a levee maintained by RD 537 just north of the Southern Pacific Railroad tracks.
- In 2002, the West Sacramento Project was substantially completed. This project involved raising more than 1 mile of the South Levee of the Sacramento Bypass by up to 5 feet and raising 4.5 miles of the Yolo Bypass levee by up to 5.5 feet.
- In 2008, WSAFCA completed an EIP known as the I Street Bridge EIP. This EIP improved a critical section of levee in the redevelopment area along the riverfront of the city to reduce flood risk to public safety, private property, and public infrastructure. The EIP improved a 475–linear foot reach of the Sacramento River North Levee to address the problems of through- and under-seepage. This EIP and Section 408 action was expeditiously completed by WSAFCA and the State of California, with permits acquired by USACE.

- In 2009 and 2011, USACE and CVFPB repaired two slip sites along the Yolo Bypass as part of the Central Valley Flood Management Planning Program. The project involved excavating and disposing of the unsuitable soil in the levee and reconstructing it with new soil to restore stability.
- In 2011, WSAFCA completed two EIPs at the CHP Academy site and The Rivers site. These projects addressed levee deficiencies of geometry, slope instability, through-seepage, and under-seepage along reaches of the Sacramento Bypass and Sacramento River. These EIPs were completed under a single Section 408 action in coordination among WSAFCA, the State of California, and USACE.
- In 2011, USACE initiated construction of a small setback levee project on the Sacramento River downstream of the Barge Canal as part of the SRBPP. The proposed Southport project would connect with that project on its downstream end such that the two projects in combination would address flood management deficiencies for the entire reach of the river from the Barge Canal to the southern city limit.

1.4.3.1 Non-Structural Measures for Flood Risk Management

In addition to the activities described above, the City has enacted other policies and practices to manage flood risk. The City and WSAFCA are actively pursuing and implementing flood risk–reduction measures that are structural, like levee modifications to meet Federal and state design criteria, and non-structural measures, some of which are outlined below.

- The City has in place an Emergency Operations Plan, which addresses risks to health and safety from flooding. To ensure adequacy and conformance with state-of-the-art standards, and to account for growth, the Emergency Operations Plan is reviewed annually and a comprehensive update is conducted every 3 years or more frequently as needed. Based on this review and revision cycle, the Emergency Operations Plan addresses residual flood risk as flood risk management programs are implemented and as the population and built environment change.
- City residents and other interested parties are informed of flood risk, flood management efforts, and updates to the Emergency Operations Plan through the City's website and *City iLights*, an electronic publication specifically for the City of West Sacramento and made available to all residents. In addition, the Fire Department regularly conducts community outreach and informs residents on the latest information related to emergency preparedness.
- As amended in 2007, the City's municipal code requires new developments to provide 200-year flood protection or pay into an in-lieu fee program to fund WSAFCA's flood risk management efforts. (Chapter 15.50, 200 Year Flood Protection.)
- The City, RD 537, and RD 900 are partners in a joint flood operation agreement with procedures to protect health, safety, welfare, and property of the residents and landowners. Procedures described in the document consist of flood preparedness, information management, monitoring, flood fighting, and flood evacuation.
- Emergency response and evacuation services for the program area are provided by the various departments in the City of West Sacramento and cities nearest to the program area and through Yolo County and Solano County Sheriff, Fire, and Emergency Services Departments. The City established an Emergency Operations Center, a special City facility opened in times of major emergencies. The purpose of the center, also connected to a regional resource system, is to act as the central point of communications directing personnel and resources. The Emergency

Operations Center will be managed and operated by City staff members who are trained to fulfill emergency functions.

- The City has also established a City Slow Rise Flood Plan published on the City's website describing seven stages in which specific actions are taken as water rises in the Sacramento River and Yolo Bypass. Residents are informed of emergencies through TV, radio, print, the Reverse 911 System, website, fire and law enforcement loudspeakers on vehicles, door–to-door and, as needed, loudspeakers on helicopters. The City is prepared to evacuate citizens with special care needs and those housed in special care facilities during the general public voluntary evacuation stage.

1.4.4 Fish and Wildlife Habitat Needs

It is commonly accepted that California's Central Valley has lost more than 95% of its wetland and riparian habitat area since the mid-nineteenth century. Prior to European settlement, much of the Central Valley was characterized by a mosaic of grasslands, savanna, woodlands, and wetlands. Owing to the Mediterranean climate of mild winters and a relatively defined period of precipitation, the rivers winding from the Sierra Nevada to San Francisco Bay would pulse from the late fall to late spring with seasonal rains and snowmelt, frequently overflowing their banks to fuel these habitats. These habitats contributed to a rich biodiversity of fish and wildlife, including invertebrates; countless resident and migratory birds; resident and anadromous fish, reptiles, amphibians; and many varieties of mammals.

Today, the rivers are highly channelized and river flow is strictly regulated. The native floodplain is constricted or nonexistent. In the urbanized reach of the Sacramento River in the study area, what likely was once a riparian forest of thousands of acres in area and thousands of feet across is now largely limited to a single strand of overly mature trees. The hydrologic management of the reservoirs and lack of floodplain surfaces do not allow riparian trees to set seed and reproduce. Many of the fish and wildlife that depend on these species have become extinct, been extirpated, or are listed as threatened or endangered.

At a minimum, the Southport project will be required to avoid, minimize, and mitigate effects on remnant resources. The City and WSAFCA have goals to expand and enhance habitat for fish and wildlife, public recreation, and general open space values. The Southport project provides excellent opportunities to realize these benefits.

1.4.5 Local Recreation Needs

The City, as a member agency of WSAFCA, is proposing recreation elements that are compatible with flood risk-reduction measures to meet recreation needs. For example, the Sacramento River is central to the identity and image of the city, yet opportunities to enjoy it are hampered by lack of safe and usable public access points. The city also is lacking developed facilities and infrastructure for dedicated off-street bikeways, environmental interpretation and education, fishing, boating, hiking, and other active and passive outdoor recreation experiences. This situation has been heightened by the recent growth of the local population, demographically influenced by young families and individuals oriented toward outdoor recreation.

The Parks Master Plan from 2003 identified several key recreation opportunities for the city that would enable its citizens and visitors to enjoy the resources provided by the Sacramento River and other waterways. Those opportunities include using corridors along the Sacramento River, DWSC, turning basin, Barge Canal, and Yolo and Sacramento Bypasses. These corridors are an opportunity to develop pedestrian and non-motorized-transport linkages that can be used for transportation as well as recreation.

As part of its Parks Master Plan, the City performed a demand analysis to determine the community's need for certain services. Twelve demands were noted, two of which relate to the city's waterway corridors, summarized below.

- **Improved water access.** Residents value the water resources available in West Sacramento. They desire improved access to water-related recreation such as fishing, boating, swimming, and passive use (e.g., wildlife viewing, hiking).
- **Recreation corridors and trails.** The residents support corridors for bicycling, walking, and horseback riding.

Further substantiating the need for bicycle and pedestrian paths, the 1991 West Sacramento Bicycle and Pedestrian Path Master Plan and Addendum (City of West Sacramento Parks and Community Services Department 1995) identified opportunities, constraints, and design standards for a citywide network of bicycle and pedestrian paths. The plan also described the City's understanding of these paths as more than a recreational resource; they also encourage bicycling and walking as alternatives to automobile transportation. The Parks Master Plan demand analysis found that the residents support construction of these corridors for bicycling, walking, and horseback riding.

Supported by the demand analysis, the City has established the following goals and objectives.

- Acquire and develop recreation corridors located along watercourses and railroad rights-of-way to link the park system and provide additional recreation opportunities.
- Locate new parks to take advantage of the city's natural resources, including the river and other watercourses.
- Provide improved river access for boating and fishing.
- Develop open space areas to protect significant wetlands and riparian forests, and to provide passive recreation opportunities.
- Facilitate bicycle and pedestrian travel as an alternative to automobile use.

1.5 Related Actions, Programs, and Planning Efforts

This section provides an overview of other flood risk management and related actions, projects, and programs that compose the regional planning context. Whereas the previous section provides historical background, the following section includes current and future actions that may be considered as part of the cumulative effects analysis.

1.5.1 System-Wide Efforts

Related efforts affecting the entire SRFCP (or beyond) are described below.

1.5.1.1 California Water Plan

The California Water Plan, first published by DWR in 1957, outlines statewide objectives and policies to support integrated and sustainable water management in California. The plan is updated every 5 years, consistent with the most recent advancements in science and public policy. The status of California's water-dependent natural resources, as well as water supply and demand levels, are articulated in each plan update. The updates also evaluate future water trends based on a range of plausible water management scenarios. Based on the current status of statewide water supplies and anticipated future trends, the updates analyze and propose strategies to improve the quality and quantity of California's water resources. The recommendations outlined in each water plan update form a blueprint for advancing sustainable water management, prioritizing infrastructure projects, and informing policy decisions related to California's water future.

The most recent update to the California Water Plan was completed in 2009 and provides guidance for California water management through 2050. This was a significant update in that the scope of the plan was broadened to more specifically include flood risk management. The 2009 update was developed based on input and recommendations from numerous stakeholders, including elected officials, agencies, tribes, businesses, and water resource managers. The document acknowledges that California is facing one of the most significant water crises in history. Climate change, increasing demand, aging infrastructure, and new regulations are cited as contributing factors to declining water deliveries and prolonged drought conditions. The 2009 update outlines resource management strategies, planning approaches, and analytical methods to address these growing challenges and improve the way in which water is used and managed in California, including flood management.

DWR released the California Water Plan Update 2013, which continues to integrate water resource management, including concepts for water supply, flood risk management, and ecosystem health, on October 30, 2014. Prepared over the past five years with the involvement of dozens of State and federal agencies and hundreds of stakeholders from diverse communities, this document builds on the 2009 effort and includes several key updates in response to stakeholder comments. It sets forth a suite of actions designed to improve the resilience and sustainability of our regional water resources into the future and also reports on progress related to the implementation of the 2009 update. The multi-volume plan also serves as a compendium of facts about where California's water supply system, including an enhanced analysis of California's hydrological regions and subregions.

1.5.1.2 Central Valley Flood Protection Plan

The Central Valley Flood Protection Act (CVFPA), enacted in California in 2009, called for DWR to prepare a CVFPP, which was adopted by the CVFPB in June 2012. The CVFPP provides a comprehensive framework for system-wide flood risk management in the Central Valley. The CVFPA also establishes a new standard of "200-year flood protection" for urban areas in the Central Valley and requires this standard to be achieved by 2025.

The CVFPP presents three preliminary approaches for addressing current challenges and affordably meeting the CVFPP goals. The state has assembled what it views as the most promising, affordable, and timely elements of the three preliminary approaches into the State Systemwide Investment Approach, which provides guidance for future state participation in projects and programs for integrated flood management in the Central Valley.

The people of California passed two bond measures (Propositions 84 and 1E) that provide approximately $5 billion toward flood management efforts to reduce flood risk, particularly to state–Federal levees protecting urban areas in the Central Valley. These flood risk–reduction measures are expected to be built over the 10 years following authorization of the bonds in 2006. However, there were urgent needs to improve inadequate flood risk management in existing urban areas in advance of the overall comprehensive effort. These advance efforts—EIPs—can be implemented ahead of and parallel to the comprehensive effort as long as they are designed to ensure that they do not eliminate opportunity or prejudice future flood risk management alternatives that would provide regional or system-wide benefits. Local agencies and the state are identifying and planning EIPs in a parallel process to be compatible with comprehensive, system-wide studies. Several EIPs have been implemented, such as those under the programs of SAFCA and WSAFCA.

Along with the requirement for increased flood protection by 2025, one of the objectives of the CVFPP is:

> increasing the engagement of local agencies willing to participate in flood protection, ensuring a better connection between state flood protection decisions and local land use decisions (Draft Framework for Early Implementation Projects and Section 408 Approval).

In line with that objective, WSAFCA has proposed the Southport project as an EIP.

1.5.1.3 Sacramento River Flood Control System Evaluation

Following the flood of 1986, USACE and the State of California, along with local partners, completed a comprehensive evaluation of the SRFCP and initiated a flood risk management program aimed at repairing, raising, and strengthening urban levees, among other activities. This effort, known as the Sacramento River Flood Control System Evaluation (commonly referred to as System Evaluation) resulted in the repair of more than 70 miles of deficient levees by USACE. However, to date, not all the authorized repairs have been completed. Moreover, the completed repairs were built to standards in place at the time, which are no longer current.

Because of the large scale of the evaluation, the review was split into five phases. The results were published in the Sacramento River Flood Control System Evaluation, Phase II–V, Programmatic EIS/EIR, dated May 1992. Phases I and II evaluations include the Sacramento urban area and Marysville/Yuba City area. Phase III is the Mid-Valley area in and around the town of Knights Landing, approximately 27 miles northwest of Sacramento. Phases IV and V include the lower Sacramento River area south of Sacramento and the upper Sacramento River area north of Knights Landing. According to the November 2002 SRFCP Limited Reevaluation Report, Phase VI was added more recently to evaluate additional potential sites in all phases, but its supplemental design memorandum had not been completed at that time.

Phase III is the only currently active phase and is being designed for dike slurry wall work at three sites along the right bank of the Sacramento River (RM 84.1 to 87.2). The work also involves dike reconstruction, with final design being recently completed, at three sites along the left bank of the Knights Landing Ridge Cut. The State of California is proposing to complete the Knights Landing Ridge Cut work under an EIP, or USACE would complete all work in 2015 to 2016.

1.5.1.4 Sacramento–San Joaquin River Basins Comprehensive Study and Central Valley Integrated Flood Management Study

Following the 1997 flood, the Comp Study was initiated by the state and USACE to formulate comprehensive plans for flood risk reduction and environmental restoration. This study was unable to stimulate widespread public or political interest in flood risk reduction or environmental restoration activity beyond the then-existing urban levee improvement programs. The study did result in a new set of engineering criteria for the design and evaluation of urban levees and a greatly expanded scope and cost for the ongoing urban levee improvement efforts on the Sacramento and American Rivers. In addition, the adequacy of previous repairs was reviewed.

Presently, the Central Valley Integrated Flood Management Study (CVIFMS) is a continuation of the Comp Study in which USACE and the state are defining a long-range program for the Sacramento and San Joaquin River basins and the corresponding level of Federal participation. This program will identify opportunities to reduce flood risk by improving the flood capacity of the system while restoring and protecting floodplain and environmental features, including wetlands and other fish and wildlife habitat. The approaches and management strategies under CVIFMS include:

- Conduct a watershed study to provide long-term reduction of flood risk and environmental restoration needs.
- Coordinate closely with the CVFPP development and implementation to produce joint products for mutual benefits and use.
- Provide leadership in specific disciplinary areas to ensure consistency in national management directives and guidelines.
- Coordinate with ongoing projects and programs to incorporate relevant information and actions in the study development.

Subject to continued appropriation, USACE plans to complete the CVIFMS by 2017.

1.5.1.5 Sacramento River Bank Protection Project

USACE is responsible for implementation of the SRBPP in conjunction with its non-Federal partner, CVFPB. The SRBPP is a continuing construction project authorized by Section 203 of the Flood Control Act of 1960. The purpose of this project is to provide protection from erosion to the existing levee and flood management facilities of the SRFCP. To date, project work has been carried out in two phases, and a total of about 830,000 feet of riverbank has been stabilized. Phase I consisted of 435,000 feet and Phase II's original authorization was for 405,000 feet. An additional 80,000 feet (a supplement to Phase II) has been authorized under the WRDA of 2007 and is being supported by a Post Authorization Change Report, Engineering Documentation Report, and EIS/EIR under development. This authorization would be applied by USACE to the Sacramento River and other sites within the SRFCP that are identified as critical levee erosion sites. A project under the SRBPP is presently under construction immediately adjacent to and upstream of the Southport project. This SRBPP project is a short segment of new setback levee connecting the Barge Canal south levee to the west levee of the Sacramento River.

1.5.1.6 Public Law 84-99 Program (PL 84-99)

The Flood Control and Coastal Storm Emergency Act (PL 84-99) authorizes USACE to undertake activities, including disaster preparedness, advance measures, emergency operations, rehabilitation of flood management works threatened or destroyed by flood, protection or repair of federally authorized shore protective works threatened or damaged by coastal storms, and provision of emergency water because of drought or contaminated source. PL 84-99 establishes an emergency fund for emergency response preparations for natural disasters, for flood fighting and rescue operations, and for rehabilitation of flood management and hurricane protection structures. Under PL 84-99, an eligible flood management system such as the SRFCP can be rehabilitated if damaged by a flood event. USACE has the responsibility to coordinate levee repair issues with interested Federal, state, and local agencies following natural disaster events where flood management works are damaged.

California experienced a series of storms affecting federally authorized flood damage–reduction projects between December 28, 2006, and January 9, 2007. High water elevations associated with these storms resulted in damage to levees along the Sacramento River and its tributaries. These damages included the development of boils at a site located along the right bank of the Sacramento River in RD 900. This site was located near Davis Road at RM 54.2. USACE, in cooperation with CVFPB, constructed a seepage berm at this site in 2007 under the general authority PL 84-99. The 80-foot-wide by 200-foot-long seepage berm, consisting of drain rock encapsulated in geotextile fabric topped with levee fill, was placed at the landside toe of the levee over the area of reported boils.

1.5.2 Federal Projects in the Region

Related Federal efforts in the SRFCP are noted below.

1.5.2.1 Sacramento Metropolitan Area, California, Feasibility Report (West Sacramento Project)

As introduced earlier in this chapter, the *Sacramento Metropolitan Area, California, Feasibility Report* (also known as the West Sacramento Project) was completed in 1992 by USACE and describes the results of studies of flood problems along the Sacramento River and Yolo Bypass, from the Sacramento Weir downstream to an area just south of Freeport. The West Sacramento Project included plans for improving flood risk management for the city of West Sacramento. The project area is located along the right bank of the Sacramento River in Yolo County, California. The West Sacramento Project was substantially completed in 2002. The project involved raising more than 1 mile of the south levee of the Sacramento Bypass by up to 5 feet and raising 4.5 miles of the Yolo Bypass levee by up to 5.5 feet.

There have been five repairs to the Yolo Bypass levee since the West Sacramento Project was completed. Two sites on the waterside of the levee were repaired in 2004 and another site on the waterside of the levee was repaired in 2009. The 2009 repair site was extended in 2012, at which time repairs were also made on the landside of the levee.

1.5.2.2 West Sacramento General Reevaluation

The original West Sacramento Project of 1992 studied only a small portion of the levees that manage flood risk for the city of West Sacramento. As introduced earlier in this chapter, USACE and WSAFCA are developing a GRR for West Sacramento flood risk–reduction measures to assess the entirety of the levees protecting the city of West Sacramento in light of most recent criteria and knowledge regarding levee design. The Draft GRR and Draft EIS/EIR was released for public review and comment in July 2014.

USACE uses GRRs to present the results of a reevaluation of a previously completed study, using current planning criteria and policies, because of changed conditions and/or assumptions. The results may reaffirm the previous plan, reformulate and modify it, or find that no plan is currently justified. The results are documented in a GRR that, if recommended and supported, also serves as the decision document for a Federal action (U.S. Army Corps of Engineers and Central Valley Flood Protection Board 2009). NEPA analysis for the GRR will be separate from that for the EIPs, but the processes are being closely coordinated for consistency and efficiency.

The primary objective of the West Sacramento GRR is to determine the extent of Federal interest in additionally reducing the flood risk in the study area while concurrently exploring opportunities to increase recreation and restore the ecosystem along the Sacramento River within the study area.

In regard to the relationship between the Southport project and the West Sacramento GRR, it is intended that some or all of the Southport project will be constructed prior to any construction under the GRR, which can occur only after authorization of, and appropriation for, the West Sacramento Project by Congress following completion of the GRR. Initiated in March 2009, the GRR is expected to be presented to Congress for authorization in 2015, meaning the earliest that Federal levee flood risk–reduction measures would be constructed under the GRR is 2016. WSAFCA anticipates that state and WSAFCA (non-Federal) costs to implement the Southport project could be credited against the remaining non-Federal share of the cost of the project studied under the GRR. Credit is available only if the flood risk–reduction measures constructed as part of the Southport project are found to be integral to the project recommended in the GRR.

More specifically, requests for general credit for flood management under Section 221 of the Flood Control Act of 1970 (as amended by Section 2003 of WRDA of 2007) may allow the work conducted by WSAFCA and described in the GRR to be credited against the local cost sharing requirements of the West Sacramento Project GRR as long as the project features constructed are integral to the USACE project.

Because implementation of the flood risk-reduction measures by WSAFCA does not immediately use Federal funds, it would not result in a commitment of Federal resources that would prejudice selection of a GRR alternative before a final decision on the GRR alternatives is made. In addition, the project-specific improvements considered in this EIS(the Southport project) are limited to a small portion of the overall flood management system considered in the GRR. In summary, the Southport project is being advanced by WSAFCA to facilitate measures that are intended to be integral to the ultimate West Sacramento Project GRR.

1.5.2.3 American River Watershed Common Features General Reevaluation

To reduce flood risk for the city of Sacramento, which is bordered by the left bank of the Sacramento River, the American River Watershed Common Features General Reevaluation (Common Features) was authorized by Congress in the WRDA of 1996. This authorization called for strengthening the north and south levees of the American River and raising and strengthening the upper 12 miles of the left levee of the Sacramento River in the Natomas area, just north of the city of Sacramento. These improvements were considered *common features* of any comprehensive plan of flood management for the Sacramento area that ultimately might be approved by Congress. In WRDA of 1999, the scope of the Common Features authorization was expanded to include raising portions of the north and south levees of the American River (including the Mayhew Levee), additionally strengthening portions of the north levee of the American River, and raising and strengthening the north and south levees of the Natomas Cross Canal in the Natomas area. In 2006, the Common

Features authorization was deemed sufficient to cover improvements to the left levee of the Sacramento River near the Pioneer Reservoir and in the Pocket/Freeport area.

USACE is developing two post-authorization change studies. The Common Features GRR is reevaluating the previous Common Features project and identifying levee improvements needed to provide the city of Sacramento and the Natomas area to the north with at least a 200-year (one in 200 AEP event) level of performance. The Common Features GRR Draft Environmental Assessment/Initial Study was released for public review and comment in February 2014. Construction associated with the report would begin approximately 1 year after adoption of the report by Congress. Much of this work was completed by SAFCA as an EIP and Section 408 action (see Section 1.5.3.1, Natomas Levee Improvements Program). The Natomas Post-Authorization Change Report documents the evaluation of features in the Natomas Basin portion of the Common Features project and was submitted to Congress in October 2010.

1.5.2.4 Sutter Basin Feasibility Study

SBFCA and the State of California are the non-Federal sponsors of a Feasibility Study for the Sutter Basin, which eventually may provide the Sutter Basin with a local objective of 100- to 200-year level of performance (depending upon location). The Sutter Basin is bounded roughly by the Feather River, Cherokee Canal, Sutter Buttes, and the Sutter Bypass and contains the cities of Biggs, Gridley, Live Oak, and Yuba City, as well as a significant amount of agricultural land. Past flood events and geotechnical analysis show that the levees surrounding the Sutter Basin (including the Feather River West Levee) have a higher probability of failure related to through-and under-seepage than levees designed to meet current standards. Additionally, the levees are at risk of overtopping from floods greater than they are designed to withstand.

The Sutter Basin Project is the subject of a Feasibility Study by USACE, Sacramento District, to determine Federal interest in implementing a flood risk management project. The Draft Feasibility Study Report and the EIS/EIR for the Feasibility Study were released June 14, 2013, evaluating structural and nonstructural flood risk management measures, including implementation of flood risk-reduction measures on existing levees; construction of new levees; and other storage, conveyance, and nonstructural options. The Final Report – Final EIR/Final Supplemental EIS was released in October 2013. Any ecosystem restoration measures associated with flood risk management measures likely would include restoration of floodplain function and habitat. Any recreation measures associated with flood risk management measures would include those outdoor recreation opportunities associated with sustainable water resource development.

1.5.3 State and Local Projects in the Region

Related state- and locally led efforts in the SRFCP are described below.

1.5.3.1 Natomas Levee Improvements Program

As part of its long-term program to improve the Natomas Basin levee system, SAFCA proposes to continue waterside and landside levee-strengthening efforts, including levee raises, seepage remediation, increased bank protection, levee stabilization, and flattening of landside levee slopes under the Natomas Levee Improvements Program (NLIP), an EIP and Section 408 action.

The ultimate goal of the NLIP is to provide the Natomas Basin, an urbanized area, with a 200-year level of flood protection as mandated by SB 5, by implementing flood risk-reduction measures along approximately 42 miles of levees surrounding the Natomas Basin. These levees include the Natomas Cross Canal South Levee, Sacramento River East Levee, American River North Levee, Natomas East Main Drainage Canal West Levee, and the Pleasant Grove Creek Canal West Levee. The NLIP is a four-phase construction program: Phase 1 occurred in 2008, Phase 2 in 2009 and 2010, Phase 3 in 2010 and 2011, and a majority of Phase 4a work was completed in 2011 with the remainder in 2012. Phases 1 through 4a focus on the Natomas Cross Canal South Levee and a large portion of the Sacramento River East Levee.

Portions of work under the Phase 3, 4a, and 4b along the Sacramento River East Levee, the American River North Levee, the Natomas East Main Drainage Canal West Levee, the Pleasant Grove Creek Canal West Levee, and water supply and drainage pump station improvements are still needed but have been deferred from SAFCA's EIP construction program. The USACE completed the *Post Authorization Change Report and Interim General Re-evaluation Report, American River Common Features Project, Natomas Basin, Sacramento and Sutter Counties, California* study and has an approved Chief's report that is under consideration for congressional authorization. After Federal authorization is secured, SAFCA will work with the state and USACE to continue implementation of the NLIP.

1.5.3.2 Feather River West Levee Project

SBFCA is implementing the Feather River West Levee Project (FRWLP) along the right bank of the Feather River as an EIP and Section 408 action. The study reach is approximately 41 miles, beginning at Thermalito Afterbay and extending downstream to about 4 miles north of the confluence with the Sutter Bypass. The project most immediately will reduce flood risk for Yuba City and the other communities in the study area and is targeted at addressing under-seepage, through-seepage, and slope instability. This project is presently under construction; an EIS/EIR was prepared with USACE as the Federal lead agency for NEPA based on USACE responsibilities under Section 408, Section 404, and Section 10. Similar to the relationship of the Southport project to the West Sacramento Project GRR, SBFCA's FRWLP is being coordinated with the ongoing Sutter Basin Feasibility Study (described previously). Construction began in 2013 and is expected over three construction seasons.

1.5.3.3 Bay Delta Conservation Plan

The Bay Delta Conservation Plan (BDCP) is a regional Habitat Conservation Plan (HCP) and Natural Communities Conservation Plan (NCCP) being prepared by a group of local water agencies, environmental and conservation organizations, state and Federal agencies, and other interest groups. The BDCP is being developed in compliance with the ESA and the California Natural Communities Conservation Planning Act (NCCPA). When complete, the BDCP will provide the basis for the issuance of endangered species permits for the operation of the state and Federal water projects relying on water supply from the Delta. The plan would be implemented over the next 50 years with the goal of restoring the Delta ecosystem and protecting water supplies. Restoration activities associated with BDCP may overlap those of the Southport project.

1.6 Community Outreach, Agency Coordination, and Issues of Known Controversy

1.6.1 Community Outreach

USACE and WSAFCA have established a proactive multimedia outreach program to broaden awareness of the Southport project and the associated environmental analysis. The approach to the outreach program has been to go beyond the guidelines and requirements of NEPA and CEQA for public noticing to ensure the affected community and other interested stakeholders are informed, engaged, and involved through an accessible, open, and transparent process. Thus far, the outreach program has included the following actions.

- Held three scoping meetings for the Southport project EIS/EIR.
- Conducted public meetings, open houses, and property owner meetings about the design phase.
- Held an introductory meeting about the real estate process.
- Published notices in local newspapers of major circulation.
- Published the Notice of Intent, Revised Notice of Intent, and Notice of Availability in the *Federal Register*.
- Filed a Notice of Preparation, Supplemental Notice of Preparation and Notice of Availability with the California Office of Planning and Research and the Yolo County Clerk/Recorder.
- Posted NEPA notices on the USACE website.
- Posted CEQA and NEPA notices, project information, and draft documents on the City/WSAFCA website.
- Published feature articles in the *City iLights* online newsletter and its predecessor *City Lights* newsletter.
- Presented and discussed the status of the project at WSAFCA Board meetings and project-specific public meetings.
- Sent direct mailing to residents within proximity of proposed construction activities.
- Placed phone calls to public agencies.
- Held small-group meetings with interested stakeholders.
- Posted notices in public places.
- Conducted presentations at local Rotary Club and Chamber of Commerce luncheons.
- Developed and distributed bill inserts about project status.
- Presented information at the Water Resources Association of Yolo County.

More detailed information concerning the scoping processes is available within the Scoping Report and Supplemental Scoping Report provided in Appendix A.

As the proposed project is further developed, the outreach program will continue in a broad sense through the methods listed above and will expand through more targeted specific outreach to residents and businesses who might be more directly affected by construction or operation of the proposed improvements.

To date, the outreach program has been met with strong participation and engagement from the public, agencies, and nongovernmental organizations. Comments received from the public have been considered to refine the project description and the environmental analysis.

The dominant subject of spoken comments, questions at the meetings, and written comments were concerns regarding private property acquisition. There was particular focus on private property acquisition to allow construction of a setback levee, based on a combination of perceptions that: flood risk is not evident; WSAFCA is pursuing setback levees only because the State of California may pay a higher share of the project costs; and private property should not be traded for the recreation and open space benefits of others.

In response to expressed public concerns, future outreach efforts would educate landowners regarding flood risk and levee deficiencies; inform landowners that all project alternatives require a footprint that goes beyond the existing levee—alternatives other than a setback levee also have features such as seepage berms or an adjacent levee that have the potential to result in loss of homes and need for property acquisition; and inform landowners that all proposed alternatives and alternative selection will be based on rational, objective, data- and science-driven processes defined by state and Federal regulations, administered under the highest standards of professional practice and driven by WSAFCA and the City's obligations to manage risks to health and safety.

1.6.2 Agency Consultation and Coordination

1.6.2.1 Coordination with Other Federal, State, and Local Agencies

The project has been planned in coordination and cooperation with numerous local, state, and Federal agencies. In Chapter 3, the regulatory setting for each respective resource describes the compliance with applicable Federal, state, regional, and local laws and regulations, including consultation to date with various agencies, supplemented by additional regulatory context in Chapter 5. A summary of those coordination efforts follows.

Resource Agency Coordination

Over the course of the project planning and environmental review for the project, WSAFCA and USACE have met with the U.S. Fish and Wildlife Service (USFWS), the National Marine Fisheries Service (NMFS), and the California Department of Fish and Wildlife (CDFW) during site visits and project meetings to discuss the project, including effects on listed species and mitigation plans. Formal consultation with USFWS and NMFS under Section 7 of the ESA has been initiated by USACE.

For the WSLIP, coordination began in 2008, consisting of informal agency meetings, site visits, telephone calls, and electronic mail to discuss potential project effects on habitat and potential avoidance and minimization measures. Specific to the Southport project, coordination began in 2011. Information has been exchanged to apprise each resource agency of the project status and progress, and to request feedback. USFWS issued a biological opinion (BO) on January 6, 2015, and the NMFS BO was issued on April 23, 2015.

Native American Consultation

In August 2011 and again in September 2012, ICF cultural resources staff contacted the NAHC to request a search of their Sacred Lands File. The NAHC staff responded on September 29, 2011, and again on October 9, 2012, with a list of Native American contacts for Yolo and Sacramento Counties and indicated that the results of the sacred lands database search were negative for the project area.

On October 6, 2011, October 15, 2012, and February 14, 2013, ICF staff sent letters to the Native American contacts on the lists provided by NAHC as well as Native American tribes listed by the Bureau of Indian Affairs. Letters were sent to 22 Native American representatives. The correspondence included a map depicting the project corridor, a brief description of the proposed project, and a request for the contacts to share any knowledge or concerns they may have regarding cultural resources in or adjacent to the study area. Four tribes, the Yocha Dehe Wintun Nation, the United Auburn Indian Community, the Buena Vista Rancheria, and the Wilton Rancheria, responded to letters with a request to consult on the proposed project. On August 6, 2013, an on-site meeting was held with the United Auburn Indian Community, the Wilton Rancheria, a USACE archaeologist, an ICF archaeologist, and a representative from the City of West Sacramento. On August 20, 2013, an on-site meeting was held with the Yocha Dehe Wintun Nation, a USACE archaeologist, an ICF archaeologist, and a representative from the City of West Sacramento. Consultation with these tribes is ongoing. To date, no other tribes have responded.

1.6.2.2 CEQA Responsible and Trustee Agencies

The Final EIR, certified by WSAFCA as CEQA-compliant on August 14, 2014, will be used by CEQA Responsible and Trustee Agencies to determine the effects of the proposed project. Responsible Agencies are those that have a legal responsibility to approve the project. These agencies are required to rely on the Lead Agency’s environmental document in acting on whatever aspect of the project requires their approval but must prepare and issue their own findings regarding the project (State CEQA Guidelines Section 15096). Trustee Agencies are those that have jurisdiction over certain resources held in trust for the people of California but do not have legal authority over approving or carrying out the project. Responsible and Trustee Agencies for the project are presented in Table 1-3.

Table 1-3. Responsible and Trustee Agencies

Agency	Jurisdiction
Trustee Agency	
California Department of Fish and Wildlife	Fish and wildlife
	Native plants designated as rare or endangered
	Game refuges
	Ecological reserves
California Department of Conservation	Williamson Act lands
California State Lands Commission	State-owned "sovereign" lands
Responsible Agency	
California Department of Fish and Wildlife	Fish and wildlife
U.S. Fish and Wildlife Service	Native plants designated as rare or endangered
National Marine Fisheries Service	Game refuges
U.S. Department of Agriculture	Ecological reserves
California State Lands Commission	State-owned "sovereign" lands
Office of Historic Preservation	Historic and cultural resources
Central Valley Flood Protection Board	Levee modifications
California Air Resources Board	Air quality
Regional Water Quality Control Board (#5)	Water quality and discharges to water bodies
California Department of Water Resources	State water and flood management interests
Yolo County/State Mining and Geology Board	Surface mining and reclamation activities associated with borrow
City of West Sacramento	Land use designations
Reclamation District #900	Levee operations and maintenance
Reclamation District #537	Levee operations and maintenance

1.6.2.3 Fish and Wildlife Coordination Act

A Coordination Act Report (CAR) was prepared by USFWS in coordination with CDFW and can be found in Appendix K. The CAR describes the existing environmental resources within the project area and the potential effects of the project on these resources. Recommendations developed by the USFWS contained in the CAR have been considered in formulation of the project alternatives. The discussion below more specifically demonstrates how each recommendation, opportunity, or problem identified in the CAR has been considered in plan formulation and mitigation development.

Recommendation: Minimize effects to shallow water habitat along the Sacramento River by planting native woody materials within rock slope protection areas. Work with the Service, NMFS, and CDFW to develop planting and monitoring plans; and DWR and WSAFCA to develop a variance to allow vegetation within the Corps' vegetation free zone to remain in place, especially in areas designed for rock slope protection.

> **Response**: Concur. SRA and associated riparian vegetation will be retained in place to the maximum extent possible. Where feasible, SRA will also be restored or enhanced as part of rock slope protection placement. In addition, instream woody material, biotechnical materials, and

revegetation of the erosion repair sites, levee breaches, and remnant levee will be integrated into the design. No variance will be needed to allow vegetation within the Corps' vegetation free zone, as the project's action alternatives do not include removal of any vegetation from existing levees solely for the purpose of compliance with Engineering Technical Letter (ETL) 1110-2-571.

Recommendation: Minimize impacts to wildlife species by reseeding all lands disturbed by construction activities that will not be used for another purpose with native grasses and forbs. Similarly, agricultural lands remaining out of production should be reseeded with native forbs and grasses. Reseeding should be conducted just prior to the rainy season to enhance germination and plant establishment.

Response: Concur. All disturbed areas, including borrow sites and seepage berms, will be reseeded with native forbs and grasses. Reseeding would occur at the end of each construction season, just prior to the rainy season, as recommended.

Recommendation: Compensate for the loss of 31.04 acres of riparian scrub/woodland by creating 62.08 acres of riparian scrub/woodland.

Recommendation: Compensate for the loss of 15.46 acres of upland woodland by creating 30.92 acres of upland woodland.

Recommendation: Compensate for the loss of 1.91 acres of emergent wetland by creating 3.82 acres of emergent wetland.

Recommendation: Compensate for the loss of 35.76 acres of shallow water habitat by creating 71.52 acres of shallow water habitat.

Recommendation: All compensation areas should be created within the newly expanded floodplain area. Plantings should be done at the optimal time for success, and a monitoring plan should be developed to track success of the plantings.

Response: Concur. The levee setback component of the project would result in the restoration of approximately 120 acres of historical Sacramento River floodplain with a diverse mosaic of seasonal floodplain, wetland, riparian, and upland habitat. Compensation for the loss of riparian woodland, protected upland woodland, emergent wetland and ponds is expected to be accomplished onsite and compensation success benchmarks applied, as discussed in this Final EIS and the MMP. Appropriate mitigation ratios will be determined by the controlling jurisdictional agency. Specific mitigation measures include the following:

Mitigation Measure VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat

For direct effects on woody riparian habitat that cannot be avoided, WSAFCA will compensate for the loss of riparian habitat to ensure no net loss of habitat functions and values. Compensation ratios will be based on site-specific information and determined through coordination with the appropriate state and Federal agencies during the permitting process. Compensation will be provided based on the ratio determined (e.g., 2:1=2 acres restored/created/enhanced or credits purchased for every 1 acre removed). Compensation may be a combination of onsite restoration, offsite restoration or mitigation credits. WSAFCA will develop a restoration and monitoring plan that describes how riparian habitat will be enhanced or recreated and monitored over a minimum period of time, as determined by the appropriate state and Federal agencies.

If WSAFCA identifies onsite areas that are outside the USACE vegetation-free zone and chooses to compensate onsite or in the project vicinity, a revegetation plan will be prepared. Mitigation site selection will avoid areas where future disturbance or maintenance is likely. The revegetation plan will be prepared by a qualified restoration ecologist and reviewed by the appropriate agencies prior to removal of existing riparian vegetation. The revegetation plan will specify the planting stock appropriate for each riparian land cover type and each mitigation site, ensuring the use of genetic stock from the project area. The plan will employ the most successful techniques available at the time of planting. Success criteria will be established as part of the plan and will include a minimum of 80% revegetation success at the end of 5 years and will attain 70% revegetation success after 3 years and 75% vegetative coverage after 5 years.

WSAFCA will monitor and maintain the plantings as necessary for 5 years, including weed removal, irrigation, and herbivory protection. WSAFCA will submit annual monitoring reports of survival to the regulatory agencies issuing permits related to habitat effects, including CDFW, USACE, NMFS, and USFWS. Replanting will be necessary if success criteria are not met and replacement plants will subsequently be monitored and maintained to meet the success criteria. The riparian habitat mitigation will be considered successful when the sapling trees established meet the success criteria, the habitat no longer requires active management, and vegetation is arranged in groups that, when mature, replicate the area, natural structure, and species composition of similar riparian habitats in the region.

Mitigation Measure VEG-MM-5: Compensate for the Loss of Waters of the United States

Compensation for the loss of waters of the United States will include restoring or enhancing open water habitat at a mitigation ratio that will be developed in coordination with regulatory agencies to ensure no net loss of habitat functions and values. Before receiving a Corps 404 permit for fill of existing open water habitat, WSAFCA will prepare a restoration plan to compensate for the loss of open water habitat and submit the plan to the appropriate regulatory agencies for review. In most, if not all, cases, open water habitat will be compensated out-of-kind by restoring the riparian habitat adjacent to open water habitat. Restoration of riparian habitat will improve open water habitat quality by increasing the amount of cover adjacent to the aquatic habitat for birds and terrestrial species, and the amount of shaded riverine area in the aquatic habitat for fish and other aquatic species.

The restoration plan will be prepared by a qualified restoration ecologist. The restoration plan will specify the planting stock appropriate for each riparian cover type and each mitigation site, ensuring the use of genetic stock from the project area. The plan will employ the most successful techniques available at the time of planting. Success criteria will be established as part of the plan. The restoration will be conducted on site or in the vicinity, but mitigation site selection will avoid areas where future maintenance would be likely.

If off-site mitigation is necessary, a location adjacent to open water will be selected. An area that currently supports minimal riparian habitat value would be desirable. WSAFCA will implement the restoration plan, maintain plantings for a minimum of at least 10 years (including weed removal, irrigation, and herbivory protection), and conduct annual monitoring for 4 years, followed by monitoring every 2 years for the next 6 years. As feasible, existing native wetland vegetation from the affected sites should be harvested and maintained for replanting after construction.

Mitigation Measure VEG-MM-6: Compensate for Loss of Protected Trees

WSAFCA will apply for a tree permit for the removal of any protected trees during construction. WSAFCA will replace trees that must be removed with trees at or near the location of the effect or another location within West Sacramento approved by the City's tree administrator. WSAFCA will also replace any replacement trees that die within 3 years of the initial planting.

Replacement trees are required at a ratio of 1:1 (i.e., 1-inch diameter of replacement plant for every 1-inch diameter of tree removed). Trees may also be mitigated through payment of an in-lieu fee, which will be used to purchase and plant trees elsewhere in West Sacramento. Mitigation will be subject to approval by the City's tree administrator and will take into account species affected, replacement species, location, health and vigor, habitat value, and other factors to determine fair compensation for tree loss.

Recommendation: Conduct pre-construction surveys for breeding migratory birds including the State listed Swainson's hawk and burrowing owl.

Response: Concur. Pre-construction surveys for breeding migratory birds, including the State-listed Swainson's hawk and burrowing owl will be conducted.

Recommendation: For all compensation areas, develop an operations and maintenance plan that is coordinated with the Service and all other resource agencies.

Response: Concur. The operations and maintenance plan for compensation areas will be coordinated with appropriate resource agencies.

Recommendation: Comply with local tree ordinance requirements for any landmark or heritage trees that are impacted by the project.

Response: Concur. Project impacts to landmark and heritage trees will be mitigated consistent with local tree ordinance requirements.

Recommendation: Consult with the CDFW regarding impacts to State-listed species.

Response: Concur. Coordination with CDFW will continue and consultation will be completed for state-listed species, as appropriate.

1.6.3 Issues of Known or Expected Controversy

NEPA requires that project proponents identify issues of known controversy that have been raised in the scoping process and throughout the development of the project. Potentially controversial issues that were discovered during public scoping and that may arise in the development and execution of the project are discussed below.

1.6.3.1 Property Acquisition

A specific issue of concern involves potential conflicts with private property that is within or near the construction area. In some cases, permanent property acquisition may be needed for project construction, operation, and maintenance; and temporary construction easements may be needed for construction staging and equipment access. Temporary restrictions on access to private property may also be necessary. These effects are described in Chapter 3, Section 3.11, Land Use and Agriculture.

1.6.3.2 Construction-Related Effects

As the levee system in the project area is close to residential areas and other developed land uses, actions proposed by the project are likely to result in construction-related effects. These effects include those under the topics of public safety, noise, traffic, and air quality and are specifically described in Chapter 3. A specific discussion about effects on residents is contained in Section 3.12, Environmental Justice, Socioeconomic, and Community Effects.

1.6.3.3 Levee Encroachments and Vegetation

The Southport project alternatives are likely to include removal, relocation, or replacement of features in, on, or under the levee or adjacent O&M corridors such as structures, pipelines, walls, stairs, utilities, and other elements such as vegetation.

USACE published technical guidance and reinforcement of policies restricting woody vegetation on Federal project levees. Implementation of such guidance has stirred controversy in the Sacramento region as cursory assessments have shown that much vegetation may require removal, resulting in effects on fish and wildlife habitat, including habitat for endangered and threatened species, and social values like recreation and aesthetics. This issue is described further in this chapter under Sections 1.3.1, Project Purpose, and 1.4.1.5, Encroachments and Non-compliant Vegetation; in Chapter 2; and under the effects discussions for vegetation, fish, wildlife, visual resources, and recreation in Chapter 3. Other encroachments are addressed in the land use, utilities, and housing sections of Chapter 3.

1.6.3.4 Growth Inducement

West Sacramento has experienced extensive growth over the last decade. This growth has been generally consistent with the *City of West Sacramento General Plan* but has slowed considerably as a result of current economic conditions. Although not specifically a key topic of concern identified during the project scoping period, the Southport project's potential to induce growth, or remove a potential barrier to growth, is discussed at length in Chapter 4, "Cumulative and Growth-Inducing Impacts."

Chapter 2
Alternatives

2.1 Introduction

As introduced in Chapter 1, "Introduction," WSAFCA is proposing the Southport project to implement flood risk–reduction measures along the Sacramento River South Levee in the city of West Sacramento, Yolo County, California. As part of WSAFCA's overall flood risk management strategy, the project is targeted at providing a 200-year level of performance consistent with the state goal for urbanized areas, as well as providing opportunities for ecosystem restoration and public recreation. Typical levee deficiencies to be addressed by the proposed flood risk–reduction measures are discussed in Chapter 1, Section 1.4.1, Overview of Levee Failure Mechanisms and Deficiencies, and represented in Plate 2-1a, Levee Seepage, and Plate 2-1b, Other Typical Levee Deficiencies.

The construction footprint extends along the right bank of the Sacramento River, bounded on the north by the USACE SRBPP site (south of the Barge Canal) and continuing downstream approximately 5.6 miles to the South Cross Levee, adjacent to the Southport community of West Sacramento. The Southport project area comprises 3.6 square miles and encompasses the area along the river corridor and potential soil borrow sites in the study area (Plate 1-5).

This chapter contains the following elements.

- General information about alternatives, including the screening process.
- General information about flood risk–reduction measures that may address identified levee deficiencies in the Sacramento River South Levee.
- Descriptions of the five action alternatives for implementation of the Southport project, including the applicant-preferred alternative (APA), Alternative 5.
- Description of the No Action Alternative.
- Environmental commitments (ECs) incorporated into all action alternatives.

2.2 General Information about Alternatives

2.2.1 Approach to Alternatives

NEPA and CEQA require that an EIS and EIR, respectively, consider a reasonable range of alternatives that would attain most of the basic project objectives while avoiding or substantially lessening the significant environmental effects of a proposed project. Analysis of a range of reasonable alternatives sharply defines the issues and allows comparison among the options.

Consistent with NEPA standards, the five Southport project action alternatives contained in this document are analyzed at an equal level of detail (40 CFR 1502.14). As required under NEPA and CEQA, a no action or no project alternative also has been included; consistent with NEPA terminology, it will be referred to in this EIS as the *No Action Alternative*.

2.2.2 Alternatives Screening Process

2.2.2.1 Southport Project Alternatives Screening Criteria

For each deficiency noted in Chapter 1, a number of measures and alternatives may be used to reduce flood risk. To develop a reasonable range of alternatives for consideration in the Southport EIS, WSAFCA and USACE applied seven criteria to evaluate the flood risk-reduction measures and possible alternatives and eliminate those that would not adequately meet the criteria. These criteria were refined from the program-level screening criteria established for the WSLIP and include those applied to select the I Street Bridge EIP completed in 2008 and the CHP Academy and The Rivers EIPs completed in 2011. The criteria were prioritized in a two-tier structure. The first tier is essentially a *pass/fail* decision, with a *fail* rating eliminating an alternative from further consideration. The second tier may be rated on a variable scale of degree (i.e., a relative ranking like *high/medium/low*) rather than *pass/fail*. Public feedback through the environmental process is considered for all criteria.

An alternatives analysis per the guidelines of 404(b)(1) for a CWA Section 404 Individual Permit would be conducted separately.

The seven criteria used for the alternatives screening process are listed below.

Tier 1

- **Ability to meet the project purpose and objectives to reduce risk (pass/fail).** The objective of the project is to address deficiencies of through- and under-seepage, erosion, levee geometry, and slope stability. Alternatives that provide the greatest reduction in subsurface water pressure (measured as the exit gradient of water moving through the soil), decrease the threat from erosion, and improve slope stability and geometry relative to current levee standards are the most favored. Evidence of seepage has been observed at these sites during high-water events, and the waterside slope is characterized by overly steepened and highly erodible banks. Alternatives that do not substantially and comprehensively reduce these risks would be eliminated from further consideration.

  As presented in Chapter 1, the project objectives are to:

  - Reduce flood risk toward a state-mandated target of 200-year protection from Sacramento River flows for the Southport reach from the SRBPP to the South Cross Levee (southern city limit), in compliance with state mandates for 200-year protection for urbanized areas.
  - Address known deficiencies along the Southport reach as observed during high-flow events in the Sacramento River, including waterside erosion, geometry, through-seepage, and under-seepage (also discussed in Chapter 1, Section 1.2, Setting and Study Area).
  - Provide ecosystem and habitat restoration, as well as preserving and enhancing riparian and other native habitats, where compatible with construction, operation, and maintenance of flood risk–reduction infrastructure, and consistent with the Parks Master Plan and Bicycle and Pedestrian Master Plan.
  - Provide improved or new public outdoor recreation and open space opportunities, where compatible with construction, operation, and maintenance of flood risk–reduction infrastructure, and consistent with the Parks Master Plan and the Bicycle and Pedestrian Master Plan.

- Construct a project as soon as possible to reduce flood risk as quickly as possible.
- Construct a project that is politically, socially, economically, and environmentally acceptable.
- Facilitate compatibility with the CVFPP and West Sacramento GRR such that proposed activities would be "no regrets" and not inconsistent with any future plans.

- **Consistency with CVFPP and GRR (pass/fail)**. An alternative must represent a "no regrets" project that is not inconsistent with and would not preclude broader flood management plans currently under development through the CVFPP and West Sacramento GRR.
- **Avoidance of hydraulic effects (pass/fail)**. Hydrology and hydraulic modeling has demonstrated that the urbanized reach of the Sacramento River through West Sacramento and Sacramento is highly sensitive to changes in channel capacity based on the dynamics of the Sacramento River with the American River and Sacramento Bypass and Yolo Bypass system. Increases in channel capacity (associated with setback levee alternatives) beyond a certain threshold may have a significantly measurable negative effect of raising water surface elevations, which is unacceptable and would fail as an alternative.

Tier 2

- **Facilitation of multi-use objectives (high/medium/low)**. Federal, state, and local policies promote goals of integrating multiple objectives to leverage funding, integrate and coordinate projects, and achieve economies of scale. The community benefits from the coordination of flood risk management activities with other planned projects as it would enable WSAFCA and the City to realize other goals in concert with flood risk management goals and provide potential economies of scale, while minimizing disruption. Alternatives that facilitate realization of other objectives in the project area are favored. While the project is focused on flood management, alternatives should provide opportunities for recreation and ecosystem restoration. Alternatives would be evaluated for completeness in terms of multi-use opportunities.
- **Land Use compatibility (high/medium/low).** The current and planned future land use of the areas on or adjacent to the proposed flood risk–reduction measure implementation should be taken into consideration. While it is recognized that alternatives may affect current land uses or planned land use designations, displacement of existing structures should be balanced with cost considerations. If known projects exist or have been approved by the City along the affected levee reach, alternatives should be evaluated with consideration of the degree to which they disrupt or interfere with such land uses.
- **Avoidance, minimization, and mitigation of environmental effects (high/medium/low).** This is a standard, yet important, criterion to ensure that an alternative does not have onerous environmental effects relative to other alternatives. Locations along the river support habitat critical to threatened or endangered species. In addition, the river corridor has a rich history of human use and contains cultural resources significant to that history. The environmental review and permitting process for effects on these types of resources can be lengthy and delay construction of flood risk–reduction measures. Therefore, alternatives that avoid effects on these resources are preferable. Where complete avoidance of effects is not possible, the project is intended to be self-mitigating through inclusion of environmentally beneficial components (such as habitat features) that offset remaining adverse project effects.

- **Cost (high/medium/low).** Alternatives are evaluated relative to one another for construction, operations, and maintenance costs and compared with the means of applicable Federal, state, and local funding and crediting programs.

2.2.2.2 Measures and Alternatives Not Carried Forward

Several measures and alternatives for the Southport project were considered but not carried forward based on the screening criteria presented above. These alternatives are described briefly below.

Reoperation of Upstream Reservoirs, Weirs, and Bypasses

Upstream reservoirs currently are operated to meet a number of different objectives, including water supply, flood management, power production, water quality, and fish. Similarly, the weir and bypass system that is part of the SRFCP to reduce peak flows from the primary river channels is governed by complex operating criteria. Table 2-1 summarizes the analysis of reoperation of upstream reservoirs and bypasses relative to the screening criteria.

Table 2-1. Reoperation of Upstream Reservoirs, Weirs, and Bypasses Screening Summary

Criterion	Comment
Meet the project purpose and objectives to reduce risk	Fail; reoperation of upstream reservoirs, weirs, and bypasses would not address geotechnical deficiencies in the Southport levee and known performance problems for seepage and erosion; may need further evaluation to determine ability to meet the project objective to reduce flood risk for the entire planning area; risk not reduced in the near term due to need for extensive interagency and stakeholder coordination.
Consistency with CVFPP/GRR	Uncertain; reoperation may be consistent with the CVFPP but likely would not address the needs of the West Sacramento GRR.
Avoidance of hydraulic effects	Uncertain; reoperation of upstream reservoirs and bypasses may need further evaluation to determine avoidance of hydraulic effects within and outside the planning area.
Facilitation of multi-use objectives	Uncertain; reoperation of upstream reservoirs and bypasses could affect boating and fishing by changing water levels and flows in those facilities and the river channel as well as affecting shoreline habitat; in addition, agriculture in bypasses could be affected as well as shoreline recreation facilities in bypasses and at reservoirs.
Land use compatibility	Uncertain; reoperation of upstream reservoirs and bypasses may affect uses within the bypass and reservoir footprints.
Avoidance, minimization, and mitigation of environmental effects	Uncertain; facility modifications necessary for reoperation could have considerable environmental effect, as well as the changed hydrology from operations.
Cost	Uncertain; reoperation of upstream reservoirs and bypasses has unknown costs in terms of modifications to these facilities to accommodate different operating regimes.

This alternative was not carried forward for the Southport project because it failed to meet the Tier 1 criteria of fulfilling the project purpose and objectives of addressing deficiencies of through- and under-seepage, erosion, levee geometry, and slope stability and had many uncertain ratings. The elevation and operational criteria for the Fremont Weir, Tisdale Weir, Sacramento Weir, and others determine the flow split between the mainstems of the rivers and flows directed into the bypasses of the SRFCP. While reoperation of certain weirs may reduce water surface elevation in the Sacramento River and, therefore, reduce WSAFCA's planning area's flood risk from northeast and east, flow would be increased in the Yolo Bypass and Sacramento Bypass, increasing the risk of failure from the northwest and west from the bypasses. The unintended and negative consequences may extend beyond WSAFCA's planning area and may transfer risk to other populations.

Reoperation of reservoirs and bypasses to optimize attenuation of floodflows potentially could reduce WSAFCA's planning area's flood risk but may compromise the ability to meet other mandated management objectives. Moreover, this action essentially would reoperate the system on a broad scale, which is not in WSAFCA's authority. Given that many agencies and other stakeholders would need to be involved, it is unlikely that an agreement with respect to reoperation would be reached in the near term, if possible at all, to achieve any meaningful benefit to WSAFCA. Based on the screening criteria, this alternative has many uncertain ratings and a fail rating in a critical category; therefore, it has not been carried forward as part of the Southport project.

Development of Additional Upstream Storage

Similar to reoperation of upstream reservoirs, development of increased capacity for floodwater storage within the SRFCP upstream of WSAFCA's planning area (such as through new reservoirs, enlarged bypasses, and setback levees) presents a possibility for reducing flood risk to West Sacramento. Table 2-2 summarizes the analysis of developing additional upstream storage relative to the screening criteria.

Table 2-2. Development of Additional Upstream Storage Screening Summary

Criterion	Comment
Meet the project purpose and objectives to reduce risk	Fail; development of additional upstream storage would not address geotechnical deficiencies in the Southport levee and known performance problems for seepage and erosion; may need further evaluation to determine ability to meet the project objective to reduce flood risk for the entire planning area.
Consistency with CVFPP/GRR	Uncertain; development of additional upstream storage may be consistent or not incompatible with the CVFPP and West Sacramento GRR.
Avoidance of hydraulic effects	Uncertain; development of additional upstream storage may need further evaluation to determine avoidance of hydraulic effects within and outside the planning area.
Facilitation of multi-use objectives	Uncertain; development of additional upstream storage could affect boating and fishing by changing water levels and flows in those facilities and the river channel as well as affecting shoreline habitat; in addition, agriculture in bypasses could be affected as well as shoreline recreation facilities in bypasses and at reservoirs.
Land use compatibility	Low to medium favorability; development of additional upstream storage may affect land uses if reservoirs and bypasses would need to be increased in footprint to allow additional capacity, which would require land acquisition and land use change.
Avoidance, minimization, and mitigation of environmental effects	Low favorability; development of additional upstream storage may have substantial environmental effects if reservoirs and bypasses would need to be increased in footprint to allow additional capacity.
Cost	Low favorability; development of additional storage has unknown costs in terms of modifications to these facilities.

As with reoperation of upstream reservoirs and bypasses, WSAFCA does not own or control upstream properties for developing additional storage. Based on the screening criteria, this alternative has many uncertain ratings and a fail rating in a critical category; therefore, it has not been carried forward as part of the Southport project.

Raising Building Pads

This alternative involves raising building pads to an elevation above the floodplain. Table 2-3 summarizes the analysis of raising building pads relative to the screening criteria.

Table 2-3. Raising Building Pads Screening Summary

Criterion	Comment
Meet the project purpose and objectives to reduce risk	Fail; raising building pads would not meet the objective to reduce flood risk for the entire planning area because approximately 14,000 existing structures would need to be modified, which is not feasible, and because the surrounding lands, assets, and infrastructure would remain at risk.
Consistency with CVFPP/GRR	Pass; this alternative would not be incompatible with the CVFPP or GRR.
Avoidance of hydraulic effects	Pass; raising building pads likely would not induce hydraulic effects within or outside the planning area.
Facilitation of multi-use objectives	Medium favorability; raising building pads would not preclude multi-use objectives.
Land use compatibility	Low favorability; raising building pads would consume land for embankments around pads.
Avoidance, minimization, and mitigation of environmental effects	Low favorability; raising building pads may have substantial environmental effects on mineral resources, transportation, air quality, noise, and other resources through extensive construction activities to implement.
Cost	Low favorability; costs to raise 14,000 building pads could range from a few thousand dollars to several hundreds of thousands of dollars each. Costs would be increased by the complicated logistics of raising privately owned facilities.

While it may be technically possible for existing development to be retrofitted to be flood-proofed or to raise all existing structures above the 200-year flood level and for new development to be designed and built to this standard, implementation would require prohibitive cost, substantial time, and reevaluation of environmental effects and local permitting, review, and approval processes. This alternative would not substantially meet the project objectives in that it would not reduce flood risk in an expedited fashion for the entire population of the planning area because construction activities likely would be staged over tens of years, leaving parts of the population at greater risk than others. Furthermore, it would not provide flood risk management for all property because farmland, streets, parking lots, utilities, and other infrastructure would not be raised above the 100-year or 200-year flood level. Further complicating this alternative is that potential flood depths in the some parts of the affected area are too great to feasibly enable the raising of building pads or structural retrofits. Based on the screening criteria, this alternative has not been carried forward as part of the Southport project.

River Dredging

This measure, which likely would be a component of an alternative rather than a complete alternative in itself, would entail removal of river bottom material through dredging to increase channel capacity. Dredging would be conducted from a barge by clamshell or suction cutterhead, and the deposits would be placed outside the river channel on floodplain areas or landward of the levee. Dredging likely would entail ongoing maintenance dredging to restore channel capacity because siltation over time would replace the material removed. Table 2-4 summarizes the analysis of river dredging.

Table 2-4. River Dredging Screening Summary

Criterion	Comment
Meet the project purpose and objectives to reduce risk	Fail; river dredging may result in localized increases in channel capacity but would not reduce water surface elevation sufficiently to reduce risk from seepage from the Sacramento River.
Consistency with CVFPP/GRR	Pass; dredging would not be incompatible with CVFPP or GRR.
Avoidance of hydraulic effects	Uncertain; river dredging has the potential to significantly change river hydraulics, especially upstream and downstream effects.
Facilitation of multi-use objectives	Medium favorability; dredging would neither create nor preclude opportunities for recreation or habitat.
Land use compatibility	Medium to high favorability; river dredging would have no effect on land use except for dredge disposal areas, which could be designed to be compatible with land use.
Avoidance, minimization, and mitigation of environmental effects	Low favorability; dredging may be constrained considerably by fish and wildlife habitat and water quality restrictions in the aquatic environment of the dredging activity as well as the terrestrial environment of the dredge disposal sites.
Cost	Low favorability; river dredging would not by itself address any of the deficiencies relative to state and Federal levee criteria and therefore would not be cost-effective because other measures would need to be employed.

Because river dredging by itself does not directly or substantially contribute toward addressing any of the deficiencies in the project area, it has not been carried forward as part of the Southport project.

2.2.3 Action Alternatives Overview

2.2.3.1 Overview of Measures Carried Forward in Alternatives Development

For each deficiency in the project area (described in Chapter 1, Section 1.4.1), a number of flood risk–reduction measures, or a combination of measures, can be used to attain the level of flood risk management desired. In some cases, more than one type of measure can address a particular deficiency. For example, several different measures can alleviate seepage. Conversely, one measure may resolve more than one problem (e.g., a setback levee may solve the problems of under-seepage, stability, and erosion). In this case, the measures are grouped by the primary deficiencies they address, as noted below.

- Seepage control (for through- and under-seepage)
- Slope stability/geometry
- Erosion control
- Other (for measures that are unique or do not follow grouping conventions by deficiency)

Table 2-5 outlines the five deficiencies identified in the Sacramento River South Levee and the potential measures that could be applied to resolve each deficiency. The detailed measure descriptions are in Section 2.2.9.

Table 2-5. Levee Measures and Deficiencies Summary

		Deficiency				
Group	**Measure**	**Through-Seepage**	**Under-Seepage**	**Slope Stability and Geometry**	**Erosion**	**Encroachments**
Seepage Control	Seepage berm		✓			
	Slurry cutoff wall	✓	✓			
	Relief wells		✓			
Slope Stability/ Geometry	Slope-flattening	✓		✓		
	Adjacent levee	✓		✓	✓*	✓
Erosion Control	Rock slope protection			✓	✓	
Other	Setback levee	✓		✓	✓*	✓
	Vegetation removal					✓

* Adequacy of this measure for correcting an erosion deficiency is dependent on physical and environmental site conditions.

2.2.3.2 Overview of Alternatives Carried Forward

The measures summarized above have been combined into five complete action alternatives analyzed in this EIS.

- Alternative 1: Adjacent Levee
- Alternative 2: Setback Levee
- Alternative 3: Slope Flattening
- Alternative 4: Reduced Length Setback Levee
- Alternative 5: Setback Levee with Slope Flattening (APA)

The reach of the Southport project stretches from the termination of the SRBPP at River Mile 57.2R south to the South Cross Levee, as shown in Plate 1-5. Within the project area, seven segments have been defined, lettered A through G from south to north. The segments range from Segment A at the South Cross Levee to Segment G near the SRBPP. These seven segments, described in Section 1.2, roughly define areas of differing existing subsurface conditions, land cover types, and deficiencies that constrain or influence the field of available flood risk–reduction measures that may be employed in that segment. Thus, each alternative comprises a combination of measures that may differ by segment; in technical reports prepared in support of the Southport project, these alternatives are often referred to as combined measure alternatives, or CMAs.

Each action alternative is described in a separate section below (Sections 2.2.4 through 2.2.8), focusing on the differences among alternatives. Section 2.2.3.3, Common Elements and Assumptions, describes the elements and assumptions that are common and compulsory for all action alternatives, and Section 2.2.9, Detailed Measure Descriptions, provides the construction and O&M details for each of the measures that make up the alternatives. Finally, Section 2.4, Environmental Commitments, provides ECs that would be incorporated with each action alternative. These sections in combination constitute a complete detailed description of the action alternatives.

Applicant Preferred Alternative

Alternative 5 is considered the APA because it represents WSAFCA's preferred combination and configuration of measures that meet the project objectives. Some of the key factors include addressing the documented levee deficiencies with high confidence in technical feasibility, minimizing environmental effects, optimizing restoration opportunities, and providing cost-effective value. Another factor in favor of Alternative 5 is that Bees Lakes would remain hydraulically isolated from the river channel (i.e., not opened to surface water flow) as it would be under Alternative 2. Opening Bees Lakes to flow raises issues associated with effects on existing biological resources, complications with access to the existing marinas, increased potential for fish stranding when high waters recede from the floodplain, and addressing water quality issues in the Bees Lakes surface waters.

Environmentally Superior Alternative

Identified per CEQA Guidelines Section 15126.6(e)(2), Alternative 5 is also considered the environmentally superior alternative because it minimizes effects on potentially jurisdictional waters and balances emissions, real estate acquisition and land use change, environmental benefits, habitat effects, and construction-related disturbances. While it may not have the fewest environmental effects across every resource category, it is the least impactful as a composite across all resource categories.

2.2.3.3 Common Elements and Assumptions

Several common elements and assumptions are encompassed within each action alternative and are described below.

Flood Risk–Reduction Measure Footprint

The levee flood risk–reduction measure footprint comprises the following elements: a waterside O&M easement (where available), the levee from toe to toe, a seepage berm (if included as a measure), and the landside O&M and utility easement. The waterside O&M easement is assumed to be 20 feet wide, and the landside O&M easement is assumed to be 50 feet wide. The utility corridor is included largely within the landside O&M area, or within the new roadway alignment included in Alternatives 2, 4, and 5. In Segment G, the landside O&M easement was assumed to vary between the proposed flood risk–reduction measure toe and the existing residential lot lines, a distance varying from approximately a few feet to 100 feet. Vehicle access to the O&M easements would be restricted to use by RD 900 and DWR for inspection, maintenance and flood fighting purposes. The O&M

roadways would be gated to prevent public vehicular access and signs installed indicating that public vehicular use is prohibited.

Common Flood Risk–Reduction Measures

Each alternative reflects an alignment that includes a slope stability and geometry measure, an erosion control measure, and a seepage control measure. A slurry cutoff wall or seepage berm is proposed to address seepage control deficiencies along the extent of the project area. For the purpose of conservatively determining environmental effects of the action alternatives within this document, a 300-foot-wide seepage berm was assumed. However, it is expected this width may be reduced considerably as project design efforts continue and more data is gathered. The seepage berm is assumed to range from 5 feet thick at the levee toe to 3 feet thick near the seepage berm toe. Where a tie-in layer was located, a cutoff wall at the associated depth was assumed. Used in conjunction with slope flattening and adjacent levees, rock slope protection on the waterside is proposed to address the risk of erosion. Rock slope protection may also be used to repair erosion sites where no slope flattening or adjacent levee is proposed, as described under Section 2.2.9.6, Rock Slope Protection. Relief wells may be used in combination with slurry cutoff walls and seepage berms and installed in select locations where berms cannot be wide enough or slurry cutoff walls deep enough to meet the required design standards for seepage control remediation.

Land Acquisition, Structure and Utility Removal or Relocation, and Road Construction

Each alternative would require varying amounts of land acquisition to accommodate the expanded footprint of the new flood risk–reduction measures. The land within the expanded flood risk–reduction footprints, which includes the proposed flood risk–reduction measure and the waterside and landside O&M easements, would be acquired to prevent structural encroachments into the flood risk–reduction area as required by USACE and the CVFPB. Land acquisition also would be required for a new road and right-of-way alignment proposed for the setback levee alternatives, Alternatives 2, 4, and 5. Acquisition of an entire affected parcel was assumed if the real estate needs cover 60% or more of the original parcel size.

Structures, including residences that fall within the flood risk–reduction measure footprints, were assumed to require removal, either through demolition or relocation outside of the footprint. Existing facilities located within the flood risk–reduction measure footprints may require removal and nearby replacement, abandonment, or relocation. Each alternative would require demolition of RD 900's inactive irrigation pump station located in the project area on the landside of the levee just south of the intersection of Linden Road and South River Road. The alternatives would also require removal and relocation of the following facilities: a cell tower near Linden Road, an overhead power line and telecommunication lines located along the landside toe of the existing levee, and underground telecommunication lines within the levee prism. Affected sections of South River, Linden, and Davis Roads are assumed to be reconstructed to varying degrees for each alternative. Alternatives 2, 4, and 5 propose roadway relocation.

Land acquisitions, structure and utility relocations, and road construction associated with each alternative are described in more detail under the alternative descriptions below and in relevant resource sections in Section 3, Affected Environment and Environmental Consequences.

Common Construction Details

Overhead Power Line Relocation

The project would also involve the removal and replacement of existing wood distribution and power poles and related equipment. The Pacific Gas and Electric Company (PG&E) would remove existing electrical transmission and distribution poles located within risk-reduction measure footprints to accommodate the project alternatives. New facilities would be constructed within the designated utility corridors, as shown in Exhibit 1 of Appendix G, in advance of other construction activities to minimize utility outages. Electrical transmission and distribution pole removal would be conducted by a line crew, typically accessing each pole site with a line truck and trailer or a boom truck. In those instances when the pole is located on the levee crown, a crane may be used. Planned vegetation removal throughout the utility and O&M corridors would accommodate pole installation activities.

PG&E work areas are approximately 125 feet by 125 feet and typically located in close proximity to installation activity locations. On average, PG&E would require up to 10 work areas per project phase, which would be located within the flood risk–reduction measure footprint, access roads, and identified staging areas. Removal of vegetation to utilize access roads by PG&E equipment may be required.

Structure and Road Demolition and Vegetation Removal

Under all five action alternatives, structure and road demolition and vegetation removal would be performed as part of construction. Structure and road demolition activities would consist of removing standing structures within the flood risk–reduction measure footprints and removing sections of two-lane asphalt rural road in the project area. Construction activities would consist of removing and demolishing the facilities with the use of a bulldozer and excavator with a percussion hammer attachment for breaking up concrete foundations as needed. The contractor would load the rubble into waste containers using a front-end loader and then haul the waste to a permitted disposal site within 10 miles of the project area.

Vegetation clearing activities would consist of removing larger woody vegetation, such as trees and shrubs. Grubbing activities consist of removing roots, and stripping activities consist of excavating approximately 6 inches of organic material from the levee surface. Structure and road demolition and vegetation removal associated with each alternative are described in more detail below under the alternative discussions and in relevant resource sections.

Material Importation and Disposal

Materials imported to the project site would vary by alternative, but would likely include water, bentonite, cement, lime (dry quicklime, dry hydrated lime, or lime slurry), incidental construction support materials, aggregate base rock, asphalt, concrete, hydroseed, riprap, willow plantings, container plants, coir fabric, and embankment fill soil material for the new levee surfaces. Instream woody material (IWM) may also be imported to the project site. Debris from structure, road, and vegetation removal and embankment fill material of poor quality would be hauled off site to a permitted disposal site within 20 miles of the project site.

Sources of Borrow Material

Each alternative would require the use of large quantities of fill soil, or *borrow*. To meet borrow demands, each alternative would need to acquire borrow from multiple sources, including:

- Embankment fill material excavated from the existing levee structure as part of construction.
- Material excavated from borrow sites located on open land within the city or within close proximity to the city limits.
- Dredged material previously removed from the deep water ship channel (presently stockpiled on high-terrace, upland benches adjacent to the west of the channel [Plate 1-5]).
- Material purchased from permitted commercial borrow locations within 20 miles of the project site.

Embankment fill material excavated as part of construction would be evaluated for reuse, and that deemed suitable would be used as part of construction of the new levees and berms. Embankment fill material available for construction of the setback alternatives (Alternatives 2, 4, and 5) would include materials salvaged as a result of the proposed partial degrading of the existing levee.

Ongoing borrow analysis also has identified potential borrow sites near the project site from which suitable borrow may be excavated (Plate 1-5) (Blackburn Consulting 2011). These potential borrow sites range in location from immediately adjacent to the levee construction to approximately a 7-mile round-trip haul distance from the area of construction. If local borrow sites are used, existing top soil would be scraped and set aside and borrow material excavated from the site. Excavation depths would vary, depending on landowner agreement; however, wherever feasible, depths of excavation would not encroach upon the water table. Following the completion of each construction season, borrow sites would be hydroseeded with native grasses to reduce erosion during the winter months and to encourage their continued use as upland habitat. Finally, following the completion of material extraction, Southport-area borrow sites would be graded to a depth of no greater than 3 feet and returned to preproject drainage and irrigation conditions.

To maximize the use of local borrow sites, high plasticity clay may be used as deeply buried setback levee core fill material. To increase the workability and load-bearing characteristics of high plasticity clay, lime treatment may be performed prior to borrow material excavation using high calcium quicklime (hydrated lime, commercial lime slurry, or dry quicklime). To treat borrow material with lime, the contractor would scarify the area to be treated, spreading the lime at a uniform rate. The lime would be mixed into the soil with a rotary pulverizing mixer, adding water during mixing. The initial mixture cures for 16 to 48 hours, then would be remixed using the same equipment. Upon completion of the remixing, the treated material would be excavated and transported to the fill site for placement and compaction.

Where feasible, excess embankment fill material deemed unsuitable for reuse could be placed in the borrow site pits and compacted, and the top soil replaced, returning the site to its original elevation. The borrow sites then would be reseeded and returned to pre-use vegetated conditions.

Also under evaluation for suitability as borrow is material previously dredged from the DWSC as part of routine maintenance that is presently stockpiled along the western bank of the DWSC and located on the city's western border with unincorporated Yolo County. This possible borrow source, referred to as "dredge material," is located on a high-terrace, upland bench adjacent to the channel, placed during previous dredge events unrelated to this project. If suitable, dredge material would be loaded onto trucks and transported to the project site, an approximately 12-mile round trip. Dredge material use would not require any post-extraction borrow site activity.

Lastly, borrow also could be purchased and hauled on site from a permitted commercial borrow location within 20 miles of the project site.

Construction Implementation

Construction Schedule

For the purpose of environmental analysis, project construction is assumed to occur over 2 years, with construction of Segments C, D, E, F, and G preceding construction of Segments A and B. Construction of the first segments would take place during the first construction season (Year 1). Construction of the segments A and B would take place during the second construction season (Year 2).

Under each alternative, flood risk–reduction measure construction activities would primarily occur during the typical construction season, April 15 to October 31, although extension of the CVFPB encroachment permit may be sought if weather conditions permit. All construction activities, including, but not limited to, structure and vegetation removal, roadway removal and replacement, revegetation activities, and utility removal and replacement, that may occur outside the primary construction season would be subject to the conditions of environmental and encroachment permits and authorizations to be issued by CDFW, Regional Water Board, CVFPB, USACE, USFWS, NMFS and others.

The construction contract would allow the contractor to construct on a 10-hour-per-day/6-days-per-week work schedule for most construction activities. However, where necessary, slurry cutoff wall construction could occur on a 24-hour-per-day/7-days-per-week work schedule in order to condense the amount of days required for construction. Nighttime slurry cutoff wall construction would be completed as described in Section 2.2.9, Detailed Measure Descriptions.

Temporary Facilities and Access Provisions

To facilitate project construction, earthen ramps would be constructed to ease equipment access between the levee crown and the staging area(s). The earthen ramps would be removed when construction is complete.

Winterization Procedures

All project construction would be performed in accordance with the seasonal requirements of WSAFCA's CVFPB encroachment permit. At the end of each primary construction season, the levee would be restored, at a minimum, to the level of performance existing at the project outset. During construction Year 1, "tie-ins" would be built connecting the existing levee up- and downstream to the segments constructed that season. These tie-ins would be achieved by benching the existing levee and installing compacted lifts to competently bond the new and existing levee materials. During the flood season, maintenance of the baseline level of flood risk management would be undertaken by the maintaining agency, RD 900. Maintenance activities would be conducted as described in Postconstruction Operation and Maintenance, below, and would include inspections every 90 days, after high-water events, and at any other time deemed necessary by the RD 900 superintendent. The findings of these inspections would be reported to the CVFPB's chief engineer through DWR's Flood Project Integrity and Inspection Branch (FPIIB).

Postconstruction Operation and Maintenance

After construction completion, the levee and staging areas and levee slopes would be hydroseeded with a native seed mix for erosion protection and to prevent colonization of exotic vegetation. Permanent facilities associated with the project would be the new levee, seepage berm footprint, and culverts and roads within the O&M corridor.

The Southport project falls within unit no. 116 of the SRFCP. The SRFCP—authorized by the 1917 Flood Control Act and officially transferred to the CVFPB in 1944 as the operating and maintaining authority—is maintained in accordance with USACE's SRFCP *Operation and Maintenance Manual* (U.S. Army Corps of Engineers 1955). A supplement to the SRFCP manual applies specifically to unit no. 116 and is currently implemented by RD 900, the local authority to which the CVFPB transferred O&M responsibility.

Presently, to meet Federal flood management regulations (33 CFR 208.10) and state requirements (California Water Code §8370), each year the Federal flood management facilities are inspected four times, at intervals not exceeding 90 days. DWR inspects the system twice a year, and RD 900 inspects it twice a year and immediately following major high-water events. The findings of these inspections are reported to the CVFPB's chief engineer through DWR's FPIIB. O&M activities would continue to be conducted in the same manner and with the same frequency as presently performed.

33 CFR 208.10 provides general O&M guidance to obtain the maximum benefits for the following features:

- Structures and facilities
- Levees
- Floodwalls
- Drainage
- Closure structures
- Pumping plants
- Channels and floodways

Typical maintenance activities include mowing, vegetation spraying, and erosion control and repair. Mowing typically is done twice a year using a standard riding lawnmower where possible, a specialized slope mower, and a larger tractor with a boom where slope mowing is not practical. Herbicide and bait station application for rodent control is conducted under county permit by experts licensed by the state for pest and rodent control. Monthly herbicide application reports are filed with the county. Erosion control and repair activities include backhoe fill of eroded areas and placement of gravel along the levee crest shoulder to reestablish and maintain the minimum crown width. These activities are performed for approximately 20 days annually. Patrol road reconditioning activities are performed once a year and would include placing, spreading, grading, and compacting aggregate base or substrate.

Other Project Elements: Recreation Enhancements and Restoration Component

Each of the five action alternatives also includes elements of recreation improvements, and Alternatives 2, 4, and 5, which primarily use a setback levee, include an expanded wildlife habitat restoration element. The state EIP program favors projects with multiple benefits, which the recreation and restoration components would provide. The City has proposed a suite of recreation improvements that are compatible with Southport project action alternatives. At this time, there is not sufficient funding to construct a full recreation program as part of the Southport project, so only select elements of the program are proposed for construction. However, the Southport project has been designed to accommodate eventual buildout of the Southport Sacramento River Recreation Program, as has the land acquisition element described in Section 2.2.3.3, under Land Acquisition, Structure and Utility Relocation, and Road Construction. The recreation elements proposed for construction as part of the Southport project are identified under each alternative discussion. The restoration elements associated with Alternatives 2, 4 and 5 are described in more detail below.

2.2.4 Alternative 1—Adjacent Levee

Alternative 1 involves the importation of up to 2.2 million cubic yards of embankment fill material for the construction of adjacent levees landward of the Sacramento River levee, while maintaining South River Road in its present alignment—atop the existing levee in most of the segments and on the landside toe of the levee in Segment A and the southern portion of Segment B (Plates 2-2a and 2-2b). The alignment for the adjacent levee alternative reflects generally a 35-foot shift from the existing levee centerline, dependent on whether a 2:1 or 3:1 landside slope is prescribed. Table 2-6 provides detail for the treatments proposed for each segment of the levee under Alternative 1.

Table 2-6. Alternative 1 Flood Risk–Reduction Measures

Segment	Construction Year	Alternative 1 Measures
A	2	Adjacent levee, slurry cutoff wall, and rock slope protection
B	2	Adjacent levee, slurry cutoff wall, landside seepage berm, and rock slope protection
		Adjacent levee, landside seepage berm, and rock slope protection
C	1	Adjacent levee, landside seepage berm, and rock slope protection
D	1	Adjacent levee, slurry cutoff wall, landside seepage berm, and rock slope protection
		Setback levee and slurry cutoff wall
E	1	Setback levee and slurry cutoff wall
		Setback levee and landside seepage
F	1	Adjacent levee and landside seepage berm
		Adjacent levee, landside seepage berm, and rock slope protection
G	1	Adjacent levee, slurry cutoff wall, and rock slope protection

2.2.4.1 Alternative 1 Flood Risk–Reduction Measures

Adjacent Levee

Under Alternative 1, an adjacent levee would be built along the extent of Segments A, B, C, D, F, and G. Segments C, D, F, and G would be constructed during Year 1; Segments A and B would be constructed during Year 2. Adjacent levee construction would be completed as described in Section 2.2.9.

Setback Levee

At Segment E and the northern portion of Segment D, a setback levee with an offset of 150 feet from landside to waterside toes would be constructed bordering the Bees Lakes area perimeter during Year 1. Setback levee construction would be completed as described in Section 2.2.9.

Slurry Cutoff Wall

During Year 1 of construction, a 30-foot-deep by 3-foot-wide slurry cutoff wall would be installed along the proposed adjacent levee the length of Segment D and most of Segment E, and an 84-foot-deep by 3-foot-wide slurry cutoff wall installed in Segment G. A 40-foot-deep slurry cutoff wall would also be constructed along the length of Segment A and into the southernmost end of Segment B during Year 2. Slurry cutoff wall construction would be completed as described in Section 2.2.9.

Seepage Berm

After adjacent levee construction and slurry cutoff wall installation are complete, a 300-foot-wide seepage berm would be constructed landward of the new levee at Segments C, F, and a portion of Segment E during Year 1 and at Segment B during Year 2. Seepage berm construction would be completed as described in Section 2.2.9.

Rock Slope Protection

After adjacent levee, setback levee, slurry cutoff wall, and seepage berm construction is complete, rock slope protection would be placed along Segments C, D, F, and G during Year 1 and along Segments A and B during Year 2. Additional rock slope protection would be placed at erosion sites in Segments D and E. Rock slope protection construction would be completed as described in Section 2.2.9.

2.2.4.2 Construction Details

Structure and Road Demolition and Utility Relocation

Project construction would require utility relocation and modifications, as well as the demolition of structures and roads as described under Section 2.2.3.3. Alternative 1 would require the demolition of 7 residences in Segment A, 10 residences in Segment B, 1 residence in Segment D, 3 residences in Segment F, and 1 residence in Segment G (Jameson pers. comm. 2013). Sections of South River, Davis, and Linden Roads would be demolished prior to project construction.

Vegetation Removal

Vegetation removal would be implemented as described under Section 2.2.3.3, and would include vegetation removal from both the waterside and the landside of the levee, the footprint of the seepage berm, and the landside utility and O&M corridor.

South River Road and Associated Road Construction

South River Road, on top of the existing levee (Segments B through G), would remain in its current condition. An aggregate base access road would be built on top of the proposed adjacent levee and the setback levee constructed in Segment E. At Segment A, South River Road would be rebuilt along the landside toe of the levee. A portion of Davis Road (Segment D) and Linden Road (Segment F) would be reconstructed to reconnect with South River Road.

2.2.4.3 Construction Schedule

The project is expected to take 2 to 3 years of construction to complete. In order to conservatively represent potential environmental effects, an intensive 2-year construction schedule is analyzed in this document. Under a 2-year construction schedule, construction of Segments C, D, E, F, and G is expected to be completed in Year 1. Segments A and B likely would be constructed during Year 2. Regrading of borrow sites would be ongoing; regrading of any sites used during Year 2 would be completed in a third year of project construction.

2.2.4.4 Construction Staging

As depicted in Plate 2-2a, three staging areas would be used in the project area. These staging areas are located on the landside of the levee at Segments B, C, and F and would occupy approximately 3.4, 61.7, and 17.5 acres, respectively. These areas would be used for staging construction activities and to provide space to house construction equipment and materials before and during construction activities. The staging area at Segment B (3.4 acres) would correspond with Segment A and B construction, and the staging areas at Segments C (61.7 acres) and F (17.5 acres) would be used for the construction of Segments C through G.

2.2.4.5 Recreation Enhancements

As described above under South River Road and Associated Road Construction, an aggregate base access road would be built on top of the proposed adjacent levee, and on top of the proposed setback levee at Segment E, for inspection, flood-fighting, and vegetation maintenance. To minimize environmental disturbance and maximize cost-effectiveness, the City proposes to open up this access road for public use, creating a recreation trail for bicyclists and pedestrians. Equestrian use of levee crown patrol roads is prohibited by state Title 23 regulation.

This multi-purpose road may be paved or surfaced with compacted aggregate base for all-weather use. If paved, the road would be a Class I-equivalent bikeway at approximately 12 feet wide with 4-foot aggregate base shoulders on either side for pedestrian use. RD 900 use for flood-fighting and O&M would have priority over recreational use. For safety purposes, removable access controls (bollards) would be installed at all entrances to the road and as needed for authorized vehicle control. Permanent safety signs would be installed at select access points and at periodic intervals along the road to inform users that it serves as a levee maintenance road and to instruct them to watch for patrolling vehicles. These signs also would inform users that portions of the road and other recreation facilities are subject to flooding and that trail damage and related safety hazards could occur during the flooding season. Other signs would be installed as needed to inform users of necessary directions, rights-of-way, appropriate use, and safety.

2.2.5 Alternative 2—Setback Levee

Alternative 2 involves the construction of an adjacent levee in Segments A, the southernmost portion of Segment B, and Segment G. Approximately 3.6 miles of setback levees would be constructed beginning in Segment B and continuing into Segments C, D, E, and F. Alternative 2 would also include the breach and degrading of the existing levee for the purpose of restoration of the

Sacramento River floodplain (Plates 2-3a and 2-3b [revised]). Portions of the existing levee would be removed to allow water to flow in and out of the floodplain. The floodplain would be lowered through excavation of borrow areas in a portion of Segment B and Segments C and F to provide surfaces and associated vegetation that would be inundated more frequently than the higher existing floodplain surfaces. Alternative 2 would open the Bees Lakes area in Segment E to seasonal flow, hydraulically connecting it to the Sacramento River. Table 2-7 provides detail for the measures proposed for each segment of the levee under Alternative 2.

Table 2-7. Alternative 2 Flood Risk–Reduction Measures

Segment	Construction Year	Alternative 2 Measures
A	2	Adjacent levee, slurry cutoff wall, and rock slope protection
B	2	Adjacent levee, slurry cutoff wall, and rock slope protection
		Adjacent levee, slurry cutoff wall, landside seepage berm, and rock slope protection
		Setback levee, slurry cutoff wall, and landside seepage berm
C	1	Setback levee, slurry cutoff wall, and landside seepage berm
D	1	Setback levee and slurry cutoff wall
E	1	Setback levee and slurry cutoff wall
		Setback levee, landside seepage berm, and slurry cutoff wall
F	1	Setback levee, slurry cutoff wall, and landside seepage berm
G	1	Adjacent levee, slurry cutoff wall, and rock slope protection

Alternative 2 also includes relocation of a portion of South River Road and construction of Village Parkway and its connections to South River Road. Construction of Alternative 2 project features would require importation of up to 2.4 million cubic yards of embankment fill material.

2.2.5.1 Alternative 2 Flood Risk–Reduction Measures

Setback Levee

Under Alternative 2, a setback levee, with an offset of 150 feet from landside to waterside toe, would be built along the extent of Segments C, D, E, and F during Year 1. A setback levee would be built in the northern portion of Segment B during Year 2. The setback levee centerline would be positioned a minimum of 400 feet from the existing levee centerline. Setback levee construction would be completed as described in Section 2.2.9.

Adjacent Levee

An adjacent levee would be constructed at Segment G during Year 1, and an adjacent levee would be constructed through the extent of Segment A and approximately halfway through Segment B during Year 2. The adjacent levee would transition into the setback levee at the northern end of Segment F and in the middle of Segment B. Adjacent levee construction would be completed as described in Section 2.2.9.

Slurry Cutoff Wall

During Year 1 of construction, a 30-foot-deep by 3-foot-wide slurry cutoff wall would be installed along the proposed setback levees the lengths of Segments C, D and E. A 24-foot-deep by 3-foot-wide wall would be installed in southernmost Segment F, and an 84-foot-deep by 3-foot-wide wall installed in the remaining portion of Segment F and continuing into Segment G. A 30- to 40-foot-deep slurry cutoff wall would also be constructed along the length of Segments A and B during Year 2. Slurry cutoff wall construction would be completed as described in Section 2.2.9.

Seepage Berm Construction

A 300-foot-wide seepage berm would be constructed after setback levee construction on the landside of the new levee at Segments C, F, and a portion of Segment E during Year 1 and at a portion of Segment B during Year 2. Seepage berm construction would be completed as described in Section 2.2.9.

Rock Slope Protection

After setback levee, slope-flattening, adjacent levee, slurry cutoff wall, and seepage berm construction are complete, rock slope protection would be placed along Segment G and a small portion of Segment F during Year 1 and along Segment A and a portion of Segment B during Year 2. Additional rock slope protection would be placed at five erosion sites in Segment C, one erosion site in Segment D, one erosion site in Segment E, and one erosion site in Segment F. Rock slope protection construction would be completed as described in Section 2.2.9.

Offset Floodplain Area

The offset floodplain area refers to the two expanded floodways located between the proposed setback levee and the remnant levee that would be created when portions of the existing levee are breached to allow Sacramento River water to flow into the offset area. The offset floodplain area mitigates the losses of existing habitat values due to project effects, as well as maximizes the potential habitat value in the Sacramento River floodplain. Project activities in this area would include floodplain and habitat restoration and borrow excavation. WSAFCA would vegetate both the north and south offset areas to provide mitigation for the project's environmental effects, such as vegetation removal. Any area of restored floodplain in excess of area needed for project mitigation would be used to further advance flood risk–reduction efforts implemented by WSAFCA or WSAFCA's partners.

Where excavated material is appropriate for reuse as borrow material, it would be used in construction of the flood risk–reduction measures. After excavation, disturbed areas would be finished and graded to allow creation of restored habitats. Once construction of the setback levee is complete, the existing levee would be degraded and breached in several locations to allow inlet and outlet of floodplain-inundating flows.

The target habitats in the offset floodplain area consist of riparian forest, shaded riverine aquatic habitat, seasonal wetlands, and upland grasslands. Elevations in the offset floodplain area would vary from approximately +7.0 feet NAVD 88 to +20.0 feet NAVD 88 in order to provide broad habitat variability for a range of environmental and hydrodynamic conditions. Based on the historic flow data (1970–2010), river flows are expected to be sufficient enough to result in inundation of the offset area to +10 feet NAVD 88 an average of 77 days per year (Appendix B.6). This annual average varies considerably from year to year, with the standard deviation of 65 days and a maximum of 239 days; the offset area would thus be expected to drain completely every year. The months with the highest average flow are January, February, and March.

Upper terraces would support riparian habitat that transitions from willow scrub at lower elevations to mixed riparian forest at higher elevations. Native riparian plant species would be installed as container plants and pole cuttings at a regular spacing interval throughout the offset floodplain area. Both overstory and understory species would be installed to mimic the natural structure of riparian forests along the Sacramento River. Supplemental irrigation would be provided for several years during the plant establishment period and then discontinued, with the source possibly pumped from the river or by agreement with an owner of an adjacent water supply. To avoid trampling or disturbance of the plantings during the establishment period, signs would be posted at appropriate intervals providing notice that access to the restoration areas is not allowed. Exclusionary fencing for these purposes likely would not be allowed by the CVFPB.

The existing levee would be breached in several locations, and a network of seasonal wetland channels, termed *low-flow swales*, would be excavated in the offset floodplain area that would inundate during high-water events on the Sacramento River to provide habitat for special-status native fish species, including Sacramento splittail and Chinook salmon. To mimic some natural floodplain conditions that species like splittail depend on for spawning and rearing, the channels would be constructed at an elevation that provides shallow, low-velocity, off-channel habitat in the spring during smaller flood events, approximately +7 feet NAVD 88. Channel margins would be gently sloping to maximize edge habitat during flood events. IWM structures could be installed in some of the channels to provide cover from predators. In larger flood events during the winter and spring, the upper riparian terraces would be inundated and provide additional areas of habitat for fish as well as contribute to the productivity of the aquatic ecosystem.

The created channels would follow the slope of the river and have several connections to the main river channel in order to maximize connectivity and minimize potential stranding as floodwaters recede. The channels would fully dewater by the early summer in order to discourage use by nonnative fish.

Areas of upland grassland in the offset floodplain area would serve as potential floodplain rearing habitat for native fish as well as foraging habitat for raptors during periods of low water.

If excess restored habitat is identified that would not be needed to meet the project's mitigation obligations, a mitigation bank or other offsite mitigation preserve could be considered for establishment in the offset floodplain area. A mitigation bank restores, enhances, creates and/or preserves water resources or other significant natural areas and assumes responsibility for their long-term maintenance, earning mitigation credits that are recognized by the regulatory agencies. Mitigation bankers can then sell these mitigation credits to permittees and others who must compensate for having impacted water resources or other natural areas. The sale of credits legally transfers the liability for the mitigation from the permittee to the mitigation banker. A mitigation bank in the Southport offset floodplain would likely yield riparian floodplain mitigation and/or endangered species conservation credits, and possibly restored and enhanced shaded riverine aquatic (SRA)/channel margin habitat credits.

In contrast, a mitigation preserve would yield an area (or areas) of protected habitat that is obligated to a third-party permittee to provide compensatory mitigation. The permittee retains full responsibility for its establishment and maintenance. Compensatory mitigation generated in the offset area, either via credits or preserved acres, could be used for project mitigation. It can also be purchased or utilized by a third-party entity requiring compensatory mitigation or exchanged with other mitigation preserves via a regulatory agency approved transaction to secure types of required project mitigation that is not suitable for development in the offset area.

2.2.5.2 Construction Details

Structure and Road Demolition and Utility Relocation

Project construction would require utility relocation and modifications, as well as the demolition of structures and roads as described under Section 2.2.3.3. Alternative 2 would require the demolition of 3 residences in Segment A, 10 residences in Segment B, 1 residence in Segment D, 5 residences in Segment F, and 1 residence in Segment G. South River Road would be removed along the levee crown in Segments B through F and on the landside of the levee in Segment A.

Vegetation Removal

Vegetation removal would be performed as described under Section 2.2.3.3. The vegetation on the existing Sacramento River levee mostly would be retained, with the exception of the five breach locations, because the existing levee no longer would provide flood risk–reduction function or be subject to the USACE vegetation guidelines. Some vegetation would be removed as part of construction of the new setback levee, seepage berms, and the landside utility O&M corridor.

Levee Breaches

Portions of the existing levee would be breached to approximately +10 feet NAVD 88 to allow Sacramento River flows into the offset area during high flow events and notched to approximately +7 feet NAVD 88 to facilitate inundation of the low-flow swales described in Offset Floodplain Area above. Under Alternative 2, there would be one breach in Segment B, two breaches in Segment C, and two breaches in Segment F (Plate 2-3a [revised]), ranging between approximately 800 linear feet and 1500 linear feet. They would be constructed outside the flood season while the offset area would not be inundated. The breaches would be armored with rock placed in a layer approximately 2.5 feet thick extending the entire length of the breach and would include the top of the adjacent degraded levee shoulders for 100 feet on each side of the breach. Laterally, the revetment would extend from the toe of the riverbank to 100 feet landward of the centerline of the degraded levee. Some areas that would receive rock slope protection are currently riprapped.

The bank protection at the breaches is designed both to control erosion and to maintain existing vegetation and IWM wherever possible. This can be accomplished by incorporating rock benches that serve as buffers against extreme toe scour and shear stress while providing space for planting riparian vegetation and creating a platform to support aquatic habitat features. The breach locations would not be subject to USACE levee vegetation guidance and would be vegetated using biotechnical designs.

The placement of rock onto the levee slope would occur either from atop the levee or from the waterside by means of barges, or both. Rock required within the channel, both below and slightly above the surface of the water at the time of placement, would be placed by a crane located on a barge and then spread by an excavator located on top of the levee. Construction would require two barges—one barge to carry the crane and another to hold the stockpile of rock to be placed on the channel slopes—and one excavator located on top of the levee. Rock required on the upper portions of the slopes would be placed by an excavator located on top of the levee. Rock placement from atop the levee would require one excavator and one loader for each potential placement site. The loader would bring the rock from a permitted source within 25 miles of the project area and dump it within 100 feet of the levee. The excavator would then move the rock from the stockpile to the waterside of the levee. Soil may be placed in the interstitial spaces, followed by hand installation of native vegetation consistent with USACE levee vegetation policy. Equipment and materials necessary for rock slope protection are listed in Table 2-18, below.

Offset Floodplain Area Restoration Project Construction

Construction of the restoration project would begin with fine grading of the offset area (major grading would be conducted as part of the Southport EIP) in compliance with the construction documents and any earthworks measures associated with the SRA/channel margin enhancement elements. This would involve grading the channel margin slope to a flatter profile, installation of instream woody material, and placement of vegetated rock reinforcement as needed. Following this, installation of the irrigation system for the restoration plantings would occur. Once the irrigation system is installed and confirmed to be working per the construction drawings, the plantings would be installed. This would include installation of container plants or pole cuttings.

Once all planting and irrigation installation activities are complete, final site stabilization would occur with the application of an appropriate restoration seed mix and/or other erosion control measures.

As-built record drawings of the completed project would be prepared once all construction activities have been completed and the completed project has been accepted by the site owner or its designee.

Road Construction, Marina Access, and Bees Lakes

Under Alternative 2, a majority of South River Road traffic would be relocated to the landside of the setback levee through extension of Village Parkway. Presently terminating at Lake Washington Boulevard, Village Parkway would be extended through the project area consistent with the current West Sacramento General Plan. At its southern extent, the Parkway would have a direct connection to Gregory Avenue approximately 0.3 mile south of Bevan Road. Village Parkway would be constructed in an interim configuration conforming to the standard of a Rural Road. The City proposes to provide 6-foot-wide paved bike lanes on each side of Village Parkway to increase safety for residents using the corridor for commuting, recreation, and non-motorized transport purposes. At the project's northern extent, South River Road would continue in its current alignment on the existing levee at Segment G but would be discontinued to allow for breach of the existing levee structure in the setback area beginning in Segment F. In order to maintain access to Sherwood Harbor Marina and Sacramento Yacht Club, South River Road would remain in place atop the existing levee at Segment E and the southern portion of Segment F. However, the existing levee structure no longer would serve a flood risk–reduction function. Davis Road and Linden Road would be rebuilt to provide southern and northern access, respectively, from Village Parkway to the marina area along South River Road.

As the roadway paving would cause increases in imperviousness and runoff, a roadway drainage system consisting of roadside ditches and culverts would be designed, matching existing internal drainage patterns as much as possible. The roadside ditches and culverts would be sloped to keep drainage from crossing existing sub-watershed boundaries and would discharge into existing agricultural ditches that lie within the corresponding sub-watersheds. Proposed drainage facilities within the project area would serve as interim facilities; when undeveloped portions of Southport are developed, developers would replace those project drainage facilities with a curb-and-gutter and storm drain system in accordance with the Southport Drainage Master Plan.

Year 1 would include the construction of the Village Parkway extension and the associated marina access roads (Davis Road and Linden Road). The section of road between Village Parkway and the setback levee would be constructed at grade and meet county road standards. A ramp would be constructed on the western side of the setback levee and cross over the setback levee. The section of road between the setback levee and the existing levee would be built on an embankment at the same elevation as the setback levee crest, approximately 300 feet. The total length of Davis Road construction would be 700 feet; 400 feet would be at grade and 300 feet would be built on a levee embankment. The total length of Linden Road construction would be 900 feet; 500 feet would be at grade and 400 feet would be built on a levee embankment. In addition, culverts would be installed along 260 feet of the Davis Road and Linden Road embankments to provide hydraulic connectivity between Bees Lakes and the Sacramento River.

To accommodate levee and offset floodplain maintenance activities, two aggregate base access roads would be constructed in the offset area: one at the waterside toe of the setback levee and one at the landside toe of the existing levee. An aggregate base access road also would be constructed atop the adjacent and setback levees for inspection, flood-fighting, and vegetation maintenance purposes. Four or five sets of earthen ramps would be constructed to provide access to the setback levee and offset area. The locations of these ramps will be determined through further design development.

2.2.5.3 Construction Schedule

The project is expected to take 2 to 3 years of construction to complete. In order to conservatively represent potential environmental effects, an intensive 2-year construction schedule is analyzed in this document. Under a 2-year construction schedule, construction of Segments C, D, E, F, and G is expected to be completed in Year 1. Segments A and B likely would be constructed during Year 2. Regrading of borrow sites would be ongoing; regrading of any sites used during Year 2 would be completed in a third year of project construction.

2.2.5.4 Construction Staging

As depicted in Plate 2-3a (revised), three staging areas would be used in the project area. These staging areas are located on the landside of the levee at Segments B, C, and F and would occupy approximately 3.2, 11.0, and 13.1 acres, respectively. These areas would be used for staging construction activities and to provide space to house construction equipment and materials before and during construction activities. The staging area at Segment B (3.2 acres) would correspond with Segment A and B construction, and the staging areas at Segments C (11.0 acres) and F (13.1 acres) would be used for the construction of Segments C through G.

2.2.5.5 Recreation Enhancements

As described above under Road Construction, Marina Access, and Bees Lakes, an aggregate base access road would be built on top of the proposed adjacent and setback levees for inspection, flood-fighting, and vegetation maintenance. Two access roads also would be constructed in the offset area. To minimize environmental disturbance and maximize cost-effectiveness, the City proposes to open up these access roads for public use, creating a recreation trail for bicyclists and pedestrians. Equestrian use of levee crown patrol roads is prohibited by state Title 23 regulation.

These multi-purpose roads may be paved or surfaced with compacted aggregate base for all-weather use. If paved, the roads would be Class I-equivalent bikeways at approximately 12 feet wide with 4-foot aggregate base shoulders on either side for pedestrian use. RD 900 use for flood-fighting and O&M would have priority over recreational use. For safety purposes, removable access controls (bollards) would be installed at all entrances to the roads and as needed for authorized vehicle control. Permanent safety signs would be installed at select access points and at periodic intervals along the roads to inform users that they serve as levee maintenance roads and to instruct users to watch for patrolling vehicles. These signs also would inform users that portions of the roads and other recreation facilities are subject to flooding and that trail damage and related safety hazards could occur during the flooding season. Other signs would be installed as needed to inform users of necessary directions, rights-of-way, appropriate use, and safety.

Under Alternative 2, Village Parkway would be constructed on the landside of the setback levee to accommodate traffic displaced from South River Road. Village Parkway would be constructed to the standard of a Rural Road. The Southport Design Guidelines define the dimensions of a Rural Road as a 24-foot-wide, paved, two-way road with 6-foot gravel shoulders on each side (City of West Sacramento 1996). However, as mentioned above in Road Construction, Marina Access, and Bees Lakes, the City proposes to provide 6-foot-wide paved bike lanes on each side of Village Parkway to increase safety for residents using the corridor for commuting, recreation, and non-motorized transport purposes.

2.2.6 Alternative 3—Slope Flattening

Alternative 3 involves the contouring of the Sacramento River levee to alleviate over-steepened banks while maintaining South River Road in its present alignment atop the existing levee (Plates 2-4a and 2-4b). A cutoff wall is proposed in Segments A, D, E, G, and the southern portion of Segment B. A landside seepage berm is proposed in Segments B, C, and F. The alignment for the slope-flattening alternative reflects a slight landward shift (approximately 50 feet) of the existing levee centerline to account for slope-flattening to maximum limits (described below). Alternative 3 also involves the importation of up to 1.1 million cubic yards of embankment fill material for the construction of project features. Table 2-8 provides detail for the treatments proposed for each segment.

Table 2-8. Alternative 3 Flood Risk–Reduction Measures

Segment	Construction Year	Alternative 3 Measures
A	2	Waterside slope-flattening, slurry cutoff wall, and rock slope protection
B	2	Waterside slope-flattening, slurry cutoff wall, landside seepage berm, and rock slope protection
		Waterside slope-flattening, landside seepage berm, and rock slope protection
C	1	Waterside slope-flattening, landside seepage berm, and rock slope protection
D	1	Waterside slope-flattening, slurry cutoff wall, and rock slope protection
E	1	Waterside slope-flattening and slurry cutoff wall
F	1	Waterside slope-flattening and landside seepage berm
		Waterside slope-flattening, landside seepage berm, and rock slope protection
G	1	Waterside slope-flattening, slurry cutoff wall, and rock slope protection

2.2.6.1 Alternative 3 Flood Risk–Reduction Measures

Slope Flattening

Slope-flattening construction would be completed as described in Section 2.2.9. The waterside slope would be trimmed and reshaped to a 3:1 slope resulting in a slight landward shift (approximately 50 feet) of the existing levee centerline. Slope-flattening construction would be completed in Segments C through G during Year 1 and in Segments A and B during Year 2. Soil degraded during slope-flattening construction would be stockpiled at proposed seepage berm locations.

Slurry Cutoff Wall

During Year 1 of construction, a 30-foot-deep by 3-foot-wide slurry cutoff wall would be installed along the existing levees the lengths of Segments D and E, and an 84-foot-deep by 3-foot-wide wall installed in Segment G. A 40-foot-deep slurry cutoff wall would also be constructed along the length of Segment A and into the southernmost portion of Segment B during Year 2. Slurry cutoff wall construction would be completed as described in Section 2.2.9.

Seepage Berm

A 300-foot-wide seepage berm would be constructed landward of the new levee at Segments C and F during Year 1 and at Segment B during Year 2. Seepage berm construction would be completed as described in Section 2.2.9.

Rock Slope Protection

Rock slope protection construction would be completed as described in Section 2.2.9. After slope-flattening, slurry cutoff wall, and seepage berm construction are complete, rock slope protection would be placed along Segments C, D, F, and G during Year 1 and along Segments A and B during Year 2. Additional rock slope protection would be placed at an erosion site in Segment E.

2.2.6.2 Construction Details

Structure and Road Demolition and Utility Relocation

Project construction would require utility relocation and modifications, as well as the demolition of structures and roads as described under Section 2.2.3.3. Alternative 3 would require the demolition of 8 residences in Segment A, 10 residences in Segment B, 1 residence in Segment D, 2 residences in Segment F, and 1 residence in Segment G. Sections of South River, Davis, and Linden Roads would be demolished prior to project construction. The entire extent of South River Road in the project area would be removed prior to the remainder of project construction.

Vegetation Removal

Vegetation removal would be performed as described under Section 2.2.3.3, and in a manner similar to Alternative 1.

South River Road and Associated Road Construction

South River Road and portions of Davis Road and Linden Road construction would be performed as described under Alternative 1. An aggregate base access road would be constructed at the landside toe of the levee for maintenance, flood-fighting, and inspection purposes.

2.2.6.3 Construction Schedule

The project is expected to take 2 to 3 years of construction to complete. In order to conservatively represent potential environmental effects, an intensive 2-year construction schedule is analyzed in this document. Under a 2-year construction schedule, construction of Segments C, D, E, F, and G is expected to be completed in Year 1. Segments A and B likely would be constructed during Year 2. Regrading of borrow sites would be ongoing; regrading of any sites used during Year 2 would be completed in a third year of project construction.

2.2.6.4 Construction Staging

As depicted in Plate 2-4a, three staging areas would be used in the project area. These staging areas are located on the landside of the levee at Segments B, C, and F and would occupy approximately 3.3, 62.6, and 23.4 acres, respectively. These areas would be used for staging construction activities and to provide space to house construction equipment and materials before and during construction activities. The staging area at Segment B (3.3 acres) would correspond with Segment A and B construction, and the staging areas at Segments C (62.6 acres) and F (23.4 acres) would be used for the construction of Segments C through G.

2.2.6.5 Recreation Enhancements

As described above under South River Road and Associated Road Construction, an aggregate base access road would be built along the landside of the levee for O&M of the levee and utility corridor. To minimize environmental disturbance and maximize cost-effectiveness, the City proposes to open up this access roads for public use, creating a recreation trail for bicyclists and pedestrians.

This multi-purpose road may be paved or surfaced with compacted aggregate base for all-weather use. If paved, the road would be a Class I-equivalent bikeway at approximately 12 feet wide with

4-foot aggregate base shoulders on either side for pedestrian use. RD 900 use for flood-fighting and O&M would have priority over recreational use. For safety purposes, removable access controls (bollards) would be installed at all entrances to the road and as needed for authorized vehicle control. Permanent safety signs would be installed at select access points and at periodic intervals along the road to inform users that it serves as a levee maintenance road and to instruct them to watch for patrolling vehicles. These signs also would inform users that portions of the road and other recreation facilities are subject to flooding and that trail damage and related safety hazards could occur during the flooding season. Other signs would be installed as needed to inform users of necessary directions, rights-of-way, appropriate use, and safety.

2.2.7 Alternative 4—Reduced Length Setback Levee

Utilizing a setback levee shorter than that proposed under Alternative 2, Alternative 4 involves the construction of approximately 2.3 miles of setback levees, beginning in the northernmost portion of Segment B and continuing throughout Segments C, D and E. Unlike Alternative 2, Alternative 4 project elements would include construction of an adjacent levee in Segment F and would maintain hydraulic isolation of the Bees Lakes area in Segment E from the Sacramento River with the construction of a ring levee. As a result of the reduced length of the setback area, the offset area created through breaching and degrading the existing levee to restore the historical Sacramento River floodplain would be smaller than that proposed in Alternative 2 (Plates 2-5a and 2-5b [revised]). Table 2-9 provides detail for the treatments proposed for each segment.

Table 2-9. Alternative 4 Flood Risk–Reduction Treatments

Segment	Construction Year	Alternative 4 Measures
A	2	Adjacent levee, slurry cutoff wall, and rock slope protection
B	2	Adjacent levee, slurry cutoff wall, and rock slope protection
		Adjacent levee, slurry cutoff wall, landside seepage berm, and rock slope protection
		Adjacent levee, landside seepage berm, and rock slope protection
		Setback levee and landside seepage berm
C	1	Setback levee and landside seepage berm
D	1	Setback levee and slurry cutoff wall
E	1	Setback levee and slurry cutoff wall
		Setback levee and landside seepage berm,
F	1	Setback levee and landside seepage berm
		Adjacent levee, landside seepage berm, and rock slope protection
G	1	Adjacent levee, slurry cutoff wall, and rock slope protection

Alternative 4 also involves the importation of up to 2.0 million cubic yards of embankment fill material for the construction of project features. The relocation of South River Road and construction of Village Parkway and its connections to South River Road for Alternative 4 would be similar to these elements as described for Alternative 2.

2.2.7.1 Alternative 4 Flood Risk–Reduction Measures

Setback Levee

Under Alternative 4, a setback levee, with an offset of 150 feet from landside to waterside toe, would be built beginning in the northernmost portion of Segment B, and continue into Segments C, D, E and the southernmost portion of Segment F during Year 1. The setback levee centerline would be positioned a minimum of 400 feet from the existing levee centerline. Setback levee construction would be completed as described in Section 2.2.9.

Adjacent Levee

An adjacent levee would be constructed in the remaining extent of Segment F and in Segment G during Year 1, and an adjacent levee would be constructed in Segment A and the remaining extent of Segment B during Year 2. Adjacent levee construction would be completed as described in Section 2.2.9.

Slurry Cutoff Wall

During Year 1 of construction, a 30-foot-deep by 3-foot-wide slurry cutoff wall would be installed along the proposed setback levees in Segment D and southern portion of Segment E, terminating at the origin of the seepage berm in Segment E. An 84-foot-deep by 3-foot-wide wall would be installed in Segment G. A 40-foot-deep slurry cutoff wall would also be constructed along the length of Segments A and the southernmost portion of B during Year 2. Slurry cutoff wall construction would be completed as described in Section 2.2.9.

Seepage Berm Construction

A 300-foot-wide seepage berm would be constructed after setback levee construction on the landside of the new levee at Segments C, F, and a portion of Segment E during Year 1 and at a portion of Segment B during Year 2. Seepage berm construction would be completed as described in Section 2.2.9.

Rock Slope Protection

After setback levee, adjacent levee, slurry cutoff wall, and seepage berm construction are complete, rock slope protection would be placed along Segments F and G during Year 1 and along Segments A and B during Year 2. Additional rock slope protection would be placed at five erosion sites in Segment C, one erosion site in Segment D, and one erosion site in Segment E. Rock slope protection construction would be completed as described in Section 2.2.9.

Offset Floodplain Area

Offset floodplain area construction would be similar to Alternative 2; however, the offset floodplain area constructed would be reduced to reflect the reduced length of the setback levee in Segments B and F. In addition, the Bees Lakes area would remain hydraulically isolated from the offset floodplain area as described below under Road Construction, Marina Access, and Bees Lakes.

2.2.7.2 Construction Details

Structure and Road Removal and Utility Relocation

Project construction would require utility relocation and modifications, as well as the demolition of structures and roads as described under Section 2.2.3.3. Alternative 4 would require the demolition of 3 residences in Segment A, 10 residences in Segment B, 1 residence in Segment D, 2 residences in Segment F, and 1 residence in Segment G. South River Road would be removed along the levee crown in Segments B through F, as well as on the landside of the levee in Segment A. Structure and road removal and utility relocations would be performed as described under Section 2.2.3.3.

Vegetation Removal

Vegetation removal would be performed as described under Section 2.2.3.3 and under Alternative 2.

Levee Breaches

Construction of the levee breaches would be performed as described under Alternative 2. However, there would only be two breaches in the existing levee, which would both be located in Segment C (Plate 2-5a [revised]).

Road Construction, Marina Access, and Bees Lakes

Similar to Alternative 2, Village Parkway would be extended to the project area's southern extent, moving South River Road traffic to the landside of the levee. Under Alternative 4, marina access would be maintained through extension of Davis Road and Linden Road to connect Village Parkway and South River Road as described in Alternative 2.

Alternative 4 would not implement measures to hydraulically connect Bees Lakes and the Sacramento River. The road embankments, acting as levees and linked to the setback levee and the existing levee, would create an isolation ring levee around Bees Lakes. This ring levee would prevent hydraulic surface connectivity between Bees Lakes and the Sacramento River. Access roads and appurtenant ramps would be constructed atop the proposed setback and adjacent levees, as well as within the offset area, as described under Alternative 2.

2.2.7.3 Construction Schedule

The project is expected to take 2 to 3 years of construction to complete. In order to conservatively represent potential environmental effects, an intensive 2-year construction schedule is analyzed in this document. Under a 2-year construction schedule, construction of Segments C, D, E, F, and G is expected to be completed in Year 1. Segments A and B likely would be constructed during Year 2. Regrading of borrow sites would be ongoing; regrading of any sites used during Year 2 would be completed in a third year of project construction.

2.2.7.4 Construction Staging

As depicted in Plate 2-5a (revised), three staging areas would be used in the project area. These staging areas are located on the landside of the levee at Segments B, C, and F and would occupy approximately 3.2, 11.0, and 11.7 acres, respectively. These areas would be used for staging construction activities and to provide space to house construction equipment and materials before and during construction activities. The staging area at Segment B (3.2 acres) would correspond with Segment A and B construction, and the staging areas at Segments C (11.0 acres) and F (11.7 acres) would be used for the construction of Segments C through G.

2.2.7.5 Recreation Enhancements

As described above under Road Construction, Marina Access, and Bees Lakes, aggregate base access roads would be built within the offset area and on top of the proposed adjacent and setback levees for inspection, flood-fighting, and vegetation maintenance. Similar to what is described under Alternative 2, these maintenance roads would be opened up to public use by bicyclists and pedestrians, with appurtenant access controls and safety signs. Alternative 4 also would involve construction of bike lanes along Village Parkway, as described under Alternative 2.

2.2.8 Alternative 5—Setback Levee with Slope Flattening (APA)

Alternative 5 is the APA. Similar to Alternative 2, Alternative 5 involves the construction of approximately 3.6 miles of setback levees in Segments B through F, an adjacent levee in Segment G, and the breach and degrading of the existing levee to restore the historical Sacramento River floodplain (Plates 2-6a and 2-6b [revised]). Unlike Alternative 2, Alternative 5 project elements would include slope flattening with rock slope protection in Segment A instead of an adjacent levee with rock slope protection and, as described under Alternative 4, would maintain the hydraulic isolation of the Bees Lakes area in Segment E from the Sacramento River through construction of a ring levee, creating two offset areas. Additionally, unlike Alternative 2, Alternative 5 includes breaching of the existing levee over two construction years, allowing only a single levee breach in each of the north and south offset areas during Year 1, in Segments F and C, respectively, and creating a 1-year backwater condition in the offset areas. The remaining breaches, one each in Segments B, C and F, would be constructed in Year 2.

Table 2-10 provides detail for the treatments proposed for each segment.

Table 2-10. Alternative 5 Flood Risk–Reduction Treatments

Segment	Construction Year	Alternative 5 Measures
A	2	Waterside slope flattening, slurry cutoff wall, and rock slope protection
B	2	Adjacent levee, slurry cutoff wall, and rock slope protection
		Adjacent levee, slurry cutoff wall, landside seepage berm, and rock slope protection
		Setback levee, slurry cutoff wall, and landside seepage berm, breach of existing levee
C	1	Setback levee, slurry cutoff wall, and landside seepage berm, breach of existing levee
	2	Breach of existing levee
D	1	Setback levee and slurry cutoff wall
E	1	Setback levee and slurry cutoff wall
		Setback levee, landside seepage berm, and slurry cutoff wall
F	1	Setback levee, slurry cutoff wall, and landside seepage berm, breach of existing levee
	2	Breach of existing levee
G	1	Adjacent levee, slurry cutoff wall, and rock slope protection

Alternative 5 also involves the importation of up to 2.4 million cubic yards of embankment fill material for the construction of project features. The relocation of South River Road and construction of Village Parkway and its connections to South River Road for Alternative 5 would be similar to these elements as described for Alternative 2.

2.2.8.1 Alternative 5 Flood Risk–Reduction Measures

Flood risk–reduction measure construction would be performed as described under Alternative 2 for Segments B through G. Alternative 5 proposes to construct slope flattening with a slurry cutoff wall in Segment A as described under Alternative 3. A full description of these flood risk–reduction measures is provided in Section 2.2.9. Additional rock slope protection would be placed at five erosion sites in Segment C, one erosion site in Segment D, one erosion site in Segment E, and one erosion site in Segment F.

Offset Floodplain Area

Offset floodplain area design would be similar to that described under Alternative 2. However, the Bees Lakes area would remain hydraulically isolated from the offset floodplain area as described below under Road Construction, Marina Access, and Bees Lakes. Additionally, levee breaching under this alternative would be done over 2 construction years. The downstream breaches in both Segments C and F would be created in the first year, allowing a 1-year backwater condition in the offset areas that would assist vegetation establishment. Under Alternative 5, construction of the offset areas would begin with creation of the Year 1 breaches as soon as the river stage is low enough to prevent inundation of the offset area during the construction season. Grading of the Segment C, D, E and F offset area would then be undertaken as described under Alternative 2, followed by installation of restoration plantings and associated irrigation system installation as described below in Offset Floodplain Area Restoration Project Construction. Following construction of the upstream breaches in Segments C and F and the breach in Segment B in Year 2, grading and planting of the offset area in Segment B would commence. Inundation frequency and duration of the final offset area would be as described for Alternative 2.

Backwater Interim Condition

The interim condition would allow restoration plantings to establish during the fall, winter, and spring following construction Year 1 without exposure to through-flows from the Sacramento River, increasing the likelihood of long-term planting success. Following breaching of the existing levee in Segments C and F in Year 1, the offset areas would fill as the level of the Sacramento River rises and would drain through the single breach in each offset area as river stage decreases. The areas would be graded to encourage drainage as river stage decreases, and temporary and permanent erosion control measures such as jute netting, coconut fiber with net, live brush mattresses, and native turf would be selected as appropriate to protect graded areas in accordance with the project's stormwater pollution prevention plan (SWPPP).

2.2.8.2 Construction Details

Structure and Road Removal and Utility Relocation

Structure and road removal and utility relocations would be performed as described under Section 2.2.3.3 and under Alternative 2.

Vegetation Removal

Vegetation removal would be performed as described under Section 2.2.3.3 and under Alternative 2.

Levee Breaches

Construction of the levee breaches would be performed as described under Alternative 2, including degrade to approximately +10 feet NAVD 88 to allow Sacramento River flows into the offset area during high flow events, and notched to approximately +7 feet NAVD 88 to facilitate inundation of the low-flow swales. However, levee breaching under this alternative would occur over 2 years. In Segments F and C, the degraded levee would be breached in Year 1 at two locations, once in each segment, creating a backwater condition that would remain in place over the offseason. In Year 2, the degraded levee would then be breached at additional locations in Segments B, C, and F to permit river flows to move through the offset areas.

Offset Floodplain Area Restoration Project Construction

Construction of the restoration project would largely be conducted as described in Alternative 2. However, due to the creation of the backwater interim condition, irrigation system construction and plantings would be conducted in Segments C, D, E, and F during the fall and winter of Year 1, and in Segment B in fall and winter of Year 2, as weather and river flows permitted. Areas disturbed during such activities would be restabilized in accordance with the terms of the project's SWPPP.

Road Construction, Marina Access, and Bees Lakes

Village Parkway construction would be constructed as described under Alternative 2. However, Alternative 5 would not implement measures to hydraulically connect Bees Lakes and the

Sacramento River. The road embankments, acting as levees and linked to the setback levee and the existing levee, would create an isolation ring levee around Bees Lakes, as described under Alternative 4. This ring levee would prevent hydraulic surface connectivity between Bees Lakes and the Sacramento River. Access roads and appurtenant ramps would be constructed atop the proposed setback and adjacent levees, as well as within the offset area, as described under Alternative 2.

2.2.8.3 Construction Schedule

The project is expected to take 2 to 3 years of construction to complete. In order to conservatively represent potential environmental effects, an intensive 2-year construction schedule is analyzed in this document. Under a 2-year construction schedule, construction of Segments C, D, E, F, and G is expected to be completed in Year 1. Segments A and B likely would be constructed during Year 2. Regrading of borrow sites would be ongoing; regrading of any sites used during Year 2 would be completed in a third year of project construction.

2.2.8.4 Construction Staging

As depicted in Plate 2-6a (revised), three staging areas would be used in the project area. These staging areas are located on the landside of the levee at Segments B, C, and F and would occupy approximately 3.2, 11.0, and 13.1 acres, respectively. These areas would be used for staging construction activities and to provide space to house construction equipment and materials before and during construction activities. The staging area at Segment B (3.2 acres) would correspond with Segment A and B construction, and the staging areas at Segments C (11.0 acres) and F (13.1 acres) would be used for the construction of Segments C through G.

2.2.8.5 Recreation Enhancements

As described above under Road Construction, Marina Access, and Bees Lakes, aggregate base access roads would be built within the offset area and on top of the proposed adjacent and setback levees for inspection, flood-fighting, and vegetation maintenance. Similar to what is described under Alternative 2, these maintenance roads would be opened up to public use by bicyclists and pedestrians, with appurtenant access controls and safety signs. Alternative 5 also would involve construction of bike lanes along Village Parkway, as described under Alternative 2.

2.2.9 Detailed Measure Descriptions

The following measures are the components that make up each action alternative, described in explicit detail to facilitate determination of environmental effects that may result from construction.

2.2.9.1 Seepage Berm

Objective

Seepage berms are wide embankment structures made up of low-permeability to semi-pervious materials that resist accumulated water pressure and safely release seeping water (Plate 2-7). Seepage berms proposed for the Southport project 300 feet in width, extending outward from the landside levee toe and laterally along the levee as needed relative to the seepage conditions. A seepage berm addresses the levee deficiency of under-seepage.

Design and Construction

Generally, seepage berms widths can vary widely, from less than 100 feet up to 300 feet. Typical height of berms is 5 feet at the levee landside toe, tapering to 3 feet at the berm toe, regardless of the berm width. Lateral length depends on seepage conditions along the area of identified levee deficiency.

Construction consists of clearing, grubbing, and stripping the ground surface. Depending on the action alternative, soil used to construct a berm would be stockpiled from levee degradation, excavated from nearby borrow pits, or trucked on site from off-site locations (if on-site material is not adequately available.) During the degrading, soil would be stockpiled at the proposed berm site. If constructing the alternative does not require levee degradation, all soil material used to construct a berm would come from nearby borrow sites. At the borrow sites, bulldozers excavate and stockpile borrow material. Front-end loaders load haul trucks, and the haul trucks subsequently transport the borrow material to the site. The haul trucks dump the material, and motor graders spread it evenly, placing approximately 3 to 5 feet of embankment fill material. Material used for berm construction has greater permeability than the native blanket material. However, depending on material availability, a lower permeability material may be used. Adjustments to berm width are made in such cases, as appropriate. During the embankment placement, material is placed in a maximum of 1- to 2-foot loose lifts, thereby allowing the compactors to achieve the specified compaction requirements. Sheepsfoot rollers compact the material, and water trucks distribute water over the material to ensure proper moisture for compaction and reduce fugitive dust emissions.

Seepage berms may have an optional feature of a drainage relief trench under the toe of the berm. Drained seepage berms include the installation of a drainage layer (gravel or clean sand) beneath the seepage berm backfill and above the native material at the levee landside toe. A drained seepage berm would likely decrease the overall footprint of the berm.

Equipment and materials necessary to construct a seepage berm are listed in Table 2-11.

Table 2-11. Semi-Pervious Berm—Phases, Equipment, and Materials

Phases of Construction	Equipment	Materials
Site preparation (clearing, grubbing, and stripping)	Scraper	Embankment fill material
Embankment fill material placement	Excavator or track hoe	Water
Finish grading	Bulldozer	Aggregate base rock
Site restoration and demobilization	Front-end loader	Hydroseed
	Haul truck	
	Motor grader	
	Sheepsfoot roller	
	Water truck	

Areas used for construction staging, levee slopes, the berm, and any other disturbed areas would be hydroseeded with a native seed mix.

Operation and Maintenance

The only postconstruction permanent facility is the berm. Maintenance of the berm would be similar to the typical O&M practices presently in place for maintenance of levee surfaces.

- Vegetation maintenance up to four times a year by mowing or applying herbicide.
- Control of burrowing rodent activity monthly by baiting with pesticide.
- Slope repair, site-specific and as needed, by re-sloping and compacting.
- Patrol road reconditioning up to once a year by placing, spreading, grading, and compacting aggregate base or substrate.
- Visual inspection at least monthly by driving on the patrol road on the crown and maintenance roads at the base of the levee.

2.2.9.2 Slurry Cutoff Wall

Objective

A slurry cutoff wall consists of impermeable material that is placed parallel to the levee, typically through the center of the levee crown (Plate 2-8). While slurry cutoff walls may be constructed using a variety of methods, this document analyzes the environmental effects of three possible methods for constructing a slurry cutoff wall: (1) conventional slot trench, (2) deep soil mixing (DSM), and (3) jet grouting. For the purpose of this project, the first two methods are being considered for application over longer areas, and jet grouting is a spot application used when conditions limit application of the primary methods. A slurry cutoff wall addresses the levee deficiency of seepage (through- and under-seepage).

Shallow cutoff walls are those that extend through the levee embankment and a portion of the levee foundation. They do not finish into a low permeability aquitard but serve to 'tie together' surface layers, causing them to function more as a blanket layer, and increasing the seepage path. Shallow cutoff walls also serve to cutoff localized seepage pathways, such as high permeability crevasse splay deposits, root pathways, or other subsurface structures. As such, they replace the need for installing an inspection trench beneath or adjacent to new levees. The feasibility and design of these features is evaluated based on local conditions. Fully penetrating conventional cutoff walls (open trench installation with track-hoe) extend through the levee embankment and levee foundation and finish into a low permeability aquitard. Fully penetrating conventional cutoff walls generally are preferred, if feasible to construct, because they are the least costly compared to cutoff walls installed using the DSM, TRD, or clam shell technology, while still providing the advantage that all cutoff walls provide of minimizing construction disturbance outside the levee footprint.

If a fully penetrating wall is not feasible because of the foundation conditions (the lower impervious layer is nonexistent or at a depth impossible to reach with the existing equipment), shallow cutoff walls supplemented with additional methods of seepage control (such as seepage berms or relief wells) may be used.

Conventional Slot Trench Method

Design and Construction

To begin construction, the construction site and any necessary construction staging or slurry mixing areas are cleared, grubbed, and stripped.

In the conventional slot trench method using a soil-bentonite wall, the levee is degraded one-half its height and a trench excavated through the levee center from the top of the levee and into subsurface materials. The size of the trench is based on the severity of the seepage but is typically 3 feet wide and up to 85 feet deep. As the trench is excavated, it is filled temporarily with bentonite water slurry to prevent collapse of the trench. The soil from the excavated trench is hauled to a nearby location where it is mixed with hydrated bentonite to reduce permeability. The soil-bentonite mixture then is returned to the levee and backfilled into the trench. This mixture hardens and creates the impermeable barrier wall in the levee.

Degradation of the levee crown is required for prevention of hydro-fracturing of the levee, or, in the case of a soil-bentonite wall, to prevent slope failures through the slurry wall caused by extremely low trench strength. Degradation also provides a working platform to accommodate seepage berm construction activities, typically a minimum of 55 feet, and allow equipment to reach lower impervious layers. The excavated degradation material is hauled to a nearby stockpile area. Following completion of the slurry cutoff wall, the material is hauled back to the levee to restore the levee to its original dimensions. The material may need to be hauled off site, and borrow material may need to be imported if the in-situ levee material is found to be unsuitable for current levee standards.

One construction crew typically is able to construct 200 to 250 linear feet of slurry wall (approximately 70 to 80 feet deep) in an 8-hour shift. Equipment needed for the crew includes a long-reach track hoe, three or four dump trucks (15–cubic yard capacity each), bulldozers, excavators, loaders, a rough terrain forklift, compactors, maintainers, and a water truck. Vertical clearance of about 40 feet is needed for the excavator boom. Horizontal clearance of about 30 feet beyond the levee crest may be required for excavator swing when loading dump trucks.

A mixing area is located at the construction staging area. The mixing area is to prepare the soil-bentonite mixture and supply bentonite-water slurry. The mixing area is contained to avoid inadvertent dispersal of the mixing materials. Dump trucks haul material between the excavator and the mixing area along the levee.

An all-weather patrol road made of aggregate base rock is constructed on the levee crown to enable regular levee inspections.

The construction equipment and materials necessary to construct a slurry cutoff wall by this method are listed in Table 2-12. Flood lights and generators would also be used for nighttime slurry wall construction. Postconstruction, areas used for construction staging, mixing, the levee crown, slopes, and any other disturbed areas would be hydroseeded with a native seed mix.

Table 2-12. Conventional Slot Trench Slurry Wall—Phases, Equipment, and Materials

Phases of Construction	Equipment	Materials
Site preparation (clearing, grubbing, and stripping)	Scraper	Bentonite
Work platform and trench excavation	Excavator or track hoe	Aggregate base rock
Mixing/placement of soil-bentonite mix	Long-reach track hoe	Hydroseed
Replacement of levee material	Bulldozer	Water (if no available domestic supply)
Finish grading	Front-end loader	Miscellaneous construction support materials
Site restoration and demobilization	Haul truck	Embankment fill material (if existing material is of poor quality)
	Compactor	
	Maintainer	
	Water truck	
	Rough terrain forklift	

Operations and Maintenance

Postconstruction, the only permanent facility is the slurry cutoff wall. Observation for seepage during high-water events would be the only O&M activity needed.

Deep Soil Mixing Method

Design and Construction

The DSM method of constructing a slurry cutoff wall uses a crane-supported set of three mixing augers (typically 36 inches in diameter) set side by side. These augers are drilled through the levee crown and foundation to the required depth (capable of a maximum depth of about 130 feet dependent on the subsurface conditions). As the augers are inserted and withdrawn, a cement-bentonite grout is injected through the augers and mixed with the native soil. Cement may also be added to the mixture to increase strength and reduce curing time when needed. An overlapping series of mixed columns is drilled to create a continuous seepage cutoff barrier (Plate 2-9).

In the DSM method using a soil-bentonite wall, the levee is degraded one-half its height and a trench excavated through the levee center from the top of the levee and into subsurface materials. Where a soil-bentonite-cement wall is used, the levee is degraded one-third its height. Material is scraped and stockpiled at a nearby stockpile area. Dependent on the depth of the wall required, vertical clearance for the crane also may be needed. An excavator manipulates injector return spoils near the DSM rig, and transport trucks are used to haul spoils off site. A crane is used for in-place sampling of DSM material and also for loading bentonite into the batch plant hopper. A mobile batch plant (diesel-powered) is required near each DSM rig at the work area to prepare the cement-bentonite grout. The grout is transported to the DSM rig through flexible hoses. Each batch plant requires a pad of 50 by 100 feet. Hauling at the work area involves scraper runs along the levee to the staging area and deliveries of cement and bentonite to the batch plant.

During DSM slurry wall construction, one DSM rig typically can construct 20 linear feet of DSM wall per 8-hour shift (for wall depths up to 130 feet). An all-weather patrol road made of aggregate base rock is constructed on the levee crown to enable regular levee inspections.

The equipment and materials necessary to construct a DSM slurry wall are listed in Table 2-13. Flood lights and generators would also be used for nighttime slurry wall construction. Postconstruction, areas used for construction staging, the levee slopes, and any other disturbed areas would be hydroseeded with a native seed mix.

Table 2-13. Deep Soil Mixing Slurry Wall—Phases, Equipment, and Materials

Phases of Construction	Equipment	Materials
Site preparation (clearing, grubbing, and stripping)	Scraper	Cement
Work platform excavation	Excavator or track hoe	Bentonite
Deep soil mixing (DSM)	DSM crane	Hydroseed
Replacement of levee material	Bulldozer	Water (if no available domestic supply)
Finish grading	Front-end loader	Aggregate base rock
Site restoration and demobilization	Haul truck	Miscellaneous construction support materials
	Paddle wheel scraper	Embankment fill material (if existing material is of poor quality)
	Water truck	
	Mobile batch plant	

Operation and Maintenance

Postconstruction, the only permanent facility is the slurry cutoff wall. The only O&M activity would be observation for seepage during high-water events.

Jet Grouting Method

Jet grouting involves injecting fluids or binders into the soil at very high pressure (Plate 2-10). The injected fluid can be grout; grout and air; or grout, air, and water. Jet grouting breaks up soil and, with the aid of a binder, forms a homogenous mass that solidifies over time to create a mass of low permeability. Jet grouting typically is used in constructing a slurry cutoff wall to access areas other methods cannot. In this regard, it is typically a spot application rather than a treatment to be applied on a large scale. Jet grouting addresses the levee deficiency of seepage (through- and under-seepage).

Equipment required for jet grouting consists of a drill rig fitted with a special drill string; a high pressure, high flow pump; and an efficient batching plant with sufficient capacity for the required amount of grout and water. The high-pressure pump conveys the grout, air, and/or water through the drill string to a set of nozzles located just above the drill bit. The diameter of the jet grout column is dependent on site-specific variables such as soil conditions, grout mix, nozzle diameter, rotation speed, withdrawal rate, and grout pressure. Jet-grouted columns range from 1 to 16 feet in diameter and typically are interconnected to form cutoff barriers or structural sections. One construction crew, consisting of a site supervisor, pump operator, batch plant operator, chuck tender, and driller under ideal conditions, can construct two 6-foot-diameter, 50-foot-deep columns per day consisting of approximately 100 cubic yards of grout injected per 8-hour shift. Ideal conditions would be characterized by no technical issues such as loss of fluid pressure, breakdown of equipment, or subsurface obstructions to drilling operations occurring at either the batch plant or the drilling site.

To initiate jet grouting, a borehole is drilled through the levee crown and foundation to the required depth (to a maximum depth of approximately 130 feet) by rotary or rotary-percussive methods using water, compressed air, bentonite, or a binder as the flushing medium. When the required depth is reached, the grout is injected at a very high pressure as the drill string is rotated and slowly withdrawn. Rotation speeds range between 10 and 30 rotations per minute (rpm), and the withdrawal rates vary between 2 and 12 inches per minute. Use of the double, triple, and superjet systems create eroded spoil materials that are expelled out of the top of the borehole. The spoil material contains significant grout content and frequently is used as a construction fill.

To provide a wide enough working platform on the levee crown, the upper portion of some segments of the levee may require degradation with a paddle wheel scrapper. Material is scraped and stockpiled at a nearby stockpile area. Hauling at the work area involves scraper runs along the levee to the staging area and grout, bentonite, and water deliveries to the batch plant.

Batch plants typically are centrally located to the injection site, with pipelines for mixed grout that run the length of the work. Grout mixing and injection equipment consists of grout mixers, high-powered grout pumps and supporting generators and air compressors, holding tanks, and water tanks, with bulk silos of grout typically used to feed large mixers. Smaller equipment can be used in combination with the single phase–fluid system and can be permanently trailer-mounted to permit efficient mobilization and easy movement at the job site.

Prior to commencing jet grouting, a field test program would be completed to evaluate injection parameters and to assess jet grout column geometries, and mechanical and permeability properties. Where possible, jet grout test elements are exposed by excavation and properties are obtained by direct measurement. Bulk samples are collected and delivered to a laboratory for unconfined compressive strength and permeability testing, as required. Where excavation is not possible, core drilling is employed to obtain samples from the jet grout test columns for strength testing.

Types of Jet Grouting Systems

A single phase jet grouting system uses the binder to break up and provide soil mixing of the soils surrounding the drill rods. The single jet grouting system is the most versatile; it can be applied at any inclination and in areas where space is restricted. Set up and excavation times are considerably shorter; the method is also less expensive, cleaner, and less noisy than the three-fluid jet grouting system.

A double phase jet grouting system improves the range of influence of the single phase jet grouting system using an aureole of compressed air concentric about the jet of binder. The diameter of a column of soil treated by the single phase jet grouting system can be increased by adding the air component. Additional equipment includes a two-way coaxial drill string and an air compressor.

The triple-phase or Kajima jet grouting system uses water and air to break up the soil to produce partial substitution of the finer soil particles to create a column of stabilized material that may have a diameter exceeding 6 feet. Additional equipment includes a three-way coaxial drill string, an air compressor, and an additional pump and lines for the water phase.

The superjet grouting system is a modified double-phase jet grouting system that uses tooling design efficiencies and increased energy that allow the construction of large columns, up to 16 feet in diameter. The superjet system operates by mechanically and hydraulically focusing the injection of the grout for pinpoint cutting and erosion of very large volumes of soil in situ. The excess soil-grout mixture is simultaneously expelled at the surface, preventing subsurface pressurization and hydrofracturing. A listing of equipment and materials necessary to construct the jet grouting system is provided in Table 2-14. Flood lights and generators would also be used for nighttime slurry wall construction. Areas used for construction staging, the levee slope, and any other disturbed areas would be restored and hydroseeded following construction.

Table 2-14. Jet Grouting Phases, Equipment, and Materials

Phases of Construction	Equipment	Materials
Site preparation (clearing, grubbing, and stripping)	Scraper	
Work platform excavation	Excavator or track hoe	
Jet grouting	Jet grouting drill rig	
	Mobile batch plant	Cement, bentonite
	High pressure, high flow pump	Water
	Piping from drill rig to batch plant (spoil line)	
	Piping from batch plant to drill rig	
Replacement of levee material	Bulldozer	Water
	Haul truck	Embankment fill material
Finish grading	Bulldozer	
Site restoration and demobilization	Haul truck	Miscellaneous construction support materials
	Front-end loader	Embankment fill material
	Paddle wheel scraper	
	Water truck	

Operations and Maintenance

Postconstruction, the only permanent facility is the slurry cutoff wall. Observation for seepage during high-water events would be the only O&M activity needed.

2.2.9.3 Relief Wells

Objective

Relief wells are passive systems that are constructed near the levee landside toe to provide a low-resistance pathway for under-seepage to exit to the ground surface in a controlled and observable manner (Plate 2-11). A low-resistance pathway releases water pressure under the upper impermeable layer, allowing under-seepage to exit without creating sand boils or piping levee foundation materials. Relief wells are an option only in segments where geotechnical analyses have identified continuous sand and gravel layers and the presence of an adequate impermeable layer. Relief wells are used to address the levee deficiency of under-seepage. Relief wells would be applied only on a limited basis for site-specific conditions rather than a segment-wide application.

Design and Construction

Relief wells are constructed using soil-boring equipment to drill a hole vertically through the upper fine-grained layer (usually clays or silty clays), through the coarse-grained aquifer layer of sand or gravel, and into the lower fine-grained clay layer beneath. Pipe casings and gravel/sand filters are installed to allow water to flow freely while preventing transportation and removal of material from the levee foundation, which can undermine the levee foundation. The water then is collected and discharged into RD 900's drainage system utilizing a series of ditches or an underground piping system.

Relief wells generally are spaced at 50- to 150-foot intervals, dependent on the amount of under-seepage, and extend to depths of up to 150 feet. Areas for relief well construction are cleared, grubbed, and stripped. During relief well construction, a typical well-drilling rig is used to drill to the required depth and construct the well (including well casing, gravel pack material, and well seal) beneath the ground surface. The drill rig likely would be an all-terrain, track-mounted rig that could access the well locations from the levee toe.

Areas along the levee toe may be used to store equipment and supplies during construction of each well. Construction of each well and the lateral drainage system typically takes 10 to 20 days. Additional time may be required for site restoration.

Equipment and materials necessary to construct a relief well are listed in Table 2-15.

Table 2-15. Relief Wells—Phases, Equipment, and Materials

Phases of Construction	Equipment	Materials
Site preparation (clearing, grubbing, and stripping)	Scraper	Well casing
Drilling and well installation	Trench excavator or track hoe	Sand and gravel
Finish grading	Drill rig	Concrete
Site restoration and demobilization	Equipment support vehicle	Drain pipe
	Haul truck	Hydroseed
	Motor grader	
	Sheepsfoot roller	
	Water truck	
	Small compactor	

Postconstruction, areas used for construction staging, the levee slopes, and any other disturbed areas would be hydroseeded with a native seed mix.

Operation and Maintenance

Relief wells require regular maintenance to ensure proper operation. Piezometers, also called monitoring wells, could be installed between relief wells to allow monitoring of groundwater levels to ensure the wells are relieving the pressure within the aquifer.

Permanent facilities associated with relief wells include the wells themselves and associated lateral drains. Inspection of the relief wells is required at least annually, and observation of flow from the wells is required during high river stages. The wells are test-pumped every 2 years, and the discharge water from those tests is trucked off site to a central disposal, if necessary. The collection ditch is maintained to allow free flow of water.

2.2.9.4 Slope Flattening

Objective

Slope-flattening is a mechanical method to repair or reshape slopes that do not meet standards for geometry and stability (Plate 2-12). Levee slopes are typically subject to a standard of 3H:1V, but this may vary based on site-specific conditions and supporting engineering analysis. Slope-flattening addresses deficiency related to slope stability and geometry.

Design and Construction

To begin slope-flattening activities, the area is cleared, grubbed, and stripped to provide space for construction and reshaping slopes. Additional embankment fill material may be necessary to achieve slope-flattening. If so, bulldozers excavate and stockpile borrow material from a nearby permitted borrow site. Front-end loaders load haul trucks with the borrow material. The haul trucks transport the material to the slope-flattening site. Motor graders spread material evenly according to levee design plans, and sheepsfoot rollers compact the material. Water trucks distribute water over the material to ensure proper moisture for compaction.

To reshape a waterside slope, the existing crown of the levee is shifted farther landward, and the waterside slope is trimmed and reshaped typically to a 3:1 slope. The shifted levee crown would be a minimum of 20 feet wide, with a 3:1 slope on the landward side, except in cases where landside spatial constraints require use of a 2:1 slope. An all-weather patrol road made of aggregate base rock is constructed on the levee crown.

Equipment and materials necessary to implement slope-flattening treatment are listed in Table 2-16. Postconstruction, the construction staging areas, levee slopes, and any other disturbed areas would be hydroseeded with a native seed mix.

Table 2-16. Slope Flattening—Phases, Equipment, and Materials

Phases of Construction	Equipment	Materials
Site preparation (clearing, grubbing, and stripping)	Scraper	Embankment fill material
Reshaping of slopes and placement of additional fill (if necessary)	Excavator or track hoe	Water
Finish grading	Bulldozer	Aggregate base rock
Site restoration and demobilization	Front-end loader	Hydroseed
	Haul truck	
	Motor grader	
	Sheepsfoot roller	
	Water truck	

Operation and Maintenance

Postconstruction, the only permanent facility is the improved levee. Maintenance of the new levee surfaces would consist of:

- Vegetation maintenance up to four times a year by mowing or applying herbicide.
- Control of burrowing rodent activity monthly by baiting with pesticide.
- Slope repair, site-specific and as needed, by re-sloping and compacting.
- Patrol road reconditioning up to once a year by placing, spreading, grading, and compacting aggregate base or substrate.
- Visual inspection at least monthly, by driving on the patrol road on the crown and maintenance roads at the base of the levee.

2.2.9.5 Adjacent Levee

Objective

The adjacent levee involves the construction of a new levee embankment adjacent to the existing levee (Plate 2-13). This treatment may address the following deficiencies:

- Through-seepage
- Slope stability
- Erosion*
- Noncompliant vegetation
- Encroachments

*Adequacy of this measure for correcting an erosion deficiency is dependent on physical and environmental site conditions.

Design and Construction

The adjacent levee essentially adds material to increase the cross section of the levee, thereby allowing the prescribed 3:1 landside slopes and 20-foot-wide crown to be established. The adjacent levee is constructed on the landward side of the levee.

The first construction phase is clearing, grubbing, and stripping the work site and any construction staging areas, if necessary. A trapezoidal trench is cut at the toe of the slope and the levee embankment may be cut in a stair-step fashion to allow the new material to key into the existing material. Bulldozers then excavate and stockpile borrow material from a nearby borrow site. Front-end loaders load haul trucks with the borrow material, and the haul trucks subsequently transport it to the adjacent levee site. The haul trucks dump the material, and dozers spread it evenly. Sheepsfoot rollers compact the material, and water trucks distribute water over the material to ensure proper moisture for compaction. The landside levee typically is graded at a 3:1 slope, and the levee crown is at least 20 feet wide. The slope may be track-walked with a dozer.

The levee crown is finished with an aggregate base or paved road, depending on the type and level of access desired. Either condition requires importation of material with dump trucks, placement with a loader and motor grader, and compaction. A paver is required for asphalt placement.

Equipment and materials necessary to construct an adjacent levee are listed in Table 2-17. Postconstruction, the levee slopes, areas used for construction staging, and any other disturbed areas would be hydroseeded with a native seed mix.

Table 2-17. Adjacent Levee—Phases, Equipment, and Materials

Phases of Construction	Equipment	Materials
Site preparation (clearing, grubbing, and stripping)	Scraper	Embankment fill material
Material placement and rough grading	Excavator or track hoe	Aggregate base rock
Finish grading	Bulldozer	Hydroseed
Paving (optional)	Front-end loader	Asphalt concrete (optional)
Site restoration and demobilization	Haul truck	
	Motor grader	
	Sheepsfoot roller	
	Water truck	
	Paver (optional)	

Operations and Maintenance

Postconstruction, the only permanent facility is the improved levee. Typical levee O&M in the Southport project area currently includes the following actions.

- Vegetation maintenance up to four times a year by mowing or applying herbicide.
- Control of burrowing rodent activity monthly by baiting with pesticide.
- Slope repair, site-specific and as needed, by re-sloping and compacting.
- Patrol road reconditioning up to once a year by placing, spreading, grading, and compacting aggregate base or substrate.
- Visual inspection at least monthly, by driving on the patrol road on the crown and maintenance roads at the base of the levee.

2.2.9.6 Rock Slope Protection

Objective

Portions of the levee slopes may be protected by the placement of rock slope protection (Plate 2-14). Rock is placed in a layer approximately 2.5 feet thick on the waterside of the levee to protect against erosional forces that threaten levee stability, such as wind, waves, and boat wake. Rock slope protection addresses the levee deficiency of erosion.

Twelve bank erosion sites were identified along the Sacramento River in the project reaches that require repairs. In many instances, these sites would be addressed by the placement of rock slope protection proposed under the action alternatives. However, other sites would require additional work to address erosion problems where there is no overlap with proposed flood risk–reduction measures. Erosion sites not repaired in conjunction with proposed flood risk–reduction measure construction would be addressed through additional rock slope protection placement. Rock slope protection construction would be completed as described in Section 2.2.9, and the location of the erosion sites is described under each action alternative.

Where compliant with USACE levee vegetation policy, the bank protection at the erosion sites is designed both to control erosion and to maintain existing vegetation and IWM. This can be accomplished by incorporating rock benches that serve as buffers against erosion while providing space for planting riparian vegetation and creating a platform to support aquatic habitat features. Such features would be subject to and designed in compliance with USACE levee vegetation guidance, where applicable.

Design and Construction

The placement of rock onto the levee slope would occur either from atop the levee or from the waterside by means of barges, or both. Rock required within the channel, both below and slightly above the surface of the water at the time of placement, would be placed by a crane located on a barge and then spread by an excavator located on top of the levee. Construction would require two barges—one barge would carry the crane while the other barge would hold the stockpile of rock to be placed on the channel slopes—and one excavator located on top of the levee. Rock required on the upper portions of the slopes would be placed by an excavator located on top of the levee. Rock placement from atop the levee would require one excavator and one loader for each potential placement site. The loader brings the rock from a permitted source within 25 miles of the project area and dumps it within 100 feet of the levee. The excavator then moves the rock from the stockpile to the waterside of the levee. Soil may be placed in the interstitial spaces, followed by hand installation of native vegetation where outside the vegetation-free zone, consistent with USACE levee vegetation policy. Equipment and materials necessary for rock slope protection are listed in Table 2-18. Postconstruction, areas disturbed by the equipment or the rock stockpile area would be hydroseeded with a native seed mix.

Table 2-18. Rock Slope Protection—Phases, Equipment, and Materials

Phases of Construction	Equipment	Materials
Site preparation (dependent on site conditions: clearing, grubbing, and stripping)	Scraper	Rock and soil (optional)
Rock placement	Crane	Bedding material, rock, hydroseed
	Excavator	
	Loader	
	Barges	
Biotechnical element installation	Hand tools	Geotextiles, coir fabric, coir logs, and stakes (optional)
Site restoration and demobilization	Haul truck	Pole cuttings, container stock, and transplanted vegetation (optional)

Operation and Maintenance

Postconstruction, only the rock slope protection and native vegetation and other biotechnical features are permanent. O&M for plantings may include irrigation, weeding, and monitoring during an establishment period.

2.2.9.7 Setback Levee

Objective

A setback levee is an entirely new section of levee constructed at some distance behind the landside of the existing levee (Plate 2-15). The existing levee remains in place or is removed or breached, depending on conditions. The new section of levee is tied into the existing levee and then becomes the Federal project levee.

A setback levee can address the following deficiencies:

- Through-seepage
- Slope stability and geometry
- Erosion*
- Noncompliant vegetation
- Encroachments

* Adequacy of this measure for correcting an erosion deficiency is dependent on physical and environmental site conditions.

Design and Construction

The new levee section is constructed to meet current design standards, including height and slope requirements. To begin construction activities, the area required to construct the new levee is cleared, grubbed, and stripped. To construct the new section of levee, bulldozers excavate and stockpile borrow material from a nearby permitted borrow site. Front-end loaders load haul trucks with the borrow material. The haul trucks transport the material to the new levee site, where motor graders spread it evenly. Sheepsfoot rollers compact the material, and water trucks distribute water over the material to ensure proper moisture for compaction. Levee slopes are graded to a 3:1 slope, and a crown at least 20 feet wide is created. For the purpose of levee inspection, an aggregate base, all-weather patrol road is constructed on the crown of the new levee.

If the material from the existing levee is of sufficient quality and not intended to remain in place, it may be excavated and used as fill for the new setback levee. If the existing levee is excavated, grading may be necessary in the offset area (between the new levee and the river) to ensure proper drainage.

Equipment and materials necessary to construct a setback levee are listed in Table 2-19. Postconstruction, construction staging areas, levee slopes, and any other disturbed areas would be hydroseeded with a native seed mix.

Table 2-19. Setback Levee—Phases, Equipment, and Materials

Phases of Construction	Equipment	Materials
Site preparation (clearing, grubbing, and stripping)	Scraper	Embankment fill material
Embankment fill material placement	Excavator or track hoe	Water
Finish grading	Bulldozer	Aggregate base rock
Site restoration and demobilization	Front-end loader	Hydroseed
	Haul truck	
	Motor grader	
	Sheepsfoot roller	
	Water truck	

Operations and Maintenance

Postconstruction, the only permanent facility is the improved levee. O&M would be the same as for a typical levee, described under Section 2.2.9.5, Adjacent Levee.

2.2.9.8 Encroachment Removal

Objective

Levee standards for vegetation and encroachments may require removal of encroachments, such as structures, certain vegetation, levee penetrations (e.g., pipes, conduits, cables), power poles, pump stations, and similar features from the levee prism. This measure would include the demolition of such features and relocation or reconstruction as appropriate on a case-by-case basis (or retrofit to comply with standards).

Design and Construction

General Description

Encroachment removal techniques would be implemented based on the needs of the specific encroaching feature. Smaller encroachments would be removed, relocated, or retrofitted by manual labor of small crews (approximately two to 10 laborers) using hand tools. Larger encroachments would require machinery such as an excavator, skid-steer, and bulldozer. Dump trucks would be used for off-site hauling and disposal of removed material at a permitted commercial source. Encroachments that substantially penetrate the levee (like footings or large woody vegetation) would require levee reconstruction, discussed as a separate measure. Equipment and materials necessary for encroachment removal are listed in Table 2-20. Relocations would require similar equipment.

Table 2-20. Encroachment Removal—Phases, Equipment, and Materials

Phases of Construction	Equipment	Materials
Encroachment removal and/or relocation	Excavator	Debris
	Skid-steer	
	Bulldozer	
	Loader	
	Dump truck	
Site restoration and demobilization	Haul truck	Hydroseed
	Water truck	Water

Postconstruction, areas disturbed by the equipment would be hydroseeded.

Vegetation Policy Compliance

As introduced in Chapter 1, vegetation removal under the Southport project would be limited to only vegetation that is in the project's flood risk–reduction measures footprint to address other deficiencies. New levees (such as setback levees) would be designed to be compliant with USACE levee vegetation policy.

Consistent with the CVFPP guidance, vegetation would be removed to meet specific project objectives. Any vegetation removed as part of direct construction activities would not be replaced at that location, but would require off-site, in-kind mitigation, to be determined in consultation with the appropriate resource agencies.

In accordance with USACE levee vegetation guidance, WSAFCA would submit a detailed removal plan to the local USACE District Levee Safety Officer for review and comment prior to removal of vegetation. Methods for removing noncompliant vegetation are identified below.

- By excavation, remove the trunk (or stem), stump, rootball, and all roots greater than 0.5 inch in diameter; all such roots in, or within 15 feet of, the flood risk–reduction structure will be completely removed.
- Ensure that the resulting void is free of organic debris.
- Cut poles to salvage propagation materials for replanting, such as willows and cottonwoods.
- Conduct hand clearing using chainsaws and trimmers.
- Conduct mass clearing using bulldozers.

Operations and Maintenance

General

O&M would be the same as for a typical levee, described under Section 2.2.9.5. Any remaining or replaced encroachments would be maintained as they were preproject.

Management of Woody Vegetation

For woody vegetation remaining after construction and until an alternative long-term compliance strategy is agreed upon (which ultimately may include a variance but not as part of this project), the levees would be maintained per the approved USACE O&M manual applicable to this reach (subject to revision).

2.3 No Action Alternative

2.3.1 Introduction to No Action

Identification and analysis of a no action alternative are required pursuant to NEPA, and a no project alternative is required for CEQA. The purpose of the no action or no project alternative is to serve as a benchmark against which the effects of the action alternatives may be evaluated. For NEPA, *no action* is defined as those conditions that would result if USACE were to issue neither Section 408 permission nor permits under Section 404 of the CWA and Section 10 of the RHA.

Because the action alternatives all would require Section 408 permission from USACE for WSAFCA to implement a project, the No Action Alternative consists of continuation of current conditions and O&M practices that reasonably would be expected to occur in the foreseeable future if the Southport project were not implemented.

For CEQA, the no project analysis must discuss the existing conditions at the time the notice of preparation is published, as well as what would be reasonably expected to occur in the foreseeable future if WSAFCA were not to adopt and implement a project. Thus, to comply with both NEPA and CEQA, the Southport No Action Alternative analysis discusses effects in the context of both a reasonably foreseeable future condition and of the existing environmental conditions. A more detailed description of the No Action Alternative follows.

2.3.2 No Flood Risk–Reduction Measures Implemented under the No Action Alternative

Under the No Action Alternative, WSAFCA would not implement flood risk–reduction measures beyond current routine O&M. Current O&M activities are described in Section 2.2.3.3, *Common Elements and Assumptions*. The levees surrounding the city would continue to require risk-reduction measures to meet current levee design criteria and FEMA's minimum acceptable level of performance, as well as continue being deficient relative to the state's requirement for urbanized areas. In addition, the associated risk to human health and safety and property and the adverse economic effect that serious flooding could cause would continue, and the risk of a catastrophic flood would remain high. Again, however, regular O&M of the levee system would continue as currently executed by the local maintaining entities.

Because of uncertainties in local, state, and Federal funding; future state and Federal authorization; and other approvals, it is not reasonable to predict construction of levee repairs in the foreseeable future within a reasonable timeframe (see below for further discussion). Therefore, for the purpose of evaluating effects under the No Action Alternative, this EIS assumes that a project to achieve 200-year level of performance would not be implemented, the purpose and objectives would not be met, and the current level of flood risk would continue.

2.3.2.1 Future State or Federal Action

As the Sacramento River South Levee has known deficiencies, even if WSAFCA were not pursuing flood risk–reduction measures, it is possible that USACE and/or the State of California would repair the levees around the city at some time in the future in order to meet Federal and/or state flood risk–reduction obligations associated with the Federal flood management system.

One such example of possible Federal action is the West Sacramento GRR. As discussed in Chapter 1, the study area of the West Sacramento GRR overlaps and is similar to WSAFCA's planning area. The primary objective of the GRR is to determine the extent of Federal interest in reducing flood risk in the study area while exploring opportunities to increase recreation and restore the ecosystem along the Sacramento River. Based on the criteria used by WSAFCA to screen the EIPs, it can be expected that the Southport project action alternatives are consistent with those considered through the West Sacramento GRR process and that would be implemented by USACE with the state and WSAFCA as non-Federal partners. The environmental effects would be the same as or similar to those analyzed in this EIS (the GRR is subject to independent NEPA review). Initiated in March 2009, the GRR is expected to be presented to Congress for authorization in 2015, meaning the earliest that Federal levee flood risk–reduction measures would be constructed under the GRR is 2016. However, Federal funding for USACE projects has been on a downward trend, and the outlook for subsequent funding appropriation if a project were to be authorized is highly uncertain.

Other Federal programs, such as SRBPP and PL84-99, have implemented repairs on the levees protecting West Sacramento; however, these programs are targeted at dynamically shifting site-specific emergent conditions (most typically erosion) across a geographic scope widely ranging far beyond West Sacramento. Therefore, any future repairs under these programs, even if they were to occur in West Sacramento, would not comprehensively address the deficiencies affecting West Sacramento's flood risk. Further, future authorization and appropriation of these programs is uncertain, making them unreliable from a flood risk management planning perspective.

At the state level, regional flood management plans are being developed under the CVFPP, including West Sacramento. However, construction of projects under the CVFPP presently is under-funded for comprehensive and complete implementation.

Despite the possibility of eventual state- or federally led implementation of repairs, for the purpose of evaluating effects under the No Action Alternative, this EIS assumes that flood risk–reduction measures would not occur. This assumption provides the most conservative approach for disclosure and comparison of potential effects. Therefore, as stated above, the No Action Alternative assumes the project purpose and objectives would not be met, and the current level of flood risk would continue.

2.3.2.2 Consequences of Levee Failure

Assuming that no levee repair or strengthening would occur under the No Action Alternative means that the Southport levee, a substantial link of the West Sacramento levee system, likely would become increasingly vulnerable to failure as a result of identified seepage, erosion, and slope instability. These conditions could cause levee failure, and a failure in the Southport levee could inundate not only the Southport area but northern areas of the city as well. These circumstances are detailed below. In brief, a Southport levee failure could trigger widespread flooding; extensive damage to the city's residential, commercial, agricultural, and industrial structures; and potential loss of life and property. Extensive damage to utilities, roadways, and other infrastructure systems likely would occur. The water supply and sewage facilities likely would fail. Floodwaters would become contaminated by chemicals released from inundated vehicles, homes, industrial facilities, businesses, and equipment. The magnitude of the flood damage would depend on the location of the levee breach, severity of the storm, and river flows at the time of levee failure. To avoid and minimize these consequences, WSAFCA's member agencies would initiate the protocols described in the Emergency Operations Plan, as detailed in Chapter 1, Section 1.4.3.1, Non-structural Measures for Flood Risk Management.

In 2006, a hypothetical levee failure along the Southport levee reach was analyzed for West Sacramento using 100-year water surface elevations and hydrology. This analysis was performed to assist the City in its flood emergency preparedness planning (the hypothetical failure location is shown in Plate 2-16). (Wood Rodgers 2006.)

Flood-depth maps prepared for West Sacramento indicate that under a 100-year flood event scenario, inundation levels would range from 1 foot to 15 feet, depending on the local elevation of the land surface. Plate 2-17 shows the ultimate estimated inundation depths for a 100-year flood event.

A failure on the Southport levee during a 100-year flood event would flood the entire Southport area with at least 1 foot of water within 24 hours. Jefferson Boulevard, the primary vehicular evacuation route for Southport, would be inundated by 1 foot of water within 4 hours, making it impassable. Plate 2-16 shows the estimated time to 1-foot inundation depths throughout the Southport area. Inundation depth could reach 3 feet in 36 hours and more than 10 feet after 3 days (Plate 2-16). (Wood Rodgers 2006.)

David Ford Consulting Engineers performed an economic and risk analysis for the WSLIP (David Ford Consulting Engineers 2010: Appendix D). In support of that analysis, potential flood scenarios were developed by MBK Engineers using the Sacramento River UNET hydraulic simulation model. To develop these scenarios, simulations were made with potential levee breaches at different locations to determine the relationship between water surface elevations in the river at the breach and the resulting water surface elevation in the flooded area. One such location was on the Southport levee. This analysis has been used to assess the potential effect citywide from a levee failure in the Southport area. The flood events used in this analysis included the 100-year (1% annual chance of exceedance) and 200-year (0.5% annual chance of exceedance), along with other events, based on hydrology developed by USACE.

Plates 2-18 and 2-19 show the estimated inundation areas based on the results of these simulations for the 100- and 200-year flood events. The inundation area also is shown for a scenario with no Southport levee failure, which allows for comparison of flooding effects to the north area of the city both with and without a levee failure in Southport. In the 100-year flood event simulation, the Southport levee failure causes an increase in flood depth in the north of up to 2.6 feet and increases the flooded area from 330 acres to 870 acres (a 164% increase). In the 200-year flood event simulation, the Southport levee failure causes an increase in flood depth in the north of up to 1.0 foot and increases the flooded area from 3,620 acres to 4,120 acres (a 14% increase).

Consequently, a levee failure in Southport could affect the entire city, jeopardizing lives, and would cause substantial damage to structures, contents, and other property such as landscaping and automobiles. As of 2005, 40,439 residents were living in 15,448 housing units in the city (Sacramento Area Council of Governments 2008a, 2008b). All of these residents could be displaced by a catastrophic flood event. Additionally, the city is home to 30,655 jobs (Sacramento Area Council of Governments 2008c), 734 commercial and industrial structures, 46 public structures, and 27 park facilities, all of which would be affected by a flood event (HDR 2009).

Environmental and agricultural resources could sustain major damage in a flood event; 22.6% of the land area in the city is either farmland or open space (City of West Sacramento 2009). Damage to agricultural equipment, outbuildings, and processing facilities could lead to reduction in agricultural productivity, which could cause depression of the agricultural economy, abandonment of or prolonged delay in cultivation of productive lands, and ultimately a change in the use of these lands that may be difficult to reverse. Topsoil could be lost either to erosion or overcovering. A 2010 report indicated that flood damages would be approximately $2.4 billion (David Ford Consulting Engineers 2010).

A flood event could cause severe public health hazards as well. Flooding in the city could upset and spread stored hazardous materials, creating hazardous conditions for the public and the environment. Flood damage to homes and other structures could render them dangerous because of structural damage and contamination. The likelihood of a significant amount of mold production is high after a flood event, not only threatening the physical integrity of structures but also posing its own health risks. Mold can cause lung infections, skin irritations, and other health dangers, especially for those with asthma, allergies, or suppressed immune systems. Additionally, the floodwaters and ponds left behind could provide a wide breeding ground for mosquitoes and other disease vectors.

Effects on the water supply system could be particularly severe in a flood event and could leave residents and businesses without a reliable water supply for a significant amount of time, as a single break in a water delivery pipe or main could contaminate the entire city's water supply. Electrical systems could be damaged by flooding, which could increase the potential for fires, and natural gas leaks could result in poisoning through fume inhalation or could cause a sudden explosion if sparked.

A major flood event could result in substantial stress on or disruption of the region's emergency response capacity, hospital services, and other critical lifelines of West Sacramento. Varying levels of damage could be done to public service structures as well, causing delays in fire protection, police protection, or emergency medical assistance. A major flood event could stress the region's emergency response and hospital services, as the likelihood of injury resulting from the flood event is high, and evacuees may not have access to their regular medications.

In addition, emergency flood-fighting and clean-up actions would require the use of a considerable amount of heavy construction equipment. Timing and duration of equipment use would correlate directly with flood-fighting needs, but it is likely that air pollutants emitted would violate air quality standards (including those for which the area is already considered to be in nonattainment) and expose sensitive receptors to toxic air emissions. Depending on the magnitude of the flood, flood-fighting could last for weeks or even months. Furthermore, because of the unpredictable nature of an emergency response, there would be no best management practices (BMPs) to manage emissions. Criteria pollutants and GHG emissions could result from mobile and off-road vehicle emissions during emergency response activities. Emergency construction and repair activities would also be implemented without the use of water quality BMPs and could result in release of contaminants into the soil (groundwater) and adjacent surface water, as well as increased erosion, which could raise total suspended sediment (TSS) and turbidity in adjacent water bodies.

A flood event could also cause damage to natural resources. Fish and aquatic resources could be harmed by water-quality effects related to upset and spread of stored hazardous materials during flooding, emergency construction and repair activities, spills of hazardous materials, erosion, and increased TSS and turbidity. Hydraulic forces of the flood itself, as well as the clean-up efforts, could cause significant loss of vegetation and habitat quality, which would in turn affect wildlife species.

During the recovery period after a flood event, West Sacramento residents would require temporary housing, and displacement of many or all occupants would occur while levees, buildings, and other infrastructure were repaired. Businesses, social services, and other employers occupying affected structures would be forced to relocate. The potential number of displaced residents (more than 40,000) and businesses (more than 30,000 jobs) is so large that the demand for temporary quarters likely would exceed the available supply of vacant buildings surrounding the West Sacramento area. Thus, many displaced residents and businesses may be forced to relocate to areas a considerable distance from West Sacramento, resulting in substantial intermediate-term and long-term economic effects on the West Sacramento area and its people. These effects include changes in employment numbers and patterns, business and personal incomes, tax revenues, and regional economic activity.

Similarly, levee failure could significantly change the land uses in urban areas, both temporarily and permanently, and result in the physical division of established communities. A period of months or years would be required for cleanup and repair after a large flood event, during which time the affected parcels would be temporarily unable to support their designated land uses. Damages sustained by residential, commercial, civic, and industrial areas inundated by flooding could be so great as to render the properties permanently unusable. Additionally, the cost of cleanup and repair after flooding could be too great to make restoring the current land use worthwhile, resulting in permanent changes to land use in West Sacramento and potential division of established communities.

A flood event in West Sacramento would disrupt state and interstate highway, rail, and shipping traffic, causing long-term effects on the region's and the state's economy and ability to move people and goods. West Sacramento has one of the most comprehensive transportation networks on the West Coast. Its central geographic location and extensive north-south and east-west highway access have made it a major distribution center. High volumes of truck and passenger traffic pass through the city on Interstate 80 (I-80) and U.S. Highway 50 (US 50)/Business 80 every day, with truck traffic transporting approximately $63 billion worth of cargo annually through West Sacramento (HDR 2009). Major transcontinental rail lines passing through the city provide commercial and passenger rail service to all parts of the nation, and the Port of West Sacramento runs domestic and international shipping services (City of West Sacramento 2009). Approximately 9.3 million tons of rail freight valued at approximately $5 billion travel through West Sacramento annually (HDR 2009). Flooding of this transportation and distribution infrastructure would cut off major statewide and interstate transportation corridors.

Examples of key facilities for government and commerce in West Sacramento that would be affected by a flood event are the CHP Academy, regional distribution centers for the U.S. Postal Service and United Parcel Service, Raley Field, offices for the California Department of General Services and California State Teachers' Retirement System, the Port of West Sacramento, wastewater treatment facilities, I-80, US 50, and numerous other government and commercial buildings and infrastructure. Other important facilities and infrastructure are listed in Chapter 1, Table 1-2.

Finally, a flood event could change the visual character of and recreation opportunities in the Southport area. Such an event would cause a change in the existing visual character and potentially could lay waste to miles of land. Scenic vistas would be significantly altered for an extended period of time, or irreparably damaged, because views across this landscape would be so changed. Given the extent of catastrophic levee failure and the amount of people affected, barren or destroyed landscape would reduce the visual enjoyment of areas that were once well regarded, which could invoke deep emotional responses in viewers. In addition, a flood event could render recreation facilities, informal recreation areas, and trails unusable until cleanup and restoration activities could be undertaken. It is possible that after a catastrophic flood event, recreation facilities may never be fully restored to their former condition, permanently reducing the quality and/or quantity of recreation opportunities in the area. In addition, scenic vistas for existing and future recreation activities and facilities could be damaged irreparably or for an extended period of time, which would reduce the enjoyment derived by recreationists.

2.3.3 Relationship of Federal Emergency Management Agency Risk Map to No Action

Further complicating the no action scenario is the FEMA RiskMap process, a national effort to revise Flood Insurance Rate Maps (FIRMs). FEMA's most recent (1995) designation for a majority of the city is Zone X, indicating areas that have less than a 1% chance of flooding in any given year (100-year level of performance). FEMA is in the process of reevaluating the level of flood risk management provided by the levee system protecting the city. If the city were remapped from Zone X to an A, AE, AR, or A-99 Zone, flood insurance would become mandatory for all citizens and businesses that hold federally guaranteed mortgage loans. In addition, Federal and state regulations would prevent or constrain development in the city, which may further delay flood risk–reduction funding because a flood risk–reduction development fee is incurred for new development.

2.3.4 Levee Vegetation Policy and No Action

Compliance with USACE levee vegetation policy in the Sacramento Valley is complex because of the overlays of flood management objectives, protected fish and wildlife habitat, environmental regulations, overlapping jurisdictional authorities, and recreation and other social values.

In light of these circumstances, the No Action Alternative reflects multiple possible future scenarios. At this time, it is considered too speculative to adopt and consider a single one of these scenarios as the sole or most likely outcome. Therefore, this document acknowledges and analyzes the following conditions in regard to the USACE levee vegetation policy as it relates to the No Action Alternative for the actions under consideration.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal

based on engineering inspection and evaluation, and LCM (as described in Chapter 1). A system-wide improvement framework (SWIF) may be developed in the future and could present a plan toward meeting USACE levee vegetation policy.

The potential effects of all three of these scenarios are discussed in this EIS. While full or partial compliance with USACE levee vegetation policy is expected as the foreseeable future condition, the project action alternatives are compared to a scenario in which there is no application of the ETL to disclose the full potential range of effects on the current environmental conditions.

2.3.5 Recreation and Restoration under No Action

The No Action Alternative would delay implementation of certain elements of the Parks Master Plan and the Bicycle and Pedestrian Path Master Plan. The recreation corridors proposed in these plans include bike and pedestrian trails that lie on top of the levee and other recreation features that occupy the waterside and landside of the levee. Because the levee along this reach of the Sacramento River will need to be improved eventually, and because these construction activities likely would require the temporary removal or relocation of any recreation facilities on or near the levee, it is possible and even probable that funds would not be expended to construct some or all of these recreation features prior to flood risk–reduction measure construction activities.

Similarly, without structural modifications to the levee system, habitat restoration opportunities in the floodplain are highly limited and likely would not be implemented absent construction of flood management measures.

2.4 Environmental Commitments

ECs are measures proposed as elements of the proposed action and are to be considered in conducting the environmental analysis and determining effects and findings. The purpose of ECs is to reflect and incorporate best practices into the project that avoid, minimize, or offset potential environmental effects. *Note: The term* mitigation *is specifically applied in this EIS only to designate measures required to reduce environmental effects triggering a finding of significance.* These best practices tend to be relatively standardized and compulsory; they represent sound and proven methods to reduce the potential effects of an action. The rationale behind including ECs is that the project proponent commits to undertake and implement these measures as part of the project in advance of effect findings and determinations in good faith to improve the quality and integrity of the project, streamline the environmental analysis, and demonstrate responsiveness and sensitivity to environmental quality.

Summarized in Table 2-21, the ECs for the Southport project apply to each and all alternatives other than the No Action Alternative. To avoid and minimize construction-related effects, WSAFCA will implement the following ECs to reduce or offset short-term, construction-related effects. Measures have been developed for each of the topics below, to be applied to the Southport project resource analyses.

1 **Table 2-21. Environmental Commitments**

Environmental Commitment	Timing	Responsible Party
Nesting or Roosting Raptors Survey	Prior to construction	WSAFCA, in coordination with CDFW
Protection of Regulated and Riparian Trees	Prior to and during construction	WSAFCA, in coordination with CDFW and the City of West Sacramento
Invasive Plant Species Prevention	During and following construction	WSAFCA, in coordination with the Yolo County Agricultural Commissioner
Noise-Reducing Construction Practices	During construction	WSAFCA, in coordination with its contractor
Property Acquisition Compensation and Temporary Resident Relocation Plan	Prior to and during construction	WSAFCA, in coordination with its contractor
Traffic Control and Road Maintenance Plan	During construction	WSAFCA, in coordination with City and county public works departments
Coordination to Ensure Minimal Overlap in Disturbances to Traffic during Construction	Prior to and during construction	WSAFCA, in coordination with the City
Construction Area Closure Notification	Prior to construction	WSAFCA
Minimize Construction-Related Effects on Navigation	During construction	WSAFCA
Preserve Marina Access	During construction	WSAFCA
Minimize Effects Associated with Recreation Enhancements	During construction	WSAFCA
Stormwater Pollution Prevention Plan	Prior to construction	WSAFCA, in coordination with its contractor
Bentonite Slurry Spill Contingency Plan (Frac-Out Plan)	Prior to construction	WSAFCA, in coordination with its contractor
Spill Prevention, Control, and Countermeasure Plan	Prior to construction	WSAFCA, in coordination with its contractor
Turbidity Monitoring in Adjacent Water Bodies	During construction	WSAFCA
Groundwater Well Protection Measures	During construction	WSAFCA
Soil Supply Protection Measures	Prior to, during, and following construction	WSAFCA
Soil Hazards Testing and Soil Disposal Plan	Prior to construction	WSAFCA, in coordination with its contractor
Giant Garter Snake and Its Habitat Effects Minimization	Prior to and during construction	WSAFCA, in coordination with its contractor and CDFW
Roadway Noise and Light Reduction	Prior to construction	WSAFCA
Mosquito and Vector Control Management Plan	During and following construction	WSAFCA, in coordination with its contractor and the Sacramento-Yolo Mosquito and Vector Control District
Aquatic Invasive Species Prevention	Prior to and during construction	WSAFCA, in coordination with CDFW
Construction-Related Damage Assessment	Prior to, during, and after construction	WSAFCA, in coordination with its contractor

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2.4.1 Nesting or Roosting Raptors Survey

For construction between February 1 and August 31, WSAFCA will perform preconstruction surveys to determine whether raptors are nesting or roosting at or adjacent to staging or construction areas. In the event nesting or roosting raptors are identified, WSAFCA will coordinate with CDFW to identify measures to ensure raptors are not adversely affected. These measures may include implementation of suitable buffers and phasing of construction.

2.4.2 Protection of Regulated and Riparian Trees

WSAFCA will comply with the City's Tree Preservation Ordinance requirements and CDFW specifications for the streambed alteration agreement. Compensation for the loss of trees protected by the City of West Sacramento tree ordinance and not already compensated for as riparian trees or nonriparian native trees (nonriparian nonnative trees) will be provided in accordance with Chapter 8.24 of the West Sacramento Municipal Code. WSAFCA will also implement the following measures.

- Protect heritage trees that occur in the vicinity of the project site and outside the construction area by installing protective fencing. Protective fencing will be installed along the edge of the construction area (including temporary and permanent access roads) where construction will occur within 20 feet of the dripline of an oak or native tree 4 inches or more in diameter at 4.5 feet above the ground (as determined by a qualified biologist or arborist).
- Provide signs along the protective fencing at a maximum spacing of one sign per 100 feet of fencing stating that the area is environmentally sensitive and that no construction or other operations may occur beyond the fencing.
- Retain a certified arborist to perform any necessary pruning of oak or native trees along the construction area, in accordance with International Society of Arboriculture standards.
- Prepare tree and riparian habitat mitigation and monitoring plans. Potential mitigation areas will be evaluated by a qualified restoration ecologist, biologist, or certified arborist to determine their suitability to support the target native tree species.

2.4.3 Invasive Plant Species Prevention

WSAFCA or its contractors will implement one or more of the following actions to avoid and minimize the spread or introduction of invasive plant species. In addition, WSAFCA will coordinate with the Yolo County Agricultural Commissioner to ensure that the appropriate BMPs are implemented for the duration of the construction of proposed projects.

- Educate construction supervisors and managers about the importance of controlling and preventing the spread of invasive plant infestations.
- Treat small, isolated infestations with eradication methods that have been approved by or developed in conjunction with the Yolo County Agricultural Commissioner to prevent and/or destroy viable plant parts or seeds.
- Minimize surface disturbance to the greatest extent feasible to complete the work.
- Use native, noninvasive species or nonpersistent hybrids in erosion-control plantings to stabilize site conditions and prevent invasive plant species from colonizing.
- Use erosion-control materials that are weed-free or contain less than 1% weed seed.

- Conduct annual monitoring visits for 5 years to ensure that no new occurrences have established, or as prescribed in permits for other regulations.

2.4.4 Noise-Reducing Construction Practices

WSAFCA will require the construction contractor to follow noise-reducing construction practices such that noise from construction does not exceed applicable City noise ordinance limits or, at a minimum, to implement measures to reduce noise to acceptable levels. Measures that can be used to limit noise may include but are not limited to the following actions.

- Locating equipment as far as practical from noise-sensitive land uses.
- Using sound control devices such as mufflers on equipment.
- Using equipment that is quieter than standard equipment.
- Using noise-reducing enclosures around noise-generating equipment.
- Providing for temporary relocation if noise will exceed acceptable levels for an extended duration.

2.4.5 Property Acquisition Compensation and Temporary Resident Relocation Plan

Several of the proposed flood risk–reduction measures would require land acquisition and removal of residences to accommodate the expanded footprint of the levee system. Permanent land acquisition may be necessary for implementation of adjacent levees, relief wells, seepage berms, slope-flattening, and setback levees. In addition, sufficient land would need to be acquired to establish an appropriate maintenance corridor at the landside toes of all improved levees. Permanent acquisition, relocation, and compensation services will be conducted in compliance with Federal and state relocation laws, which are the Uniform Act of 1970 (42 USC 4601 et seq.) and implementing regulation, 49 CFR Part 24; and California Government Code Section 7267 et seq. These laws require that appropriate compensation be provided to displaced landowners and tenants and that residents may be relocated to comparable replacement housing.

In some cases, construction of flood risk–reduction measures may result in temporary disruption of utilities (water, telephone, electricity, gas, and sanitary sewer), loss of vehicle or pedestrian access for durations too lengthy for convenient day-to-day living, and/or construction-related noise outside City ordinance limits. During some periods of time, construction activities may be directly adjacent to homes. In these cases, WSAFCA will provide assistance for residents to relocate temporarily during construction activities and provide compensation to residents for reasonable rent and living expenses incurred as a result of relocation. WSAFCA will develop a Temporary Resident Relocation Plan to guide temporary relocation services and compensation. The Temporary Resident Relocation Plan will, at a minimum, serve the following functions.

- Outline the process for providing notice of relocation.
- Provide guidelines for relocation services and compensation.
- Ensure that 24-hour security for vacated homes is provided.
- Provide for temporary occasional access of vacated homes by residents (for long-duration construction periods).

- Ensure all compensation and relocation activities are conducted in compliance with Federal and state relocation laws, which are identified above.
- Ensure that the Temporary Resident Relocation Plan in no way offsets, eliminates, or reduces rights to compensation and relocation assistance resulting from required property rights.
- Ensure that the properties are returned to the property owners in an undamaged, clean condition, unaffected by residual dust or debris, in a manner consistent with the condition of the property prior to commencement of construction.
- Provide for cleaning or restoration of affected property improvements.

2.4.6 Traffic Control and Road Maintenance Plan

WSAFCA, in coordination with relevant City and county public works departments, will develop and implement traffic control plan(s) for the proposed project. The traffic control plan will be prepared in accordance with the Caltrans *Transportation Management Plan Guidelines* and the Caltrans *Manual of Uniform Control Devices*, and will be circulated to Caltrans and all affected jurisdictions.

A traffic control plan describes the methods of traffic control to be used during construction. All on-street construction traffic will be required to comply with the local jurisdiction's standard construction specifications. The plan would reduce the effects of construction on the roadway system in the project area throughout the construction period. Construction contractors will follow the standard construction specifications of affected jurisdictions and obtain the appropriate encroachment permits, if required. The conditions of the encroachment permit will be incorporated into the construction contract and will be enforced by the agency that issues the encroachment permit.

Road closures may be of varying duration, measured in hourly periods or up to several weeks in some instances. Proposed lane closures during the a.m. and p.m. commuting hours will be coordinated with the appropriate jurisdiction and minimized during the morning and evening peak traffic periods. Commuters will be notified of the construction schedule to help avoid potential disruptions. Standard construction specifications also typically limit lane closures during commuting hours. Lane closures will be kept as short as possible and detour signage, if detours are available, will be posted around construction sites. Advance notice signs of upcoming construction activities will be posted at least 1 week in advance so that road and rail users are able to avoid traveling through the construction area during these times or at least are aware of inconveniences.

Safe pedestrian and bicyclist access, if any exists on the current roadway, will be maintained in or around the construction areas at all times. Construction areas will be secured as required by the applicable jurisdiction to prevent pedestrians and bicyclists from entering the work site, and all stationary equipment will be located as far away as possible from areas where bicyclists and pedestrians are present. Further, all construction-related and temporary safety signage, construction-related equipment, fencing, and materials will be placed in a manner that does not obstruct active bicycle and pedestrian facilities including shoulders, bike lanes, bikeways, bike paths, and sidewalks, where applicable. WSAFCA will notify and consult with emergency service providers to maintain emergency access and facilitate the passage of emergency vehicles on city streets.

WSAFCA will provide adequate parking for construction trucks, equipment, and construction workers within the designated staging areas throughout the construction period. If adequate space for parking is not available at a given work site, WSAFCA will provide an off-site staging area and, as needed, coordinate the daily transport of construction vehicles, equipment, and personnel to and from the work site.

The traffic control plan also will include the information listed below.

- A street layout showing the location of construction activity and surrounding streets to be used as detour routes, including special signage.
- A tentative start date and construction duration period for each phase of construction.
- The name, address, and emergency contact number for those responsible for maintaining the traffic control devices during the course of construction.

Additionally, the traffic control plan will include the stipulations listed below.

- Access for driveways and private roads will be maintained, except for brief periods of construction, in which case property owners will be notified.
- Traffic controls may include flag persons wearing Occupational Safety and Health Administration–approved vests and using a Stop/Slow paddle to warn motorists of construction activity.
- Access to transit services will be maintained, and public transit vehicles will be detoured.
- Contractors will be informed in writing of appropriate routes to and from construction sites, and weight and speed limits for local roads used to access construction sites. All such written notifications will be submitted to the City of West Sacramento Planning Department.

WSAFCA will assess damage to roadways used during construction and will repair all potholes, fractures, or other damages.

2.4.7 Coordination to Ensure Minimal Overlap in Disturbances to Traffic during Construction

WSAFCA will coordinate with the City prior to starting any construction activities to determine whether any other projects would disrupt traffic or require detours affecting the same roads. If so, WSAFCA will modify haul routes, timing, or otherwise work with the City and other project proponents to minimize cumulative disruptions to roadways.

2.4.8 Construction Area Closure Notification

WSAFCA will ensure that the contractor posts notice of construction activities and intended days of construction area closure at least 30 days in advance of closures in and near formal recreation facilities. The contractor will post notice of construction activities and closures at least 10 days in advance in all other areas. Notice will be posted adjacent to access roads, and signs will be at least 3 square feet in size and provide a contact for questions regarding project construction. WSAFCA also will ensure that the construction area is fenced off to keep the public out of harm’s way.

2.4.9 Minimize Construction-Related Effects on Navigation

During any in-channel construction activities, WSAFCA will implement the following measures to ensure that construction-related effects on navigation and recreational boating are minimized.

- Avoid or limit construction during major summer holiday periods if possible.
- Post warning signs and buoys at, upstream of, and downstream of all construction equipment, sites, and activities.

2.4.10 Preserve Marina Access

WSAFCA will ensure that access to marina facilities is maintained to the greatest degree possible during construction of flood risk–reduction measures. If access restrictions cannot be avoided, WSAFCA will post notice regarding the location of alternative marina facilities at least 30 days in advance of closure and ensure that closure time is minimized and/or provide alternate access routes to the facilities.

2.4.11 Minimize Effects Associated with Recreation Enhancements

WSAFCA will implement the following policies to minimize effects associated with recreation enhancements.

- Shared recreational access to or use of levees and appurtenant features will be accommodated where consistent with flood structure O&M while minimizing flood risk–reduction maintenance demand and creation of nuisance effects upon adjacent residences.
- Recreation features constructed as part of the Southport project will not cause vegetation or habitat effects in excess of those caused by flood risk–reduction measures.

2.4.12 Stormwater Pollution Prevention Plan

Because ground disturbance would be greater than 1 acre, WSAFCA will obtain coverage under the U.S. Environmental Protection Agency's (EPA's) National Pollutant Discharge Elimination System (NPDES) general construction activity stormwater permit. The Central Valley Regional Water Quality Control Board (Regional Water Board) administers the NPDES stormwater permit program in Yolo County. Obtaining coverage under the NPDES general construction activity permit generally requires that the project applicant prepare a SWPPP that describes the BMPs that will be implemented to control accelerated erosion, sedimentation, and other pollutants during and after project construction. The SWPPP will be prepared by WSAFCA or the construction contractor prior to commencing earth-moving construction activities.

The specific BMPs that will be incorporated into the erosion and sediment control plan and SWPPP will be site-specific and will be prepared by WSAFCA or the construction contractor in accordance with the Regional Water Board Field Manual. However, the plan likely will include, but not be limited to, one or more of the following standard erosion and sediment control BMPs.

- **Timing of construction**. The construction contractor will conduct all construction activities during the typical construction season to avoid ground disturbance during the rainy season.
- **Staging of construction equipment and materials**. To the extent possible, equipment and materials will be staged in areas that have already been disturbed.
- **Minimize soil and vegetation disturbance**. The construction contractor will minimize ground disturbance and the disturbance/destruction of existing vegetation. This will be accomplished in

part through the establishment of designated equipment staging areas, ingress and egress corridors, and equipment exclusion zones prior to the commencement of any grading operations.

- **Stabilize grading spoils**. Grading spoils generated during the construction will be temporarily stockpiled in staging areas. Silt fences, fiber rolls, or similar devices will be installed around the base of the temporary stockpiles to intercept runoff and sediment during storm events. If necessary, temporary stockpiles may be covered with an appropriate geotextile to increase protection from wind and water erosion.
- **Install sediment barriers**. The construction contractor may install silt fences, fiber rolls, or similar devices to prevent sediment-laden runoff from leaving the construction area.
- **Stormwater drain inlet protection.** The construction contractor may install silt fences, drop inlet sediment traps, sandbag barriers, and/or other similar devices.
- **Permanent site stabilization.** The construction contractor will install structural and vegetative methods to permanently stabilize all graded or otherwise disturbed areas once construction is complete. Structural methods may include the installation of biodegradable fiber rolls and erosion control blankets. Vegetative methods may involve the application of organic mulch and tackifier and/or the application of an erosion control native seed mix. Implementation of a SWPPP will substantially minimize the potential for project-related erosion and associated adverse effects on water quality.

2.4.13 Bentonite Slurry Spill Contingency Plan (Frac-Out Plan)

Before excavation begins, WSAFCA will ensure the contractor will prepare and implement a bentonite slurry spill contingency plan (BSSCP) for any excavation activities that use pressurized fluids (other than water). If the contactor prepares the plan, it will be subject to approval by USACE, NMFS, and WSAFCA before excavation can begin. The BSSCP will include measures intended to minimize the potential for a frac-out (short for "fracture-out event") associated with excavation and tunneling activities; provide for the timely detection of frac-outs; and ensure an organized, timely, and "minimum-effect" response in the event of a frac-out and release of excavation fluid (bentonite). The BSSCP will require, at a minimum, the following measures.

- If a frac-out is identified, all work will stop, including the recycling of the bentonite fluid. In the event of a frac-out into water, the location and extent of the frac-out will be determined, and the frac-out will be monitored for 4 hours to determine whether the fluid congeals (bentonite will usually harden, effectively sealing the frac-out location).
- NMFS, CDFW, and the Regional Water Board will be notified immediately of any spills and will be consulted regarding clean-up procedures. A Brady barrel will be on site and used if a frac-out occurs. Containment materials, such as straw bales, also will be on site prior to and during all operations, and a vacuum truck will be on retainer and available to be operational on site within 2 hours' notice. The site supervisor will take any necessary follow-up response actions in coordination with agency representatives. The site supervisor will coordinate the mobilization of equipment stored at staging areas (e.g., vacuum trucks) as needed.
- If the frac-out has reached the surface, any material contaminated with bentonite will be removed by hand to a depth of 1 foot, contained, and properly disposed of, as required by law.

The drilling contractor will be responsible for ensuring that the bentonite is either properly disposed of at an approved Class II disposal facility or properly recycled in an approved manner.

- If the bentonite fluid congeals, no other actions, such as disturbance of the streambed, will be taken that potentially would suspend sediments in the water column.
- The site supervisor has overall responsibility for implementing this BSSCP. The site supervisor will be notified immediately when a frac-out is detected. The site supervisor will be responsible for ensuring that the biological monitor is aware of the frac-out; coordinating personnel, response, cleanup, regulatory agency notification and coordination to ensure proper clean-up; disposal of recovered material; and timely reporting of the incident. The site supervisor will ensure all waste materials are properly containerized, labeled, and removed from the site to an approved Class II disposal facility by personnel experienced in the removal, transport, and disposal of drilling mud.
- The site supervisor will be familiar with the contents of this BSSCP and the conditions of approval under which the activity is permitted to take place. The site supervisor will have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The site supervisor will ensure that a copy of this plan is available (on site) and accessible to all construction personnel. The site supervisor will ensure that all workers are properly trained and familiar with the necessary procedures for response to a frac-out prior to commencement of excavation operations.

2.4.14 Spill Prevention, Control, and Countermeasure Plan

A spill prevention, control, and countermeasure plan (SPCCP) is intended to prevent any discharge of oil into navigable water or adjoining shorelines. WSAFCA or its contractor will develop and implement an SPCCP to minimize the potential for and effects from spills of hazardous, toxic, or petroleum substances during construction and operation activities. The SPCCP will be completed before any construction activities begin. Implementation of this measure will comply with state and Federal water quality regulations. The SPCCP will describe spill sources and spill pathways in addition to the actions that will be taken in the event of a spill (e.g., an oil spill from engine refueling will be immediately cleaned up with oil absorbents). The SPCCP will outline descriptions of containments facilities and practices such as double-walled tanks, containment berms, emergency shutoffs, drip pans, fueling procedures, and spill response kits. It will describe how and when employees are trained in proper handling procedure and spill prevention and response procedures.

WSAFCA will review and approve the SPCCP before onset of construction activities and routinely inspect the construction area to verify that the measures specified in the SPCCP are properly implemented and maintained. WSAFCA will notify its contractors immediately if there is a noncompliance issue and will require compliance.

The Federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil spill that:

- Violates applicable water quality standards.
- Causes a film or sheen on or discoloration of the water surface or adjoining shoreline.
- Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

If a spill is reportable, the contractor's superintendent will notify WSAFCA, and WSAFCA will take action to contact the appropriate safety and cleanup crews to ensure that the SPCCP is followed. A written description of reportable releases must be submitted to the Regional Water Board. This submittal must contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. The releases will be documented on a spill report form.

If an appreciable spill occurs and results determine that project activities have adversely affected surface or groundwater quality, a detailed analysis will be performed by a registered environmental assessor or professional engineer to identify the likely cause of contamination. This analysis will conform to American Society for Testing and Materials (ASTM) standards and will include recommendations for reducing or eliminating the source or mechanisms of contamination. Based on this analysis, WSAFCA and its contractors will select and implement measures to control contamination, with a performance standard that surface water quality and groundwater quality must be returned to baseline conditions.

2.4.15 Turbidity Monitoring in Adjacent Water Bodies

WSAFCA or its contractor will monitor turbidity in the adjacent water bodies, where applicable criteria apply, to determine whether turbidity is being affected by construction and ensure that construction does not affect turbidity levels, which ultimately increase the sediment loads.

The Regional Water Board's Water Quality Control Plan (2009) (Basin Plan) contains turbidity objectives for the Sacramento River. Specifically, the plan states that where natural turbidity is between 5 and 50 nephelometric turbidity units (NTUs), turbidity levels may not be elevated by 20% above ambient conditions. Where ambient conditions are between 50 and 100 NTUs, conditions may not be increased by more than 10 NTUs.

WSAFCA or its contractor will monitor ambient turbidity conditions upstream during construction and adhere to the Surface Water Quality Ambient Monitoring Program (SWAMP) requirements for turbidity monitoring. Monitoring will continue approximately 300 feet downstream of construction activities to determine whether turbidity is being affected by construction. Grab samples will be collected at a downstream location that is representative of the flow near the construction site. If there is a visible sediment plume being created from construction, the sample will represent this plume. Monitoring will occur hourly when construction encroaches into the Sacramento River. If construction does not encroach into the river, the monitoring will occur once a week on a random basis.

If turbidity limits exceed Basin Plan standards, construction-related earth-disturbing activities will slow to a point that results in alleviating the problem. WSAFCA will notify the Regional Water Board of the issue and provide an explanation of the cause.

2.4.16 Groundwater Well Protection Measures

Prior to construction, WSAFCA or its contractor will assess the risk of construction-related contamination of groundwater wells adjacent to construction activities. Wells located adjacent to construction activities will be inspected by an individual experienced in groundwater wells to assess the potential for construction-related contaminant intrusion at the wellhead and recommend appropriate mitigation measures to prevent such intrusion. Proposed mitigation measures would be submitted for owner approval prior to implementation. Potential mitigation measures include sealing the wellhead or construction of a berm around the well to prevent runoff from construction areas from reaching the well. Wellhead sealing could include plugging any existing pathways for surface water contamination at active wells or capping inactive wells with a water-tight cap. Berms will be constructed of a material sufficient to prevent surface water runoff from reaching the wellhead. Berms will be designed to prevent runoff from contacting or collecting around any part of the wellhead including the concrete pad or foundation.

Where wells would be permanently abandoned as a result of construction, such abandonment will be performed by a person possessing a State of California C-57 Water Well Contractor's license and a valid Yolo County Health Permit.

2.4.17 Soil Supply Protection Measures

WSAFCA's first choice for fill or borrow material will be from potential borrow areas within the project area as shown on Plate 1-5. WSAFCA will implement soil supply protection measures, including but not limited to:

- Maximizing on-site use through gradation, placement, and treatment.
- Preservation and replacement of topsoil at borrow sites, so that they could continue to be used for their current use or otherwise returned to their preproject condition. As part of borrow operations, the upper 12 inches of topsoil will be set aside and replaced after project construction in each construction season. After the project is completed, the borrow site will be recontoured and reclaimed.
- Independent environmental documentation and regulatory compliance, as required. Specific regulations related to soil resources are detailed in Section 3.3, Geology, Seismicity, Soils, and Mineral Resources.

2.4.18 Soil Hazards Testing and Soil Disposal Plan

Construction of the proposed project and its alternatives would involve excavation of soil and some degrading of the existing levee structure. Newly exposed material could come in contact with water sources, or be used as borrow material for constructing the flood risk–reduction measures. Such material could contain hazardous materials that would make it unsuitable for use as construction material because of the risk of harm to water quality and public health. Prior to any construction activities, WSAFCA or its contractor will have a qualified hazardous materials specialist collect and evaluate representative soils samples from any site, including the existing levee, that could be used as sources of borrow material or come in contact with a water body. The soil samples will be evaluated for contaminants such as trace metals, organochlorine pesticides, pyrethroids, or polychlorinated biphenyls. This evaluation will be conducted to address any requirements of the Regional Water Board as part of the 401 Certification and additional contaminants may or may not be included in the certification.

The State Water Resources Control Board (State Water Board) via its Site Cleanup Program (SCP) regulates and oversees the investigation and cleanup of non-federally owned sites where recent and historical unauthorized releases of pollutants have occurred and have affected soil, groundwater, surface, and/or other environmental media. The State Water Board and its nine regional boards have the legal authority to regulate site cleanup pursuant to California Water Code Section 13304, Resolution No. 92-49 (as Amended on April 21, 1994 and October 2, 1996), and Regional Board Basin Plans as required by Section 13240. The project site falls within the jurisdiction of the Central Valley Regional Water Quality Control Board (Regional Water Board).

If soil samples detect the presence of environmental contaminants but not above Maximum Contaminant Levels (MCLs) or other water quality objectives, the results will be reported to the Regional Water Board for classification and determination of acceptability and the potential to impair water quality or public health. If samples determine that contaminants are present at hazardous levels, WSAFCA will implement measures to treat soil in accordance with CCR Title 22 procedures for hazardous materials. CCR Title 22 procedures include, but are not limited to, the following.

- Investigation of the site and submittal of all site data to the Regional Water Board for review and analysis.
- Where MCLs are found to have been exceeded, WSAFCA will coordinate with the Regional Water Board to delineate the extent of soil and groundwater contamination and commence site remediation. The Regional Water Board will work with WSAFCA to establish site cleanup levels (SCLs). SCLs will be based on the toxicity of the chemicals of concern and the sensitivity and location of receptors.
- Site remediation will be overseen by the Regional Water Board and will involve the preparation of numerous reports and studies, including, but not limited to risk assessments, site assessment work plans, feasibility studies, remedial action and monitoring plans, and a site closure report.

Borrow material used for construction of the waterside levee or other features that would be exposed to the aquatic environment, and is deemed unacceptable by the Regional Water Board, will be properly disposed of in a landfill or made available for other approved uses. Soil loaded into transport vehicles for offsite disposal will be covered with continuous heavy-duty plastic, tarps, or other covering to minimize emissions to the atmosphere. The covering will be in good condition, joined at the seams, and securely anchored to minimize headspace where vapors may accumulate.

In addition, BMPs would be employed during excavation activities to protect water quality and public health. WSAFCA or its contractor will implement BMPs for excavation and soil handling, including but not limited to the following.

- Schedule excavation work for dry weather periods, when possible.
- Protect storm drains using earth dikes, straw bales, sand bags, absorbent socks, or other controls to divert or trap and filter runoff.
- Water/mist soil as its being excavated and loaded onto transportation trucks.
- Avoid over-application by water trucks for dust control.
- Cover stockpiles and other construction materials with heavy-duty plastic. Protect from rainfall and prevent runoff with temporary roofs or heavy-duty plastic and berms.
- Certify all employees working onsite in OSHA's 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training.
- Monitor area around construction site for fugitive vapor emissions with appropriate field screening instrumentation.

- Cover the bottom of excavated areas with sheeting when work is not being performed.

2.4.19 Giant Garter Snake and its Habitat Effects Minimization

WSAFCA will implement the following measures to minimize effects on giant garter snake and its habitat.

- Staging areas will be located at least 200 feet from suitable giant garter snake habitat.
- Any dewatered habitat will remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat.
- Vegetation clearing within 200 feet of the banks of suitable giant garter snake aquatic habitat will be limited to the minimum area necessary. Avoided giant garter snake habitat within or adjacent to the project area will be flagged and designated as an environmentally sensitive area, to be avoided by all construction personnel.
- The movement of heavy equipment within 200 feet of the banks of suitable giant garter snake aquatic habitat will be confined to designated haul routes to minimize habitat disturbance.

2.4.20 Roadway Noise and Light Reduction

Construction of the new Village Parkway alignments and ancillary roadways under Alternatives 2, 4, and 5 would increase sources of noise and light near existing residences from traffic as well as street lights. WSAFCA will discuss with residents what measures can be implemented to reduce noise and light pollution along these new roadways.

Typical noise-reducing measures include the following:

- Reduce posted speed limits.
- Prohibit heavy trucks during nighttime hours.
- Employ quiet pavement, which involves the use of open-graded or rubberized asphalt instead of standard dense graded asphalt.
- Construct solid walls (6 feet or higher) between the roadways and residences.

Village Parkway and new roads constructed to connect to Village Parkway will be designed in a manner that will serve as a buffer and screen nuisance lighting resulting from oncoming vehicle headlights and roadway lighting. Prior to approval of the roadway design, WSAFCA will implement the following elements in the project landscaping plan to the extent feasible.

- Special attention should be paid to plant choices near rural residences to ensure that species chosen are of an appropriate height, and landscaping will rely on evergreen species to provide year-round screening from nuisance light.
- Vegetation will be planted within the first six months following project completion.
- All lighting is to provide minimum impact on the surrounding environment and shall utilize downcast, cut-off type fixtures that are shielded and direct the light only towards objects requiring illumination. Therefore, lights shall be installed at the lowest allowable height and cast low-angle illumination while minimizing incidental light spill onto adjacent properties, open spaces, or backscatter into the nighttime sky.

- The lowest allowable wattage shall be used for all lighted areas and the amount of nighttime lights needed to light an area shall be minimized to the highest degree possible.
- Light fixtures shall have non-glare finishes that will not cause reflective daytime glare.
- Lights shall provide good color rendering with natural light qualities with the minimum intensity feasible for security, safety, and personnel access.

2.4.21 Mosquito and Vector Control Management Plan

In order to minimize any increased risk of mosquito breeding in the project area, WSAFCA will coordinate with the Sacramento-Yolo Mosquito and Vector Control District (SYMVCD) to develop a Mosquito and Vector Control Management Plan that follows the guidelines of the SYMVCD Mosquito Reduction Best Management Practices manual (Sacramento-Yolo Mosquito and Vector Control District 2008). The SYMVCD will monitor all potential mosquito breeding sources and will follow the SYMVCD Mosquito and Mosquito-Borne Disease Management Plan (Sacramento-Yolo Mosquito and Vector Control District 2005) for any mosquito control applications. Such applications will be administered in accordance with the SYMVCD's NPDES permit, as described in Water Quality Order No. 2012-0003-DWQ General Permit No. CAG 990004 (Amending Water Quality Order No. 2011-0002-DWQ).

2.4.22 Aquatic Invasive Species Prevention

WSAFCA or its contractors will implement the following actions to prevent the potential spread or introduction of aquatic invasive species (AIS) associated with the operation of barges and other in-water construction activities. Species of concern related to the operation of barges and other equipment in the lower Sacramento River include invasive mussels (e.g., quagga mussels [*Dreissena bugensis*] and zebra mussels [*Dreissena polymorpha*]) and aquatic plants (e.g., Brazilian waterweed [*Egeria densa*] and hydrilla [*Hydrilla verticillata*]) (California Department of Fish and Game 2008). WSAFCA or its contractors will coordinate with the CDFW's Invasive Species Program to ensure that the appropriate BMPs are implemented to prevent the spread or introduction of AIS.

Educate construction supervisors and managers about the importance of controlling and preventing the spread of AIS.

- Train vessel and equipment operators and maintenance personnel in the recognition and proper prevention, treatment, and disposal of AIS.
- Prior to departure of vessels from their place of origin and before in-water construction equipment is allowed to operate within the waters of the Sacramento River, thoroughly inspect and remove and dispose of all dirt, mud, plant matter, and animals from all surfaces that are submerged or may become submerged, or places where water can be held and transferred to the surrounding water.

2.4.23 Construction-Related Damage Assessment Plan

WSAFCA or its contractors will implement the following actions to document any property damage caused by project construction and ensure fair compensation is provided to affected property owners.

- Prior to construction, all property owners and residents whose property is located within 500 feet of any project area will be notified when construction is expected to begin. The project area includes any area of vibration, excavation or other earth-moving activities, off-road haul routes, and borrow sites. Such notice will be made to both the physical and legal address associated with each parcel. The notice will request permission of the owner to document the property's current condition, provide contact information for reporting construction-related nuisances, and explain the claims process for reporting any project-related damage to WSAFCA for reimbursement.
- With the owner's consent, WSAFCA or its contractor will photograph and/or video the property to document its existing condition. Documentation will include all structures and outbuildings present onsite. A statement will also be taken from the owner and/or resident about items of particular concern or details about the property's present condition or value. Should the owner decline such documentation, WSAFCA or its contractor will record as much similar information as is reasonably available from a public right-of-way.
- Should damage occur, WSAFCA will follow the City of West Sacramento's claim process and provide timely reimbursement to affected property owners.

Chapter 3
Affected Environment and Environmental Consequences

This chapter describes the affected environment and environmental consequences of the Southport project.

The baseline environmental conditions assumed in the preparation of this chapter consist of the existing physical environment as of August 24, 2011, when WSAFCA published the Notice of Preparation (NOP) to prepare an EIR with the State Clearinghouse. USACE published a Notice of Intent (NOI) to prepare an EIS in the *Federal Register* on August 26, 2011. On March 8, 2013, WSAFCA published a supplemental NOP to notice expansion of the project area. USACE published a revised NOI in the *Federal Register* on March 15, 2013. There were no substantial changes in the baseline environmental conditions during that time.

In order to determine which environmental resources should be analyzed in depth, the lead agencies conducted a preliminary review of the project alternatives and objectives. Where an environmental consequence to a resource could possibly result from project alternative implementation, an extensive analysis of the range of potential environmental consequences to the resource was conducted and included in this document.

The structure of each section is described below.

- **Introduction.** This section introduces the scope of the resource analysis.
- **Affected Environment.** This section includes two sections, Regulatory Setting and Environmental Setting.
    - **Regulatory Setting.** This section lists and describes laws, regulations and policies that affect the resource or the assessment of effects on the resource. Often the regulatory framework is the basis for the conclusion of the level of significance and therefore plays a crucial role in effect assessment.
    - **Environmental Setting.** This section provides an overview of the physical environmental conditions in the area at the time of or prior to the publication of the Notice of Preparation that could be affected by implementation of the proposed alternatives in accordance with NEPA regulations (40 CFR 1502.15) and State CEQA Guidelines Section 15125.
- **Environmental Consequences.** This section describes the analysis of effects relating to each resource area for each of the alternatives in accordance with NEPA regulations (40 CFR 1502.16) and with State CEQA Guidelines Section 15126, 15126.2, and 15143.
    - **Assessment Methods.** This section describes the methods, models, process, procedures, data sources, and/or assumptions used to conduct the effect analysis. Where possible, effects are evaluated quantitatively. Where quantification is not possible, effects are evaluated qualitatively.
    - **Determination of Effects.** This section provides the criteria used in this document to define the level at which an effect would be considered significant in accordance with CEQA and adverse in accordance with NEPA. Significance criteria (sometimes called thresholds of

significance) used in this EIS are based on the checklist presented in Appendix G of the State CEQA Guidelines; factual or scientific information and data; and regulatory standards of Federal, state, and local agencies. Under NEPA, preparation of an EIS is triggered if a Federal action has the potential to "significantly affect the quality of the human environment," which is based on the context and intensity of each potential effect. The significance thresholds used in this EIS also encompass the factors taken into account under NEPA to evaluate the context and the intensity of the effects of an action.

- **Effects and Mitigation Measures.** To comply with NEPA and CEQA, the effects are considered and evaluated as to whether they are direct, indirect, or cumulative. Direct effects are those that are caused by the action and occur at the same time and place. Indirect effects are reasonably foreseeable consequences to the physical environment that may occur at a later time or at a distance from the project area. Cumulative effects for all resource areas are combined and discussed in Chapter 4, "Growth-Inducing and Cumulative Effects." Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant effects accompany each effect discussion.

The effects and mitigation measures are listed numerically and sequentially throughout each section. An effect or mitigation statement precedes the discussion of each effect or measure and provides a summary of the topic. The numbering system provides a mechanism for tracking unique effects by resource area.

Each effect is accompanied by a finding or conclusion, as required under NEPA and CEQA. Table 3-1 provides a key for relating the effect findings by relative severity (increasing in degree of adversity to the environment).

Table 3-1. Key to Effect Findings (by Increasing Adversity)

Finding
Beneficial
No Effect
Less than Significant
Significant
Significant and Unavoidable

For the purposes of the analyses in this document, the effect findings are defined more specifically below.

- **Beneficial.** This effect would provide benefit to the environment as defined for that resource.
- **No Effect.** This effect would cause no discernible change in the environment as measured by the applicable significance criterion; therefore, no mitigation would be required.
- **Less than Significant.** This effect would cause no substantial adverse change in the environment as measured by the applicable significance criterion; therefore, no mitigation would be required under CEQA but there may be mitigation per other environmental regulations.

- **Significant.** This effect would cause a substantial adverse change in the physical conditions of the environment. Effects determined to be significant based on the significance criteria fall into two categories: those for which there is feasible mitigation available that would avoid or reduce the environmental effects to less-than-significant levels and those for which either there is no feasible mitigation available or for which, even with implementation of feasible mitigation measures, there would remain a significant adverse effect on the environment. Those effects that cannot be reduced to a less-than-significant level by mitigation are identified as significant and unavoidable, described below.

- **Significant and Unavoidable.** This effect would cause a substantial adverse change in the environment that cannot be avoided or mitigated to a less-than-significant level if the project is implemented. Even if the effect finding still is considered significant with the application of mitigation, the applicant is obligated to incorporate all feasible measures to reduce the severity of the effect.

3.1 Flood Risk Management and Geomorphic Conditions

3.1.1 Affected Environment

This section describes the affected environment for hydrologic, hydraulic, geomorphic, and flood risk management conditions in the Southport project area.

3.1.1.1 Regulatory Framework

Federal

The following Federal regulations and technical guidelines related to hydrologic, hydraulic, geomorphic, and flood risk management conditions may apply to implementation of the Southport Project.

National Flood Insurance Program

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 were intended to reduce the need for large, publicly funded flood risk management structures and disaster relief by restricting development on floodplains. FEMA administers the NFIP to subsidize flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA issues FIRMs for communities participating in the NFIP. These maps delineate flood hazard zones in the community. These maps are designed for flood insurance purposes only and do not necessarily show all areas subject to flooding. The maps designate lands likely to be inundated during a 100-year event and elevations of this flooding. They also depict areas between the limits affected by 100-year and 500-year events and areas of minimal flooding. These maps often are used to establish building pad elevations to reduce risk to new development from flooding effects. The locations of FEMA-designated floodplains in the project area are described below in the Federal Emergency Management Agency Mapping Efforts section.

Requirements for Federal Emergency Management Agency Certification

For guidance on floodplain management and floodplain hazard identification, communities turn to FEMA guidelines, as defined in 44 CFR 59 through 77. For a levee to be recognized by FEMA under the NFIP, the community must provide evidence demonstrating that adequate design and operation and maintenance systems provide a level of performance adequate to address the base flood (1% or 100-year flood). These specific requirements are outlined in 44 CFR 65.10, Mapping of Areas Protected by Levee Systems, and are summarized below.

Levee height. Riverine levees must provide a minimum freeboard (the height of the top of a levee above a given level of water in a river) of 3 feet above the water-surface level of the base flood. An additional 1 foot above the minimum is required within 100 feet of either side of structures (such as bridges) riverward of the levee or wherever the flow is constricted. An additional 0.5 foot above the minimum at the upstream end of the levee, tapering to not less than the minimum at the downstream end of the levee, also is required.

Closures. All openings must be provided with closure devices that are structural parts of the system during operation and designed according to sound engineering practice.

Embankment protection. Engineering analyses must be submitted that demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability.

Embankment and foundation stability. Engineering analyses that evaluate levee embankment stability must be submitted to FEMA. The analyses provided must evaluate expected seepage during loading conditions associated with the base flood and demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability.

Settlement. Engineering analyses must be submitted that assess the potential and magnitude of future losses of levee height as a result of levee settlement and demonstrate that freeboard will be maintained within the minimum standards.

Interior drainage. An analysis must be submitted that identifies the source(s) of such flooding, the extent of the flooded area, and, if the average depth is greater than 1 foot, the water-surface elevation(s) of the base flood.

Operation plans. For a levee system to be recognized, a formal plan of operation must be provided to FEMA. All closure devices or mechanical systems for internal drainage, whether manual or automatic, must be operated in accordance with an officially adopted operational manual, a copy of which must be provided to FEMA.

Maintenance plans. For levee systems to be recognized as meeting required levels of performance, they must be maintained in accordance with an officially adopted maintenance plan. All maintenance activities must be under the jurisdiction of a Federal or state agency, an agency created by Federal or state law, or an agency of a community participating in the NFIP that must assume ultimate responsibility for maintenance. The plan must document the formal procedure that ensures that the stability, height, and overall integrity of the levee and its associated structures and systems are maintained. At a minimum, maintenance plans must specify the maintenance activities to be performed, the frequency of their performance, and the person by name or title responsible for their performance.

U.S. Army Corps of Engineers Levee Design Criteria

Levees included in the project area are Federally authorized and fall within the jurisdiction of the USACE. The levee evaluation for the project area conforms to the engineering criteria established by USACE for the assessment and repair of levees. The USACE technical criteria in the following list should be used as guidance unless noted otherwise.

- Overtopping of Flood Control Levees and Floodwalls (Publication ETL 1110-2-299, August 22, 1986)
- Structural Design of Closure Structures for Local Flood Protection Projects (Publication EM 1110-2-2705, March 31, 1994)
- Design of Coastal Revetments, Seawalls, and Bulkheads (Publication EM 1110-2-1614, June 30, 1995)

- Design Guidance on Levees (Publication ETL 1110-2-569, May 1, 2005)
- Conduits, Culverts, and Pipes (Publication EM 1110-2-2902, March 31, 1998)
- Guidelines on Ground Improvement for Structures and Facilities (Publication ETL 1110-1-185, February 1, 1999)
- Engineering and Design for Civil Works Projects (Publication ER 1110-2-1150, August 31, 1999)
- Design and Construction of Levees (Publication EM 1110-2-1913, April 30, 2000)
- Geotechnical Investigations (Publication EM 1110-1-1804, January 1, 2001)
- USACE CESPK Levee Task Force, Recommendations for Seepage Design Criteria, Evaluation and Design Practices (2003)
- Slope Stability (Publication EM 1110-2-1902, October 31, 2003)
- Geotechnical Levee Practice (REFP10L0, April 11, 2008)
- Engineering and Design—Design Guidance for Levee Underseepage (Publication ETL 1110-2-569, May 1, 2005)
- Quality Management (Publication ER 1110-1-12, September 30, 2006)
- ETL 1110-2-583 Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures (April 30, 2014)

Sacramento River Flood Control Project Levee Height Requirements

As specified in the *Design Memorandum, Volume I of II for the Sacramento River Flood Control Project, California, Mid-Valley Area, Phase III* (U.S. Army Corps of Engineers 1996:2–12), the minimum levee height (freeboard) requirement for the Sacramento River is 3 feet, as defined in the USACE SRFCP 1957 design profiles for the Sacramento River and many of its tributaries.

State

The following state regulations related to hydrologic, hydraulic, geomorphic, and flood risk management conditions may apply to implementation of the Southport project.

Central Valley Flood Protection Plan

The purpose of the Central Valley Flood Management Planning (CVFMP) Program is to develop a sustainable, integrated flood risk management plan for areas protected by facilities of the state-Federal flood risk management system in the Central Valley of California. The program is one of several the DWR is implementing within FloodSAFE California to accomplish the goals of Propositions 1E and 84. The CVFMP Program consists of two primary projects: the State Plan of Flood Control and the CVFPP.

According to California Government Code Sections 65302.9 and 65860.1, every jurisdiction located in the Sacramento–San Joaquin Valley is required to update its General Plan and Zoning Ordinance in a manner consistent with the CVFPP within 24 months after the CVFPP’s adoption, which was adopted in the summer of 2012. The locations of the state and local flood risk management facilities, locations of flood hazard zones, and the properties located in these areas must be mapped and be consistent with the CVFPP. In addition, the CVFPP requires 200-year level of flood protection for urbanized or urbanizing areas (defined by a population of 10,000 or more) protected by facilities of the state-Federal flood risk management system in the Central Valley of California by the year 2025.

California Department of Water Resources Urban Levee Design Criteria

Pursuant to SB 5 [Government Code (GC) §65007(l)], the ULDC define the urban level of flood protection as the level of protection that is necessary to withstand flooding that has a 1-in-200 chance of occurring in any given year using criteria consistent with, or developed by, DWR. While cities and counties located outside the Sacramento–San Joaquin Valley are not required to make findings related to the urban level of flood protection, the ULDC can help inform engineering and local land use decisions for areas at risk of flooding anywhere in California. The ULDC were developed through a collaborative process with stakeholders from local government (including representatives from the Central Valley, San Francisco Bay Area, and Los Angeles region), state government, and the Federal government.

The ULDC provide guidance for design, construction, operation, and maintenance of levees and floodwalls in urban and urbanizing areas. The May 2012 ULDC supersedes Version 4 of the Interim Levee Design Criteria for Urban and Urbanizing Areas in the Sacramento–San Joaquin Valley (Version 4), dated December 15, 2010. The May 2012 ULDC contain numerous revisions and refinements from Version 4.

Local

Yolo County and the City of West Sacramento each have adopted goals and policies related to flood risk management, many of which are carried out by WSAFCA in the study area. For this analysis, the primary noteworthy item under the regulatory setting is the goal of 200-year level of performance and adoption of USACE's minimum freeboard requirements.

In addition to Yolo County's adopted goals and policies, according to Section 8-3.401 of the Yolo County Code, a Flood Hazard Development Permit must be obtained before any development begins within any area of special flood hazards. "Development" includes "any manmade change to improved or unimproved real estate, including filling, grading, and excavation operations. This permit would be necessary for borrow material excavation at the potential borrow site south of the construction footprint (Plate 1-5).

3.1.1.2 Environmental Setting

The following considerations are relevant to hydrologic, hydraulic, geomorphic, and flood risk management issues in the project area (also referred to as the *project reach*, meaning the stretch of the river associated with the Southport project). The construction footprint extends along the reach of the Sacramento River from the entrance of the Barge Canal downstream approximately 5.6 miles to the South Cross Levee. The project area comprises approximately 3.6 square miles in West Sacramento and includes multiple borrow areas, as well as the Sacramento River South Levee area.

Flood Risk Management

Flood Risk Defined

Flood risk is a combination of two components: the chance (or probability) of a particular flood event, and the impact (or consequence) that the flood would cause if it occurred. Probability of flooding is expressed in terms of the chance of flooding in any one given year. This may be expressed as a chance (i.e., "… a 1 in 100 chance of flooding in any one year") or a probability (i.e., "… a 1% annual probability of flooding").

Flood risk takes into account these five factors (California Department of Water Resources and U.S. Army Corps of Engineers 2012):

- Hazard: The cause of the harm, including its probability, extent, depth, and other characteristics (i.e., flooding and how often).
- Performance: How well the flood risk management system responds to the hazard (i.e., flood risk management system inadequacy or failure).
- Exposure: Who and what might be harmed by the hazard (i.e., who and what is flooded).
- Vulnerability: The susceptibility of people and property to harm from the hazard (i.e., how flooding adversely affects people and property).
- Consequence: The loss or damage incurred as a result of the hazard (i.e., what is the cost of the flooding in terms of lives and dollars).

The consequence of a flood can be expressed in terms of:

- Loss of life.
- Long-term health effects and anxiety.
- Damage to properties and possessions.
- Mud and sewage in homes and businesses.
- Living in temporary accommodation.
- Increased insurance premiums.
- Devaluation of property.
- Loss of customers and customer data.
- Closed schools and businesses.

Sacramento River Flood Control Project

The SRFCP was authorized by Congress in 1917. The SRFCP was the major project for flood risk management on the Sacramento River and its tributaries. It was sponsored by The Reclamation Board of the State of California (today reauthorized as the CVFPB) and was the first Federal flood risk management project constructed outside the Mississippi River Valley (U.S. Army Corps of Engineers 2009a).

The SRFCP includes approximately 980 miles of levees, overflow weirs, pumping plants, and bypass channels. Currently, the SRFCP extends from the Sacramento River's mouth near Collinsville in the Delta to near Chico Landing in the northern Sacramento Valley. Approximately 980 miles of levees were constructed as part of the project, providing flood risk–reduction to roughly 800,000 acres of highly productive agricultural lands, the cities of Sacramento and Marysville, and numerous other small communities. Although the SRFCP levees often were constructed of poor foundation materials such as river dredge spoils that would not meet current engineering standards, the levees are relied upon to provide flood risk management during major storms by more than 2 million people in approximately 50 communities with an estimated $37 billion in urban and agricultural development.

For more information about the SRFCP and related programs and actions, refer to Chapter 1, “Introduction.”

Sacramento River Bank Protection Project

The SRBPP is a continuing long-term project authorized by Section 203 of the Flood Control Act of 1960 (Public Law 86-645). This project was authorized to provide flood risk reduction to the existing levee and flood management facilities of the SRFCP. The SRFCP consists of approximately 980 miles of levees plus overflow weirs, pumping plants, and bypass channels that reduce flood risk to communities and agricultural lands in the Sacramento Valley and Delta.

The SRBPP has been divided into three phases. Phase I bank protection was completed in 1975 and resulted in 435,953 feet of bank protection. Current bank protection is being carried out under Phase II. The work authorized through Section 3031 of the WRDA 2007 is a continuation of Phase II bank protection, and increases the amount of currently authorized bank protection by 80,000 linear feet. Phase III is future work that will be formulated in a general reevaluation of SRFCP. Planning for Phase III is expected to conclude in 2015.

Climate

West Sacramento has a mild, Mediterranean-type climate. Mean annual temperature is a relatively mild 62.2°F. Maximum average annual temperatures during the summer range from 87.1°F to 93.1°F. Temperatures sometimes exceed 100° F. Winter temperature maximums vary from 54.5°F to 60.6°F. Average low temperatures in the winter range from 40.2°F to 43.7° F. Temperatures in the winter only occasionally drop below freezing. (Andrews 1972.)

Average annual precipitation is about 18 inches, with approximately 80% of the total rainfall occurring between November and March. Cloud-free skies generally prevail throughout the summer months, and in much of the spring and fall. Thunderstorms are relatively infrequent, although occasionally occur in the late summer and other times of the year when unstable air masses are situated over the region. The highest rainfall generally occurs in January, when the average is about 4.2 inches of precipitation. The driest month is July, during which rainfall is rare.

The temporal variability in precipitation is related to seasonal variation in atmospheric conditions. During the summer months, high pressure systems build over the Pacific Ocean off the California coast, promoting the transport of cool, dry air from the north. This effectively blocks major sources of moisture. During the winter rainy season, the jet stream migrates farther south, allowing low pressure systems off the California coast from as far away as the Gulf of Alaska to create conditions that transport moisture inland. Extreme variability of rainfall averages is indicative of wet and dry cycles. During Water Years 1986, 1993, 1995, 1996, 2005, 2006, and 2011, total rainfall was higher than average, with annual precipitation measured at 30.11, 29.10, 24.51, 22.08, 19.55, 23.47, and 20.74 inches, respectively[1] (California Department of Water Resources, Office of Water Use Efficiency, California Irrigation Management System 2011). Recent dry periods include the 1976–1977, 1987–1992, and 2007–2009 drought years, with precipitation far below average because of the prevalence of stable, high-pressure systems during those winter months.

[1] Measurement recorded at Station #6 in Davis, CA (38°32'09"N/121°46'32"W).

Hydrology and Hydraulics

Naming Conventions

The project reach is broken up into seven distinct segments, A through G, with Segment A located at the downstream end (Plate 2-2a). Additionally, levee stationing miles are employed to show exact levee locations in the project reach. The segments range from Segment A at Station 0+00 at the South Cross Levee to Station 296+10 in Segment G near the Barge Canal.

The project reach is located between RM 52.5 and RM 57 as established by the Sacramento and San Joaquin River Basins Comprehensive Study (Comprehensive Study) (U.S. Army Corps of Engineers 2002a, 2002b).

Regional Hydrology

Rivers flowing into the Delta convey approximately 50% of the state's annual runoff (California Department of Water Resources 1995). The main river systems are the Sacramento, San Joaquin, Mokelumne, Cosumnes, and Calaveras. All the major rivers except the Cosumnes River are regulated by dams. The Sacramento River is the dominant source of fresh water and sediment to the Delta, accounting for approximately 80% of annual freshwater inflows (Anderson 1994). The San Joaquin River is the second largest contributor, accounting for about 10% of annual freshwater inflows. Delta flows not diverted to agricultural and municipal intakes continue through the Carquinez Strait into the San Francisco Bay estuary, and eventually through the Golden Gate into the Pacific Ocean.

Principal reservoirs controlling flows in the lower Sacramento River are Shasta Reservoir (4.55 million acre-feet [af]) on the Sacramento River upstream of Redding and Trinity Reservoir (2.48 million af), which regulates deliveries made to the Sacramento River from the Trinity River basin. Diversions from the Trinity River basin into the Sacramento River basin averaged 1.03 million af annually from 1967 to 1991.

The Feather River is a major tributary to the Sacramento River, and Oroville Reservoir is a component of the State Water Project (SWP) system that provides 3.54 million af of storage. Average runoff from the Feather River basin (including the Yuba River) is approximately 5.85 million af at the Nicolaus gaging station (downstream of the confluence with the Yuba River).

The Sacramento River drainage basin upstream of the American River confluence encompasses approximately 23,500 square miles. The monthly minimum, average, and maximum mean daily flows on the Sacramento River near Verona (upstream of the American River) and at Freeport (downstream of the American River) are presented in Table 3.1-1. The project area is located downstream of the American River watershed; as such, the Sacramento River at Freeport gage more closely reflects the actual project flow around the project reach.

Table 3.1-1. Monthly Mean Daily Flow Statistics for Sacramento River at Verona and Sacramento River at Freeport for 1990 through 2010/2011

	Sacramento River at Verona Station 11425500			Sacramento River at Freeport Station 11447650		
	Minimum[1]	**Average[2]**	**Maximum[1]**	**Minimum[1]**	**Average[3]**	**Maximum[1]**
January	6,460	29,700	95,600	6,560	35,100	113,000
February	6,200	33,300	76,300	6,030	40,300	94,100
March	7,730	30,600	80,700	8,300	36,200	99,500
April	3,920	21,800	73,600	4,340	26,600	91,800
May	3,870	18,700	69,600	4,640	22,300	88,600
June	3,590	15,800	60,500	6,120	19,400	70,500
July	3,830	15,100	28,400	7,030	18,300	44,500
August	4,890	14,600	22,800	7,230	16,600	26,400
September	7,350	13,500	24,700	8,150	15,100	28,600
October	4,820	9,530	18,900	5,100	11,100	23,600
November	5,230	10,200	30,700	5,530	11,900	34,800
December	5,600	18,900	73,700	6,250	22,700	96,400

Source: U.S. Geological Survey 2011. Available: <http://waterdata.usgs.gov/nwis/sw>.

[1] Flow in cubic feet per second (cfs) from October 1, 1989 to September 30, 2010 (Water Years 1990 through 2010).

[2] Flow in cfs from January 1, 1990 to November 30, 2010.

[3] Flow in cfs from January 1, 1990 to September 30, 2010.

The hydrologic information described below for the project reach is derived and summarized from Northwest Hydraulic Consultants (NHC) (2007a).

Project Reach Hydrology

Daily streamflows have been recorded at the Sacramento River at Verona gage (gage 11425500) by the U.S. Geological Survey (USGS) since 1929. The gage is upstream of the project reach, at approximately RM 78.6. The Sacramento River at Sacramento (I Street) gage (gage 11447500) was operated by USGS from 1948 to 1979; it is now operated by DWR. The gage is located about 1,000 feet upstream of the I Street Bridge and about 0.5 mile downstream of the American River confluence at RM 59.5. The Freeport gage (gage 11447650) is downstream of the project reach, at about RM 46. NHC (2007b) provides a detailed analysis of daily, seasonal, and peak flows at the I Street and Freeport gages.

Simulated peak flows in the Sacramento and American Rivers were provided by MBK Engineers (MBK) (2008a) based on the Comprehensive Study Sacramento River UNET model (U.S. Army Corps of Engineers 2002a, 2002b). In Table 3.1-2, the 100-year peak flow is based on a 145,000 American River peak flow and upstream Sacramento River levees overtopping without failing; the 200-year peak is based on 160,000 cubic feet per second (cfs) American River peak flow and the same levees overtopping without failing. See the Flooding section below for longitudinal profile information with resulting maximum water surface elevation profiles, the approximate tops of the levees, and the original 1957 SRFCP design flood plane for the project reach.

Table 3.1-2. Peak Flows for the Sacramento River

	Peak Flow (cfs)	
Location	**100-year[1]**	**200-year[2]**
Sacramento River at Verona Gage	117,500	142,600
Sacramento River at I Street	135,600	143,300
Sacramento River at Freeport Gage	135,200	143,000
American River at H Street	145,000	160,000

Source: MBK Engineers' Sacramento River UNET hydraulic model June 2008 simulations documented in *Supplemental Report for the City of West Sacramento Levee Alternatives Hydraulic Analysis—Draft*, August 6, 2008.

[1] Assumes levees overtop without failing; existing conditions and operations.

[2] Assumes levees overtop without failing; urban levees have 3 feet of freeboard on 1/200 AEP water surface; non-urban levees satisfy SRFCP design freeboard requirements; Folsom Dam Joint Federal Project in place.

AEP = annual exceedance probabilities.

Geomorphic Conditions

Present geomorphic conditions of the lower Sacramento River basin are a function of the intensity of water management in each of the tributary rivers, local farming practices, water transfers, and an extensive human-made levee system. Today, the channel alignment is largely fixed by artificial levees and erosion control measures. Flooding, except when artificial levees break, no longer occurs under most flows. Instead, flow and sediment remain confined to the existing channel network. Upstream water diversions for municipalities and agriculture reduce the amount of flow entering the project reach and the amount of sediment transported through it.

Regional Historical Geomorphic Conditions

Historical changes in the lower Sacramento River basin that have affected channel morphology in the project reach include land reclamation, levee construction, dredging, hydraulic mining, impoundment of water and sediment by upstream dams and other diversions, and the construction of water diversion facilities and consequent alteration of flow and sedimentation patterns. The effects of these changes on channel morphology in the project reach are summarized below.

- Waterways in the project reach and vicinity are largely confined by levees and able to convey significantly greater flow and sediment discharges than during historical times.
- Historical cross-section data indicate that the majority of waterways in the project reach and vicinity have experienced some channel incision over the past century and may be experiencing a net sediment loss over time.
- Water regulation, diversions, and the impoundment of water and sediment by dams have resulted in a decline in the total annual water and sediment outflows to the Delta from the Central Valley, a trend that is expected to continue into the future (Northwest Hydraulic Consultants 2006).
- The combination of overgrazing, deforestation, floodplain reclamation, river channelization, and most importantly, hydraulic mining for gold caused large increases in sediment loads in the lower Sacramento River system. The historical trend demonstrates a rapid decline of sediment

loads in the Sacramento River at the beginning of the twentieth century, followed by a gradual, steady increase of sediment loads over the last half century (Northwest Hydraulic Consultants 2006).

Project Area Historical Geomorphic Conditions

A preliminary geomorphic assessment performed by cbec, inc. eco engineering (cbec) provides a historical perspective on the evolution of the Sacramento River since the earliest available maps in 1850 and on how the land use changes have affected the floodplain and geomorphic processes within the river channel (Appendix B.7). The preliminary geomorphic assessment included the collection and review of historical maps and aerial images of the project reach. cbec performed research on levee development and failure to gain a full understanding of the geomorphic changes that have occurred in the project region.

The most important conclusions drawn from the cbec report in Appendix B.7 as they relate to the proposed project are summarized below.

- An 1850 ranchero map identified a vast wetland, presumably a tidal backwater composed predominantly of tule marsh, west of the Sacramento River in the area that is currently the city of West Sacramento, including the Southport region. This map did not identify the land-cover type between the Sacramento River and the wetland, but it is assumed to have been riparian habitat. The 1850 ranchero map depicts the Sacramento River alignment to be straighter than its current alignment and indicates that the alignment changed significantly between 1850 and 1880. It is presumed that river alignment as depicted on the 1850 ranchero map is inaccurate. Later maps and aerial photographs indicate that levees were constructed in the late 1800s, the tule marsh drained, and the former floodplain converted to agricultural fields. (Appendix B.7:7.)
- Since the late 1800s the planform geometry of the Sacramento River through the project reach essentially has been fixed in place by levees and riprap and has not changed significantly to date. Localized changes in depositional bars and other in-channel sedimentation features have been observed over time. (Appendix B.7:47.)
- In the early 1900s large amounts of sediment were deposited in the Sacramento River as a result of hydraulic mining practices in Sierra foothill rivers and streams. This raised the channel bed of the Sacramento River substantially. Subsequently, the channel incised and widened, leading to its current planform, as a result of upstream anthropogenic impacts, such as reservoir and dam construction and urbanization. (Appendix B.7:47.)

For a complete synthesis of historical geomorphic conditions in the project reach and vicinity, refer to Sections 2.1 through 2.3 of Appendix B.7.

Geomorphic Characteristics of the Project Area

The present-day Sacramento River system has been shaped by thousands of years of complex river processes. These processes include channel migration, erosion, and flood-stage deposition. During most of Holocene time (since the last ice age, generally defined as the last 11,000 years), sediments from the Sierra Nevada and Klamath Mountains were carried by the Sacramento River and deposited into the Central Valley. Natural levees were built up along the riverbanks that frequently overflowed during flood stages, depositing sediments into low-lying basins and wide floodplains. The natural river migrated throughout a wide active zone composed of ponds, abandoned channels, meander cutoffs, oxbow lakes, and dendritic channels. (Blackburn Consulting 2010:2–3.)

Because of the low topographic position and proximity to the confluence of the Sacramento and American Rivers, the project area has been subjected to repeated inundation by floodwaters during late Holocene time, and consequently is underlain by relatively thick alluvial deposits[2]. The surface and subsurface distributions of sandy and clayey deposits are a function of former river alignments on the landscape, and present-day geomorphic processes adjacent to the river channels (i.e., flooding and deposition). In brief, the primary geomorphic features and associated surficial geological map units in the project reach and vicinity include abandoned paleochannels, meander scroll deposits, crevasse splay and overbank flood deposits, flood basin deposits, and other features commonly associated with large, active river systems[3] (Plate 3.1-1). (William Lettis & Associates 2007, 2009 as cited in Blackburn Consulting 2010.)

The Sacramento River in the vicinity of the project reach is characterized by a low gradient and typical low-velocity flow and is composed almost entirely of deep flatwater with a sand bed. River stage is controlled by dam and weir releases upstream and is subject to diurnal tidal fluctuation. Very little sediment is stored in bars, and the bank-building process typical of lowland alluvial rivers no longer occurs. The channel width varies in the project reach but averages approximately 750 feet.

The planform of the lower Sacramento River in the vicinity of the project reach can be described as generally sinuous, with a mix of irregular, partly entrenched meanders and nearly straight segments. Meander wavelengths and amplitudes are variable, with tight bends along the project area, but the width of the channel is consistent except at a few bends. The channel is controlled in many places by bank protection, levees, and resistant outcrops so that lateral migration rates are low.

For additional detail about the geomorphic characteristics of the project reach, refer to Appendix B.7, Blackburn Consulting (2010, 2011), and William Lettis & Associates (2009 as cited in Blackburn Consulting 2010).

Hydraulic Geometry

The hydraulic geometry or hydraulic properties of the project reach are based on analysis of cross sections on 0.25-mile spacing along the levee, as obtained from MBK's UNET model (Northwest Hydraulic Consultants 2007a). The hydraulic geometry is based on a bankfull geometry interpreted from the cross sections and the 200-year peak flow geometry, calculated from the water surface elevations reported by the UNET model. This information is described in further detail in NHC's internal report *West Sacramento Erosion Site, Design Scour Levels for Erosion Protection* (Northwest Hydraulic Consultants 2007c as cited in Northwest Hydraulic Consultants 2007a). The geometric properties of the Sacramento River through West Sacramento are as follows.

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[2] Mapping by Helley & Harwood (1985) shows a variety of alluvial deposits, placed by the river within meandering channels. Within the project area limits, some of these channels have been eroded/incised, backfilled, and overlain by younger deposits. A review of historical air photos from 1932–2007 by Kleinfelder (2007a as cited in Blackburn Consulting 2010:3) identify numerous drainage features and depressions that may be remnants of abandoned river channels and other drainage features.

[3] Areas of historical levee breaks along the old natural levee are identified by William Lettis & Associates as "crevasse splays" and are characterized by coarse sediments deposited in a fan-shaped or dendritic pattern away from the river. William Lettis & Associates also mapped substantial areas of "overbank deposits" consisting of sand, silt, and clay under and adjacent to the existing levees along much of the project alignment. These soils were deposited during high-water events as water overtopped the old natural levee. (Blackburn Consulting 2010:3.)

- Average surface width at natural bankfull conditions 570 feet
- Average bed width, excluding one triangular section 340 feet
- Average bankfull depth, averaged over 19 sections 39 feet
- Average bankfull cross-sectional area 17,400 square feet
- Range of maximum depths below 200-year water level 49 to 92 feet

The 200-year discharge at I Street is 143,300 cfs (Table 3.1-2). At the Freeport gage about 10 miles downstream, the maximum recorded discharge over the past 50 years was just less than 120,000 cfs in 1986. The computed 200-year water surface slope for the project reach is approximately 0.53 foot per mile (ft/mile) (0.10 meters/kilometer [m/km]).

Assuming a Manning roughness n-value of 0.030, the cross-sectional average velocity under bankfull conditions is estimated at about 4.6 feet per second (ft/s), resulting in an estimated bankfull discharge of about 80,000 cfs. Based on the cross sections provided by MBK Engineers (and subsequent analysis by Northwest Hydraulic Consultants [2007a]), during the 200-year flood the average channel velocity in the West Sacramento reach is about 5.1 ft/s (Table 3.1-3), and the average cross-sectional area is about 25,500 square feet (ft^2), giving a calculated discharge of about 138,000 cfs, essentially equal to the value of 143,300 cfs provided in Table 3.1-2.

The section-averaged velocities during the 200-year peak flow do not present a significant concern for surface erosion by flows parallel to the bank, except where the banks have no vegetation and no other bank protection or where significant obstructions project into the flow and generate eddies and complex flows capable of eroding the streambank. In most cases velocities along the bank will be lower than the section averages but may be near the average or slightly above along the outside (concave) bank of tight bends.

Table 3.1-3. Hydraulic Geometry at the Northwest Hydraulic Consultant (2007a) Erosion Sites

			100 Year				200 Year			
Erosion Site	River Mile (UNET)	Nearest Model Cross Section	Velocity (fps)	WSEL (Feet, NAVD 88)	Top Width[3] (Feet)	Area[3] (Feet^2)	Velocity (fps)	WSEL (Feet, NAVD 88)	Top Width[3] (Feet)	Area[3] (Feet^2)
1A	57.55[1]	57.25	5.2	33.97	697	25,859	5.3	35.17	701	26,666
1B	57.42[1]	57.00	5.0	33.87	726	26,603	5.2	35.07	731	27,443
1C	57.08[1]	57.00	5.0	33.87	726	26,603	5.2	35.07	731	27,443
1D	56.98[1]	56.75	4.9	33.77	810	27,358	5.0	34.97	815	28,296
1E	56.9[1]	56.50	5.1	33.67	667	26,082	5.3	34.77	672	26,855
1F	56.75[1]	56.50	5.2	33.67	667	26,082	5.3	34.77	672	26,855
1G	56.1[1]	55.75	4.5	33.37	857	29,856	4.6	34.57	863	30,847
1H	55.5[1]	55.00	4.1	33.07	857	32,870	4.2	34.27	863	33,866
1I	54.8[1]	54.25	4.8	32.67	1,244	28,342	4.2	33.87	1,262	29,342
1J	54.0[1]	53.50	6.1	31.97	588	21,933	6.2	33.07	594	22,673

Source: Northwest Hydraulic Consultants 2007a

Note: In the project reach, NAVD 88 can be converted to NGVD 29 by subtracting 2.57 feet.

[1] River Mile to middle of site.

[2] River Mile to upstream end of site.

[3] Interpolated from nearest cross section.

Levee and Bank Material

The earliest maps along the Sacramento River, from 1908, show a levee on about the same alignment as at present, along the top of the west bank of the Sacramento River. This levee has been raised, widened, upgraded, and set back at some sites over the years. The project reach's levee crest is now between 17 and 23 feet high above the landside toe, with crown elevations between 34 and 40 feet. South River Road lies along most of the levee crest, and crest widths are usually just larger than the minimum of 20 feet. Kleinfelder (2007b) discusses the stability berms, drains, and other remediation measures constructed along this leveed reach.

Kleinfelder (2007b) also describes the levee soils and underlying foundation materials based on borings. The levee soils are typically silty sand and poorly graded clean sand. Beneath the levee materials, the typical profile consisted of a layer of fine-grained silt or clay (interpreted to be overbank deposits) underlain by up to 100 feet of sand and gravel, with interbedded silty sand and clayey sand layers. The main exception to the above typical profile is near the downstream end of the project reach, where the levee is on an old railway grade. Drilling here showed a blanket of silt and clay extending at least 20 feet below the levee materials underlain by sand and/or gravel. These were interpreted to be floodbasin deposits, which appear to extend into the streambank, overlying alluvium. The bottom of the flood basin deposits is at or above the thalweg elevation of the Sacramento River. The presence of these less-erodible deposits is thought to explain the straight, stable bank and narrow river section through the Clay Bend just near the downstream end of the South Levee reach.

For a complete description of the materials underlying each levee segment in the project reach, refer to HDR (2013:85–90).

Waterside Slope Levees

Through part of West Sacramento, the levee sits on or near the top of the bank, and waterside levee slopes are often steeper than 3:1. Typically, the levee crown is near the minimum width, and eroding banks often lie well within the 3:1 waterside levee template. The implications of these steep slopes for the geotechnical and civil engineering assessments for FEMA certification are discussed further in Kleinfelder (2007b) and HDR (2006).

Existing Bank Protection

Long sections of the project reach are protected, commonly by revetments constructed of quarry rock (riprap), cobble, or concrete rubble[4]. Figures 3-10 and 3-11 of NHC (2007a) show the extent of revetment on the project reach and also classify the height of the revetment and cover for the rock types included in the USACE database.

Since 1955, additional bank protection has been constructed, and the earlier revetment repaired, by DWR, USACE, and RD 900. Much of the existing revetment was constructed in the 1960s, but repairs have occurred as recently as the late 1990s (Northwest Hydraulic Consultants 2007a). Since 2005, DWR, SAFCA, and USACE have implemented a number of levee repair and enhancement projects. cbec staff observed six constructed restoration projects consisting of riparian benches through the project reach (see Figure 3-6 of Appendix B.7).

[4] Downstream of Chicory Bend, a majority of the levees and banks are reinforced with riprap. Upstream of Chicory Bend, about half of the levees are protected with riprap (see Figure 3-6 of cbec [2011]).

Projected Incision Estimates

It is well documented that bed levels in the lower Sacramento River aggraded substantially as a result of inflows of sediment derived from hydraulic mining in the Sierra Nevada (Adler1980 as cited in James 1991: 733; James 1989, 1991). Hydraulic mining operations ceased in the 1880s, and sediment loads to the river were greatly reduced. Subsequently, a degradation or incision of the river bed occurred during the first half of the twentieth century. In the second half of the twentieth century, some bed degradation and channel widening may have continued, in part as a result of trapping bed sediment and control of the natural flow hydrograph by the upstream reservoirs.

NHC (2007a) examined the thalweg profiles for 1908, 1933, and 1997 for bed elevation trends by drawing smoothed upper and lower envelopes for each survey year, for the reach extending from Verona (RM 79) to Freeport (RM 46)[5]. Their analysis indicated the following information.

- Over the greater part of the reach that extends downstream from RM 79 (Verona Gage) to RM 46 (Freeport Gage), thalweg levels dropped by an average of about 5 feet over the period 1908–1933. This is equivalent to an average of about 0.2 foot per year (ft/year). (Northwest Hydraulic Consultants 2007a.)
- In the period 1933–1997, levels over the lower two thirds of the same reach appear to have fallen on average by another 4 feet. This is equivalent to an average of about 0.06 ft/year. (Northwest Hydraulic Consultants 2007a.)

When these assumed rates of incision are plotted as block averages against time and fitted by a smooth descending curve, they suggest a current incision rate of around 0.02 to 0.03 ft/year, probably declining to zero in less than 50 years. Even if the future rate is assumed to average 0.02 ft/year over a period of 50 years, the total future incision would amount to only 1 foot. (Northwest Hydraulic Consultants 2007a.)

Information from various sources indicates that the low-water surface profile falls from about +8.57 ft NAVD 88 at Verona (RM 79) to +4.57 ft NAVD 88 at Freeport (RM 46). These elevations yield average low-water gradients at mean tide level of about 0.12 ft/mile (0.023 m/km) from Verona to Freeport, and 0.043 ft/mile (0.008 m/km) from Freeport to the Delta. These gradients are extremely flat in general terms, and further significant lowering of the quoted low-water levels is unlikely to occur. (Northwest Hydraulic Consultants 2007a.)

In brief, given the apparent rates of incision in the second half of the twentieth century and present low-water elevations, further significant incision of the Sacramento River downstream of Verona is unlikely to occur. Any further incision could hardly exceed 1 foot or so, an amount that is negligible compared to potential riverbed scour resulting from major floods. (Northwest Hydraulic Consultants 2007a.)

Erosion Mechanisms

The dominant failure mechanisms along the project reach levee are those following.

- Wave erosion, particularly from waves generated by recreational boat traffic on the Sacramento River. The erosion from boat traffic occurs during the summer and fall, when water levels are near their annual minima, and results in wave-cut benches, steep eroding banks, and slow bank

[5] cbec (2011) also conducted a separate cross-sectional analysis (see Appendix A of cbec 2011). Their results also show a significant amount of historic incision in the Sacramento River.

retreat. Erosion from wind-generated waves also occurs on the upper levee slopes during high flow events.

- Failures or slides on the berm of the levee, possibly as a result of over-steepening, saturation, toe scour, or other factors.
- Levee encroachment from floodflow scour at the toe of the bank where banks are steep below the water level, often encroaching into the 3:1 projected waterside slope of the levee template.
- Undermined or undercut trees that result in over-steepened and eroded section on the bank and that eventually will fall over, resulting in loss of bank or levee and further erosion as flows accelerate around the root balls and trunks.

These observations are consistent with previous reports on bank erosion along the Sacramento River (Northwest Hydraulic Consultants 2007a; U.S. Army Corps of Engineers 2006b as cited in Northwest Hydraulic Consultants 2007a).

As discussed earlier, much of the project reach is protected by riprap revetment. These revetments are in reasonable repair, have withstood floods for 30 or 40 years, and have been assumed to continue to provide erosion protection, given adequate maintenance. As such, they have a low risk of failure and a low priority for treatment. However, the rock placed on these slopes has been damaged by wave erosion, it is often smaller than currently recommended for protection from boat wakes and waves (U.S. Army Corps of Engineers 2006b as cited in Northwest Hydraulic Consultants 2007a), and it is not known whether adequate toe rock was installed to protect against scour. Some upgrades or repairs may be required for certification, depending on standards adopted for these project levees by USACE[6].

Levee Deficiency Analysis

For a summary of levee deficiencies, refer to Chapter 2, "Alternatives."

Section 4 of HDR (2008a) includes the geotechnical assessment of the existing levees in the WSLIP program area with regard to seepage, slope stability, and seismic vulnerabilities[7,8]. The information provided in HDR (2008a) is derived from two reports: *West Sacramento Levee System Problem Identification and Alternative Analysis: Volume 1—Geotechnical Problem Identification Solano and Yolo Counties, California* (Kleinfelder 2007b), and *Phase 1 Geotechnical Evaluation Report (P1GER) West Sacramento Region* (URS Corporation 2007).

Data collection included 323 borings drilled with standard penetration tests (SPTs) and soundings made using cone penetration test equipment (CPTs) along the levees in the basin. Approximate stationing endpoints have been determined by URS (2007) and Kleinfelder (2007b) based on similar soil characteristics within the endpoints. Deficiencies identified within the approximate stationing endpoints do not indicate the entire stretch of levee contains said deficiency; rather a deficiency has been identified within the endpoints (HDR 2008a).

Only the deficiencies in the project reach are presented herein.

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[6] cbec has recently quantified the coverage of revetment along the bank toe using side-scan sonar. Thirteen erosion sites have been identified and prioritized, and designs for repair have been completed.

[7] Regional and local seismic conditions are discussed in Section 3.3, Geology, Seismicity, Soils, and Mineral Resources.

[8] HDR, Inc. (2008b) also discusses erosion and levee height deficiencies.

Levee Seepage Analysis

Kleinfelder (2007b) performed the engineering analysis evaluating levee seepage along the southern reaches of the WSLIP basin and presented their findings in a report titled *West Sacramento Levee System Problem Identification and Alternative Analysis: Volume 1—Geotechnical Problem Identification Solano and Yolo Counties, California* (Kleinfelder 2007b). Kleinfelder performed their analysis using the water surface elevations determined by MBK Engineers (2007) and assumed a total head boundary at the center of the river.

The seepage summaries for the project reach as completed by Kleinfelder (2007b) are shown in Table 3.1-4. Exit gradients[9] greater than 0.5 for under-seepage at the landside levee toe require mitigation according to USACE, and areas where through-seepage has been observed or projected based on soil conditions require mitigation.

In brief, the project reach has a significant amount of under-seepage (Table 3.1-4). See Table 3.1-5 below, Figure 12 of HDR (2008a) and Figure 4 of HDR (2008b) for additional information.

Table 3.1-4. Seepage Summary

Approximate Stationing	Through-Seepage		Under-Seepage	
	100-Year Event	200-Year Event	100-Year Event	200-Year Event
Project Reach[1]				
307+00 to 312+50				
245+00 to 307+00			✓	✓
215+50 to 245+00			✓	✓
189+00 to 215+00			✓	✓
129+50 to 189+00				✓
41+00 to 129+50			✓	✓
0+00 to 41+00				

Source: HDR 2008a.
[1] 0+00 represents the most downstream end of the project reach.
[2] The checkmark implies the levee segment does not meet the USACE seepage gradient criteria of less than 0.5.

[9] *Exit gradient* is defined as the average head loss per foot traveling upward through a blanket layer. If the exit gradient exceeds the critical upward hydraulic gradient, soil at the exit point is washed away. Most soil mechanics textbooks present and discuss the concept of seepage exit gradients and state that the exit gradients should not be greater than 1.0. Values of safe exit gradient may be taken as 0.14 to 0.17 for fine sand and 0.17 to 0.20 for coarse sand.

Table 3.1-5. Detailed Seepage and Slope Stability Summary

Approximate Stationing	Seepage, 200-Year Event		Stability, 200-Year Event		
	Through-Seepage	Under-Seepage	Steady State	Rapid Drawdown	Seismic
Project Reach[1]					
0+00 to 41+00				X	X
41+00 to 129+50		X	X	X	X
129+50 to 189+00		X	X	X	X
189+00 to 215+00		X	X	X	X
215+50 to 245+00		X	X	X	X
245+00 to 307+00		X	X	X	X
307+00 to 312+50				X	X
312+50 to 332+50					N

Source: HDR 2008b.
[1] 0+00 represents the most downstream end of the project reach.
N = No Analysis; X = Deficiency; Blank Cell = No Deficiency.

Levee Slope Stability Assessment

Kleinfelder (2007b) performed the engineering analysis evaluating levee slope stability and the effect of rapid drawdown along the southern reaches of the WSLIP basin and presented their findings in a report titled *West Sacramento Levee System Problem Identification and Alternative Analysis: Volume 1—Geotechnical Problem Identification Solano and Yolo Counties, California* (Kleinfelder 2007b). Kleinfelder (2007b) performed their analysis using the water surface elevations determined by MBK Engineers (2007).

The slope stability findings for the southern reaches as completed by Kleinfelder (2007b) are shown in Table 3.1-6. In brief, the project reach has significant steady state stability deficiencies, and rapid drawdown stability appears to be a significant problem (HDR 2008b). See Figure 12 of HDR (2008a) and Figure 5 of HDR (2008b) for additional information.

Table 3.1-6. Slope Stability Summary

Approximate Stationing	Steady State		Rapid Drawdown	
	100-Year Event	200-Year Event	100-Year Event	200-Year Event
Project Reach[1]				
307+00 to 312+50			✓	✓
245+00 to 307+00	✓	✓	✓	✓
215+50 to 245+00	✓	✓	✓	✓
189+00 to 215+00	✓	✓	✓	✓
129+50 to 189+00	✓	✓	✓	✓
41+00 to 129+50	✓	✓	✓	✓
0+00 to 41+00			✓	✓

Source: HDR 2008a.
[1] 0+00 represents the most downstream end of the project reach.
[2] The checkmark implies the levee segment does not meet the USACE stability factor of safety of greater than 1.4 for steady state or a factor of safety greater than 1.2 for rapid drawdown.

Levee Seepage Analysis and Slope Stability Assessment Summary

Table 3.1-7 summarizes the seepage and slope stability deficiencies for each segment in the project reach.

Table 3.1-7. Southport Project Preliminary Updated Geotechnical Deficiencies

Segment	Updated Geotechnical Deficiencies
A	Waterside rapid drawdown slope instability.
	Detrimental under-seepage through near-surface sand lenses and variable, disconnected sand lenses within the clay blanket.
B	Waterside rapid drawdown slope instability.
	Detrimental under-seepage through near-surface sand lenses and disconnected sand lenses within the clay/silt blanket; and deficient blanket average exit gradient.
C	Waterside rapid drawdown slope instability.
	Detrimental under-seepage through near-surface sand lenses and disconnected sand lenses within the clay/silt blanket; and deficient blanket average exit gradient.
D	Waterside rapid drawdown slope instability.
	Detrimental under-seepage through near-surface sand lenses and disconnected sand lenses within the clay/silt blanket; and potential deficient blanket average exit gradient.
E	Waterside rapid drawdown slope instability.
	Previous breach area with deep, loose/soft soil and connectivity to Bees Lakes could lead to future failures regardless of mitigation.
	Applies to setback alternative (Alternative 2) only: Detrimental under-seepage through near-surface sand lenses and disconnected sand lenses within the clay/silt blanket; and potential deficient average exit blanket gradient.
F	Waterside rapid drawdown slope instability.
	Detrimental under-seepage through near-surface sand lenses and disconnected sand lenses within the clay/silt blanket; and deficient blanket average exit gradient.
G	Waterside rapid drawdown slope instability.
	Detrimental under-seepage through near-surface sand lenses and disconnected sand lenses within the clay/silt blanket; and deficient average exit blanket gradient.

Source: Loktefff pers. comm. 2011

Levee Geometry Evaluation

To evaluate the crown width and side slopes of the levees in the proposed program area, HDR (2008a) generated topography data by means of Light Detection and Ranging (LIDAR) in NAVD 88.

USACE requires that levees have a maximum steepness of 3:1 (H:V) waterside slopes and 3:1 (H:V) landside slope. The design criterion for the Southport project requires that the levees have 3:1 (H:V) for both waterside and landside slopes. Crown widths for primary levees are to be a minimum of 20 feet.

Refer to Appendix A in HDR (2008a) for tables identifying sections of the levees that do not meet the design criterion. Appendix C in HDR (2008a) contains LIDAR cross sections that have been used to evaluate levee geometry. Also refer to Figure 9 of HDR (2008b), which shows the approximate locations where a geometry deficiency has been identified.

In brief, the project reach levee has an over-steepened waterside slope that is the primary problem (HDR 2008b).

Erosion Evaluation

An inventory of current bank erosion sites has been performed to identify sections of the levee that might incur future stability or seepage problems because of bank erosion. Figure 12 of HDR (2008a) and Figure 7 of HDR (2008b) summarize the results of the erosion evaluation for the project reach. The sites have been prioritized based on significance of repairs needed to meet FEMA certification.

More than 4,000 feet of the project reach were identified as having high priority erosion sites, and another 1,000 feet were identified as having moderate priority erosion sites (HDR 2008b).

It is noteworthy that the HDR (2008b) erosion evaluation described above is only one of a few ongoing erosion evaluations that have addressed the project reach levees. Since 1997, Ayres Associates has conducted a field reconnaissance by boat with the USACE Sacramento District and DWR to inventory and describe erosion sites along the Sacramento River Flood Control System. Additionally, Water Engineering & Technology (1991) investigated bank erosion sites on the lower Sacramento River in April and September 1990.

Additionally, cbec staff observed five areas of bank erosion through the study reach where unprotected channel banks are actively eroding[10] (see Figure 3-6 of Appendix B.7). On the right bank immediately upstream of the proposed upstream breach under Alternative 2, the levee is unprotected and eroding in two areas (see Locations 2 and 3 in Figure 3-6 of Appendix B.7), and a third area of levee erosion is located immediately upstream of the project reach (Location 1 in Figure 3-6 of Appendix B.7). These areas of erosion occur along unprotected sections of levee adjacent to levee sections protected by riprap. Figure 3-8 of Appendix B.7 depicts areas of erosion along Location 3. Cross section 3 (Appendix A of Appendix B.7) indicates that the geometry of the channel has changed very little at this location since 2008. However, because there have been no significant runoff events since the winter of 2006, defining a trend of erosion by evaluating the differences between the 2008 and 2011 survey data is not feasible. (Appendix B.7:29–30.)

On the left bank, adjacent to the proposed downstream breach, another small portion of unprotected levee appears to be eroding (see Location 5 in Figure 3-6 of Appendix B.7). However, cross section 14 indicates the bed and bank have accreted in the vicinity of this location since 2008. Figure 3-9 of Appendix B.7 depicts the eroding levee across from the proposed downstream breach under Alternative 2. (Appendix B.7:30.)

Erosion observed on the left bank, downstream of Chicory Bend (see Location 4 in Figure 3-6 of Appendix B.7) appears to be eroding material deposited inboard of the levee since its construction; however, the bend downstream of location 4 appears to focus a significant amount of energy/shear at the toe of the levee. Downstream of this point, the toe of the levee on the left bank is armored with riprap, but upstream of the bend the levee toe is lacking armoring. Cross section 9 (Appendix A of Appendix B.7), surveyed just upstream of Location 4, indicates very little change to the bank and bed at this location. (Appendix B.7:30.)

MBK Engineers' existing model (described below under Modeling of Hydraulic, Geomorphic, and Ecological Effects and in Appendix B.4) indicates a minimal increase in shear associated with the

[10] Additional erosion assessments to support 65% erosion repair designs have recently been completed by cbec staff.

proposed setback alternative. Because erosion exists in the majority of areas that lack armoring, even at locations where erosion typically would not occur (inside of bends), it is hypothesized that the majority of the erosion at these sites is induced by boat wake/wave–generated erosion due to the high level of recreational boat traffic in the project reach. (Appendix B.7:30.)

Depositional Features

Remnants of natural bar features exist in the project reach on the right bank between the Sacramento Yacht Club and Sherwood Harbor and on the left bank at Chicory Bend. Both of these bars support mature riparian vegetation, including willow and cottonwood. Cross sections 6 and 7 (Appendix A of Appendix B.7) indicate minimal change in bed geometry between the Sacramento Yacht Club and Sherwood Harbor. Cross section 8 (Appendix A of Appendix B.7) indicates that there has been erosion of this bar since 2008. Historical surveys and aerial photographs (Appendix A and Section 2-3 of Appendix B.7, respectively) indicated that these bars were less vegetated and likely inundated more frequently. Cbec staff observed active deposition of sediment along the banks at other locations (see Figure 3-6 of Appendix B.7), but deposition is limited to narrow unvegetated bars at the toe of the levees. (Appendix B.7:30.)

Flooding

Levees along the Sacramento River and other waterways provide flood risk management for the city of West Sacramento and conveyance for waters from upstream to the Delta. High winter flows can stress levees and berms. Longer flood durations can contribute to levee seepage and potentially structural levee failure. Flood water surface elevations also can exceed levee heights and cause overtopping and partially controlled flooding of the areas behind the levee. Overtopped levees may maintain structural integrity and would not be considered failed levees. However, the erosive forces that occur during overtopping eventually may cause a structural failure and uncontrolled flooding in the areas behind the levee. To maintain the integrity of the flood risk management system, locations with the potential for failure have been and are being identified and remedied.

MBK Engineers (2007, 2008a, and 2008b) has developed water surface profiles for use in this analysis. Their reports describe and present the results of a hydraulic analysis that was made to determine 1/100 and 1/200 AEP (commonly referred to as 100-year and 200-year) water surface elevations for the project reach. The MBK version of the Comprehensive Study Sacramento River UNET model adopted for the NLIP was used for this analysis. This adopted version is capable of modeling anticipated levee breaks or of allowing levee overtopping without failures. UNET is a one-dimensional unsteady open-channel flow model with the ability to simulate exchange of flow over levees onto floodplains. The MBK UNET model results were a maximum composite of simulations made using hydrologic data for two storm centering scenarios: Sacramento River at latitude of Sacramento and Feather River at Shanghai Bend.

The MBK UNET model indicates no levee overtopping will occur along the Sacramento River in the project reach for the 100-year or the 200-year design floodflows. (Table 3.1-8.) More information is provided in MBK Engineers' *Hydraulics Report for the City of West Sacramento Levee Alternatives Analysis* (2007) and Northwest Hydraulic Consultants' *West Sacramento Levees System: Problem Identification Report, Erosion Assessment and Treatment Alternatives, Draft for Review* (2007a).

Table 3.1-8. Computed Maximum Water Surface Elevations for Sacramento River South Levee

Reach	Comp Study River Mile	Maximum Water Surface Elevation (feet NAVD 88)		Note
		1/100 AEP[1]	1/200 AEP[2]	
Sacramento River	63.44	35.47	36.57	West Sacramento city limit
Sacramento River	62	35.47	36.67	
Sacramento River	60.5	35.47	36.67	American River
Sacramento River	59.695	35.17	36.37	I Street Bridge
Sacramento River	58	34.67	36.37	
Sacramento River	56	33.57	34.77	
Sacramento River	54	32.57	33.77	
Sacramento River	51.75	31.47	32.67	West Sacramento city limit

Source: MBK Engineers' Sacramento River UNET hydraulic model simulations documented in *Supplemental Report for the City of West Sacramento Levee Alternatives Hydraulic Analysis—Draft,* December 4, 2008.

[1] Assumes levees overtop without failing; existing conditions and operations.

[2] Assumes levees overtop without failing; urban levees have 3 feet of freeboard on 1/200 AEP water surface; non-urban levees satisfy SRFCP design freeboard requirements; Folsom Dam Joint Federal Project in place.

AEP = annual exceedance probabilities.

Flood Elevations and Levee Height Evaluation

As described in Section 4.3 of HDR (2008a), the hydraulic models developed by MBK Engineers for 100-year and 200-year water surface flood conditions along the Sacramento River have been used to assess levee conditions. Elevations have been presented in NAVD 88.

Freeboard is the additional levee height above the *adopted flood plane* (U.S. Army Corps of Engineers 1996), otherwise known as the *design water surface*. For the SRFCP, the 1957 profiles are the adopted flood plane.

Results from the hydraulic models have been used to assess levee height adequacy as compared to Federal and local agency criteria. All criteria must be considered, as policies are not consistent from agency to agency.

Plate 3.1-2 shows the existing levee crown versus the computed 100-year and 200-year water surface elevations plus 3 feet of freeboard. Throughout this reach, 3 feet of freeboard is maintained for both the 100-year and 200-year floods. As shown on the plate, water surface elevation for the project reach ranges between approximately 34 and 37 feet in NAVD 88 for the 100-year flood, and between approximately 35 and 38 feet NAVD 88 for the 200-year flood on the Sacramento River. Therefore, under conditions without the Southport project, freeboard is maintained relative to the regulatory criteria, and levee height is not a primary deficiency for the project reach. However, water surface elevation is a contributing factor for other levee failure mechanisms (such as seepage and erosion potential).

Federal Emergency Management Agency Mapping Efforts

Based on the FEMA FIRMs, the locations of the designated floodplains in the project area and vicinity are shown on Plate 3.1-3 and are summarized below.

Federal Emergency Management Agency Parcel # 0607280010B City of West Sacramento, last updated 1995

The northern border of the parcel map is the DWSC near the Port of Sacramento, the southern border is Riverview, the eastern border is the Sacramento River, and the western border is the toe drain on west side of the DWSC (Plate 3.1-3).

The entire project reach levee is in Zone X500, which is zoned by FEMA as being protected from the 100-year flood by levee, dike, or other structures subject to possible failure of overlapping during longer floods, except for a small section of the project reach levee in Segment E near Bees Lakes, which is in Zone A (part of the 100-year floodplain).

Past Sea Level Rise in the Project Area

MBK Engineers (2009a) applied the USACE sea level–rise guidance (U.S. Army Corps of Engineers 2009b) to the WSLIP program area, which includes the Southport project area, in order to determine the effects of potential sea level rise on the program area. The MBK Engineers (2009a) report uses the procedure for calculating sea level rise, which is identified in the USACE guidance, and applies that procedure to the proposed WSLIP design.

Analysis of Historical Mean Sea Level Change

As described in the MBK Engineers report (2009a), the nearest tide station with sufficient period of record (40+ years recommended) is the National Oceanic and Atmospheric Administration (NOAA) Station 9414290 at San Francisco, California. Tidal records for this station have been maintained back to the 1850s.

The NOAA Center for Operational Oceanographic Products and Services (CO-OPS) has analyzed the historical mean sea level for this site, which has been shown to be increasing at a rate of 2.01 mm/yr (California Climate Change Center 2009 as cited in MBK Engineers 2009a). Projections of future mean sea level change are fully discussed in Section 3.2, Flood Control and Geomorphic Conditions, of the *West Sacramento Levee Improvements Program 408 Permission EIS/EIR* (ICF International 2010). In brief, the design water surface for the WSLIP program area is relatively insensitive to the rates of sea level rise. Of all the scenarios analyzed, only the high sea level–rise rate 100 years after the project is constructed shows greater than one-tenth of a foot stage increase in the Sacramento River.

Modeling of Hydraulic, Geomorphic, and Ecological Effects

Seven recent independent modeling efforts have been conducted that analyze conditions in the study area. These models are intended to be used to model the existing hydraulic and geomorphic conditions and to assess the alternatives' effects on these conditions, primarily those associated with Alternatives 2, 4, and 5. MBK Engineers modeling efforts (Appendices B.1, B.2, B.3, B.4, and B.5) and cbec's associated floodplain inundation and connectivity assessment and geomorphic and ecological assessment (Appendices B.6, B.7, and B.8) are included in Appendix B.

- In 2009, MBK Engineers evaluated the potential effects of mean sea level change for the program area (MBK Engineers 2009a).
- In 2009, a modeling effort for the alternatives associated with the entire proposed program area was conducted by MBK Engineers (2009b).

- In 2011, a one-dimensional modeling effort for the alternatives associated with the project reach was conducted by MBK Engineers (Appendix B.4). Additionally, cbec used the results from this modeling effort to investigate the amount of floodplain inundation and connectivity that could be expected during a 2-year recurrence-interval flood, and region-wide sediment transport effects (Appendix B.7).
- In 2011, a two-dimensional modeling effort for the alternatives associated with the project reach was conducted by MBK Engineers (Appendix B.5). Additionally, cbec has developed a 2-D hydrodynamic model (MIKE 21C) for the project reach to be used for geomorphic and ecologic assessments (Appendix B.8). The MIKE 21C model is an unsteady two-dimensional model with coupled sediment transport that was used to simulate both low- and high-magnitude flood events (2-year to 200-year) that are essential to informing geomorphic processes and ecological flows.
- In July 2013, a final version of the one-dimensional modeling effort for the alternatives associated with the project reach was conducted by MBK Engineers (Appendix B.2). It discusses the effects associated with continuation of the existing condition, as well as the reasonably foreseeable future condition [which assumes implementation of the Folsom Joint Federal Project (JFP)]. The modeling provides nearly identical results with respect to these two "without project" conditions. Each of the five alternatives is then compared to these conditions.
- Subsequent two-dimensional modeling demonstrated the one-dimensional model was overestimating the effects due to its limitations in simulating water movement between the mainstem of the river and the expanded floodplain created by the setback levee alternatives. In September 2013, during preparation of the Draft EIS/EIR, the one-dimensional model was further refined to characterize the localized hydraulic impacts with a setback levee in place (Appendix B.1).

Additionally, one previous modeling effort has also been used in the analysis of recreational elements for the WSLIP program area.

- In 2005, MBK Engineers performed a hydraulic analysis of the effects of potential cumulative development in the Sacramento River corridor floodway between Verona and Courtland on flood stages and flows (MBK Engineers 2005). The results are provided in Section 3.2, Flood Control and Geomorphic Conditions, of the *West Sacramento Levee Improvements Program 408 Permission EIS/EIR* (ICF International 2010).

3.1.2 Environmental Consequences

This section describes the environmental consequences relating to hydrologic, hydraulic, geomorphic, and flood risk management conditions for the proposed Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the project, with and without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.1.2.1 Assessment Methods

This evaluation of hydrologic, hydraulic, geomorphic, and flood risk management conditions is based on professional standards, and information cited throughout the section. The key effects were identified and evaluated based on the environmental characteristics of the project reach and the magnitude, intensity, and duration of activities related to the construction and operation of this project.

3.1.2.2 Determination of Effects

Determination of environmental effects for this resource are based on quantitative modeling results comparing the without project conditions and conditions that may result from project implementation. A factor in the determination of effects was consideration of the future conditions with and without the JFP in place. Hydraulic modeling consistently demonstrated that implementation of the JFP would reduce flood risk in the study area. To be conservative, effects were determined without JFP in place to disclose the maximum potential change; effects with JFP in place would be proportionally less. The effects described therefore adequately disclose the potential range of effects resulting from the No Action Alternative and project alternatives, with or without JFP.

For this analysis, an environmental effect was significant related to flood risk management and geomorphic conditions if it would result in any of the effects listed below. These effects are based on common NEPA standards, State CEQA Guidelines Appendix G (14 California Code of Regulations [CCR] 15000 et seq.), and standards of professional practice:

- 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 or off site.
- Substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site.
- Place within a 100-year flood hazard area structures that would impede or redirect floodflows.
- 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.

Effects on flood risk management are considered adverse if implementation of an alternative would:

- Significantly raise flood stage elevations.
- Increase the frequency and duration of inundation of lands (unless so desired by an alternative such as a setback levee).
- 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.

An effect on the levee system is considered adverse if an alternative would substantially increase:

- Seepage.
- Levee settlement.
- Wind erosion.
- Bank erosion or bed scour.
- Sediment deposition.
- Subsidence of land adjacent to levees.

In addition, an effect on the levee system is considered adverse if an alternative would substantially decrease:

- Levee stability.
- Inspection, maintenance, or repair capabilities.
- Current level of levee slope protection.
- Emergency response capabilities.
- Channel conveyance capacity.
- The ability of the levees to withstand seismic forces.

3.1.3 Effects and Mitigation Measures

3.1.3.1 No Action Alternative

For the purpose of this analysis, the No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach starting approximately 0.25 mile south of the Barge Canal and extending south to the Cross Levee. No levee flood risk–reduction measures would be implemented in the project area. Implementation of the JFP, a reasonably foreseeable future project presently under construction, would result in a decrease in water surface elevation in the project reach and, therefore, would decrease flood risk, but current levee standards would remain unmet.

Specific to vegetation, as presented in Chapter 2, the No Action Alternative is characterized by three possible future scenarios.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

Full compliance with the USACE levee vegetation policy would result in the removal of a substantial amount of vegetation from the bank of the Sacramento River, including vegetation that helps prevent soil erosion on the levees. Without woody vegetation, there would be a potential decrease in levee stability during high flows, and the levee would be more susceptible to erosion. To decrease the risk of erosion, USACE would seed the waterside of the levee with approved grasses. There would be no effect.

If the USACE levee vegetation policy is not applied, it is assumed that the vegetation conditions at the time of this analysis would continue into the future. This condition could cause the levee to be deemed ineligible for PL 84-99 Federal assistance, based on future inspection. If vegetation were to expand beyond the current conditions, there could be effects on geomorphology, such as changes in near-bank velocity, contributing to localized erosion, deposition, or changes in water surface elevation. However, the magnitude of such an effect is uncertain and cannot be quantified.

Additionally, if the USACE levee vegetation policy is not applied, access to levees for inspection and emergency repair could be hindered. Inspections are important for identifying necessary levee repair activities, such as addressing seepage risk due to rodent burrows, rotting tree roots, or other problems that could increase levee instability.

Modified application of the ETL through application of the ULDC would result in a slow loss of woody vegetation along the Sacramento River South Levee. As described above, the loss of woody vegetation due to the full application of the USACE levee vegetation policy would decrease levee stability because the waterside slope would be more susceptible to erosion. However, this effect would occur more gradually, as woody vegetation would be allowed to die out and would not be actively eradicated. The measures described under the modified application of the USACE levee vegetation policy would minimize risk to levee stability and reduce the potential for erosion. There would be no effect.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

Implementation of the No Action Alternative would result in the following effects on flood risk management (Table 3.1-9).

Table 3.1-9. Flood Risk Management Effects for the No Action Alternative

Effect	Finding
FR-NA-1: Continued Elevated Risk of Levee Failure	Significant (all vegetation scenarios)

Effect FR-NA-1: Continued Elevated Risk of Levee Failure

Without the Southport project, the risk of levee failure would remain at an elevated level. Under-seepage, loss of levee foundation soils, and erosion would be expected to continue. A catastrophic levee failure would result from collapse of levee slopes and loss of soil. Furthermore, if a levee breach were to occur, emergency construction and repair activities might be implemented without the use of BMPs and could result in loss of channel capacity and alteration of present-day geomorphic conditions, which could further exacerbate flood risk. While failing to bring project levees up to current design standards would continue the risk of levee instability, implementation of the ETL or modified application of the ETL would improve the current conditions. However, without the proposed repairs, the risk would still remain significant, even if the ETL or modified ETL is implemented.

See Chapter 2, in the No Flood Risk–Reduction Measures Implemented subsection under the No Action Alternative for additional information (including a flood depth map prepared for West Sacramento that illustrates inundation levels under a 100-year flood event scenario would range from 1 foot to 15 feet).

3.1.3.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on hydrologic, hydraulic, geomorphic, and flood risk management conditions (Table 3.1-10).

Table 3.1-10. Flood Risk Management and Geomorphic Conditions Effects and Mitigation Measures for Alternative 1

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
FR-1: Change in Flood Risk Associated with Water Surface Elevation	Local: less than significant	Upstream: less than significant Downstream: no effect	NA	None
FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage	Beneficial	No effect	NA	None
FR-3: Alteration of Existing Drainage Pattern of Site or Area	Significant	Significant	Less than significant	FR-MM-1: Coordinate with Owners and Operators, Prepare Drainage Studies as Needed, and Remediate Effects through Project Design
FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees	Channel bed incision: no effect Bank erosion: beneficial	Channel bed incision: no effect Bank erosion: less than significant	NA	None
FR-5: Decrease in Levee Erosion through Rock Slope Protection	Beneficial	No effect	NA	None
FR-6: Decrease in Through- and Under-Seepage	Beneficial	No effect	NA	None
FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition	No effect	No effect	NA	None

Effect FR-1: Change in Flood Risk Associated with Water Surface Elevation

Local Effects

Because it does not include alterations to the waterside slope of the existing levee, Alternative 1 was assumed to be hydraulically equivalent to the without-project condition (i.e., the No Action Alternative); as such, no project reach hydraulic modeling effort was completed for Alternative 1 in 2011. In 2013, however, MBK Engineers determined that Alternative 1 has no measurable effect on the peak stage or peak flow in any of the events analyzed through a modeling effort (Appendix B.2:Table 5, Table 14).

Additionally, as determined through a robust modeling effort for the WSLIP program area, which includes the Southport project area, MBK Engineers (2009b) concluded that there are no calculated effects of the WSLIP[11] for the 1-in-100-year and 1-in-200-year flood events (MBK Engineers 2009b:Table 3, Table 4). For the 1-in-500-year flood, the maximum water surface elevation change on the Sacramento River between the without-project and with-project conditions is 0.10 foot at RM 59.0, just upstream of the project reach (MBK Engineers 2009b:Table 5). However, even these relatively minor computed effects are considered extremely implausible, given the significant portion of upstream and adjacent levees overtopped by this flood without any levee failures occurring. See Table 6 of MBK Engineers (2009b) for quantification of the levee overtopping from this analysis and Appendix A of MBK Engineers (2009a) for analysis where upstream levees are allowed to fail.

Therefore, implementation of Alternative 1 would have direct and indirect less-than-significant effects on flood risk related to water surface elevation change.

Upstream Effects

Based on the quantitative results from the MBK Engineers (2009b) modeling effort, upstream water levels would not be affected significantly by the proposed adjacent levee raise in the project reach, assuming that all upstream levee strengthening components described above in Table 1 of MBK Engineers 2009b eventually are implemented.

Raising the adjacent levee would not significantly alter water surface elevation above the project reach or significantly change the geometry of the Sacramento River. Therefore, Alternative 1 would not cause significant changes to water flow in the river or cause negative hydraulic effects upstream of the project reach. Indirect effects on upstream reaches are considered less than significant.

Downstream Effects

An adjacent levee raise could involve indirect transfer of flood risk to adjacent or downstream levees. However, as described in MBK Engineers’ (2009b) modeling report for the WSLIP program area, raising and strengthening portions of West Sacramento’s Federal project levee system would not result in any significant hydraulic effects on other stream reaches part of the SRFCP. Furthermore, these flood risk–reduction measures would be consistent with the principles that have guided the management of the SRFCP over the past century and with the policies adopted by the state legislature calling for an immediate and comprehensive effort to increase the level of flood protection provided to West Sacramento and the other urban areas in the SRFCP area. There would be no indirect effect to downstream water surface elevations and resulting levels of flood risk.

Effect FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage

An adjacent levee raise would add material to the levee, which would help to decrease relative erosion. More levee material would require a greater amount of erosion to cause a breach. A new adjacent levee would involve up-to-date design and construction methods to avoid erosion, and it is assumed that bank erosion on the newly reshaped bank (i.e., former levee surface) on the waterside would remain minimal because features associated with this flood risk–reduction measure would be engineered to withstand the forces of erosion by flowing water.

An adjacent levee raise also would provide more material in the landward direction to help reduce the levee through- and under-seepage potential. This flood risk–reduction measure would not result in any long-term changes to the overall existing drainage pattern of the Sacramento River.

[11] Defined as levees raised to current design level (1-in-200 year water surface + 3 feet of freeboard).

Furthermore, it would not change the existing potential for through- and under-seepage upstream and downstream of the project reach as water surface elevations would not change significantly upstream or downstream, and current seepage rates do not contribute to substantial reductions in channel flows or water surface elevations. The change in hydrologic conditions resulting from this flood risk–reduction measure is not expected to result in a substantial increase in seepage through or under adjacent levees because upstream and downstream levees will be engineered appropriately to an equal level of performance. Flood risk–reduction measures described under Effect FR-6 aim to rectify through- and under-seepage concerns. The direct effect on the project levee would be beneficial; there is no indirect effect on upstream or downstream levees.

Effect FR-3: Alteration of Existing Drainage Pattern of Site or Area

Implementation of certain flood risk–reduction measures of Alternative 1 (e.g., adjacent levee raise and seepage berm) and recreation elements could involve earthwork on the top and/or landward side of the levee. The new material on the landside could cross drainage infrastructure maintained by local landowners or local agencies in some locations or directly alter surface runoff patterns. Because interference with drainage could indirectly cause or exacerbate localized flooding, this effect would be significant. The presence of the newly modified levee itself also could alter the course of local runoff. The implementation of Mitigation Measure FR-MM-1 would reduce direct and indirect effects to a less-than-significant level.

Mitigation Measure FR-MM-1: Coordinate with Owners and Operators, Prepare Drainage Studies as Needed, and Remediate Effects through Project Design

The agencies implementing project components and their primary contractors for engineering design and construction will ensure that the following measures are implemented to avoid adverse effects associated with disruption of local drainage systems.

During final project design, project engineers will coordinate with owners and operators of local drainage systems and landowners served by the systems to evaluate pre- and post-project drainage needs and design features to remediate project-related substantial drainage disruption or alteration in runoff that would increase the potential for localized flooding. If substantial alteration of runoff patterns or disruption of a local drainage system could result from a project feature, a drainage study will be prepared as part of final project design. The study will consider the design flows of any existing facilities that would be crossed by project features and develop appropriate plans for relocation or other modification of these facilities and construction of new facilities, as needed, to ensure equivalent functioning of the system during and after construction. If no drainage facilities (e.g., ditches, canals) would be affected, but project features would have a substantial adverse effect on runoff amounts and/or patterns, new drainage systems will be included in the design of project alternatives to ensure that the project would not result in new or increased localized flooding. Any necessary features to remediate project-induced drainage problems will be installed before the project is completed or as part of the project, depending on site-specific conditions.

Effect FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees

All project alternatives involve an increase in levee height and are expected to provide 200-year level of performance in the project reach and contain larger floodflows within the Sacramento River channel. Under no overtopping conditions (i.e., all flows less than the 200-year event), stream energy potentially could increase erosion on the channel bed due to lateral confinement. However, given the apparent rates of incision in the second half of the twentieth century and present low-water elevations, it is unlikely that further significant incision of the Sacramento River downstream of Verona would occur. Potential further incision would be unlikely to exceed approximately 1 foot, an amount that is negligible in comparison to transitory riverbed incision resulting from major floods. (Northwest Hydraulic Consultants 2007a.) There would be neither a direct effect on channel bed incision in the project reach, nor an indirect effect downstream of the project.

With respect to bank erosion during the 200-year event peak flow, the average velocities do not present a significant concern for surface erosion by flows parallel to the bank, except where the banks have no vegetation and no other bank protection, or where significant obstructions project into the flow and generate eddies and complex flows capable of eroding the streambank (Northwest Hydraulic Consultants 2007a). Removal and/or reduction of riparian vegetation under Alternative 1 would not increase this effect, as placement of rock slope protection would be required after vegetation removal. Because Alternative 1 would upgrade erosion control on existing levees using up-to-date design and construction standards, its implementation would reduce the risk of bank erosion during peak flow events for the project reach. The upgraded levee design and construction standards would provide a direct beneficial effect, offsetting any potential for bank erosion attributable to heightened levees.

Additionally, the roughness associated with the rock slope protection would counter the increased shear stresses of larger flow events, reducing the velocity of flows parallel to the bank and limiting transference of erosion of levee materials downstream of the project reach. Furthermore, these flood risk–reduction measures would be consistent with the principles that have guided the management of the SRFCP over the past century and with the policies adopted by the state legislature calling for an immediate and comprehensive effort to increase the level of flood protection provided to West Sacramento and the other urban areas in the SRFCP area. Alternative 1 would result in a less than significant indirect effect on downstream bank erosion attributable to heightened levees.

Effect FR-5: Decrease in Levee Erosion through Rock Slope Protection

Portions of the levee slopes (one identified erosion site in Segment E, as well as all areas where an adjacent levee would be constructed) would be protected by the flood risk-reduction measure of rock slope protection. Rock would be placed on the waterside of the levee to protect against erosional forces, such as wind and waves. No significant geomorphic or flood–related direct effects are associated with rock slope protection, as it would provide more material with a greater resistance to erosion, thus helping to decrease relative erosion amounts. Additionally, the roughness associated with the rock slope protection would counter the increased shear stresses of larger flow events that otherwise would increase erosion of the levee materials.

In addition, rock slope protection would not result in any long-term or indirect changes to the overall existing planform geometry of the river. Furthermore, it would not change the existing potential for levee erosion upstream and downstream of the project reach, assuming it can be transitioned into existing revetment geometry. This effect would be beneficial within the project reach; there is no indirect effect on upstream or downstream levees.

Effect FR-6: Decrease in Through- and Under-Seepage

Through- and under-seepage has the potential to weaken levee foundations. An adjacent levee with a slurry cutoff wall is proposed in Segments A, D, G, and a small portion of Segment B. An adjacent levee with a landside seepage berm is proposed in Segments B, C, and F. A setback levee with a landside seepage berm is proposed in Segment E. These flood risk–reduction measures would reduce or eliminate the potential for seepage. Slurry cutoff walls create walls of impermeable material that act as a barrier to water moving laterally through a levee, greatly reducing or eliminating the potential for through-and under-seepage. Similarly, seepage berms result in a wide embankment structure that resists accumulated water pressure and safely releases seeping water. These flood risk–reduction measures would result in direct beneficial effects on flood conditions in the project reach; there is no indirect effect on upstream or downstream levees.

Effect FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition

Because Alternative 1 would leave the existing levee in place, no geomorphic assessment of scour and/or deposition patterns was completed. Floodplain capacity would remain similar to existing conditions under most flows. However, for flows greater than the 200-year event that overtopped the existing levee, there is potential for both scour and deposition of fine material between the existing levee and the proposed setback levee in Segment E. The amount of scour and deposition most likely would be small and would depend on the slope and available space between the two levees. There would be no direct or indirect effect.

3.1.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on hydrologic, hydraulic, geomorphic, and flood risk management conditions (Table 3.1-11).

Table 3.1-11. Flood Risk Management and Geomorphic Conditions Effects and Mitigation Measures for Alternative 2

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
FR-1: Change in Flood Risk Associated with Water Surface Elevation	Local: less than significant	Upstream: less than significant Downstream, hydraulic: no effect Downstream, general: less than significant	NA	None
FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage	Beneficial	No effect	NA	None
FR-3: Alteration of Existing Drainage Pattern of Site or Area	Significant	Significant	Less than significant	FR-MM-1: Coordinate with Owners and Operators, Prepare Drainage Studies as Needed, and Remediate Effects through Project Design

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees	Channel bed incision: no effect Bank erosion: beneficial	Channel bed incision: no effect Bank erosion: less than significant	NA	None
FR-5: Decrease in Levee Erosion through Rock Slope Protection	Beneficial	No effect	NA	None
FR-6: Decrease in Through- and Under-Seepage	Beneficial	No effect	NA	None
FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition	Significant	No effect	Less than significant	FR-MM-2: Monitor Depositional Feature Integrity and Stability Postconstruction, and Remediate Effects through Restoration Activities FR-MM-3: Monitor Geomorphic Stability and Vegetation Community after High Flow Events and Remediate Effects through Restoration Activities if Necessary

Effect FR-1: Change in Flood Risk Associated with Water Surface Elevation

Local Effects within Project Area

No significant local flood risk management –related direct effects are associated with an adjacent levee or setback levee because these flood risk–reduction measures would help minimize flooding locally behind the modified levee sections and enable them to meet associated regulatory criteria.

Local Effects on Sacramento River East Levee

In addition to the modeling effort for the WSLIP program area described above (where the effects for Alternative 2 would be similar to those described above for Effect FR-1 under Alternative 1[12]), MBK Engineers (Appendices B.1 and B.2) performed a hydraulic effect analysis to analyze the effects of the Southport project alternatives. The modeling results for Alternative 2 suggest that, for the 100-year event, a decrease of 0.01 feet in the peak stage at the upstream end of the project reach and an increase of 0.01 feet at the downstream end of the project reach would occur; for the 200-year event, an increase of 0.01 feet in the peak stage at the upstream end of the project reach and a

[12] There are no calculated effects for the water surface for the 100-year and 200-year event in the vicinity of the adjacent levee raise in Segment G, as described above under Effect FR-1 under Alternative 1. For the 1-in-500-year flood, the maximum water surface elevation change on the Sacramento River between the without-project and with-project conditions is 0.10 foot at RM 59.0, just upstream of the project reach (see Table 5 of MBK Engineers 2009b). However, even these relatively minor computed effects are considered extremely implausible, given the significant portion of upstream and adjacent levees overtopped (see Table 6 of MBK Engineers [2009b] for quantification of the levee overtopping from this analysis and Appendix A of MBK Engineers [2009a] for analysis where upstream levees are allowed to fail) by this flood without any levee failures occurring.

decrease of 0.02 feet at the downstream end of the project reach would occur; for the 500-year event, an increase of 0.04 feet in the peak stage at the upstream end of the project reach and a decrease of 0.04 feet at the downstream end of the project reach would occur (Appendix B.1). The peak increase would be expected to occur at River Mile 54, across from Davis Road, where an increase of 0.13 feet, 0.17 feet, and 0.27 feet would result from a 100-year, 200-year, and 500-year event, respectively.

Consequently, setting back the levee would cause slight increases and decreases in water surface elevation in the project area and the Sacramento River east levee on the opposite bank. These increases would be minor; even the maximum potential increases would not result in inadequate levee height or freeboard, and there would be no substantial increase in the potential for seepage or erosion. Therefore, there is a less-than-significant change in flood risk, and the finding is less than significant. These minor increases would likely be further reduced through design and implementation refinements guided by the Section 408 permission approval process. Factors considered in the granting of permission to modify public works under 33 USC §408 are discussed in Chapter 5, "Regulatory Framework and Compliance."

Upstream Effects

The existing to current with project modeling results for Alternative 2 suggest that, for the 100-year event, there is a 0.9% increase in the peak flow in the Sacramento River below the American River, from 126,000 cfs to 127,100 cfs; for the 200-year event, there is a 1.1% increase in the peak flow in the Sacramento River below the American River, from 149,200 cfs to 150,900 cfs; for the 500-year event, there is a 1.2% increase in the peak flow in the Sacramento River below the American River, from 163,600 cfs to 165,500 cfs. The increase in flow is due to the effect of the peak stage decrease upstream of the project on the flow split at the confluence of the Sacramento and American Rivers. (Appendix B.2:6–7)

Additionally, the existing to current with project modeling results for Alternative 2 suggest that, for the 100-, 200-, and 500-year floods, the effects on peak stages at index points on the Yolo Bypass, Sacramento Bypass, and DWSC are negligible. This indirect effect is considered less than significant, assuming that all upstream levee strengthening components described in Table 1 of MBK Engineers (2009b) are eventually implemented.

Raising the adjacent levee or constructing a setback levee would not significantly alter water surface elevations or cause negative hydraulic effects upstream of the project reach. Indirect effects on upstream reaches are considered less than significant.

Downstream Effects

An adjacent levee raise or construction of a setback levee could represent an unacceptable transfer of flood risk to adjacent or downstream levee districts. For the adjacent levee in Segment G, raising and strengthening portions of West Sacramento's Federal project levee system would not result in any significant indirect hydraulic effects on other subbasins part of the SRFCP, as described above for Effect FR-1 under Alternative 1.

The existing to current with project modeling results for Alternative 2 suggest that, for the 100-year event, there is an increase in peak stage of 0.01 feet 5 miles downstream of the project at the Freeport Bridge, but the increased downstream water surface elevations dissipate to zero 25 miles downstream at Walnut Grove; for the 200-year event, there is a decrease in peak stage of 0.02 feet

5 miles downstream of the project, and the decreased downstream water surface elevations persist at diminished levels 25 miles downstream (0.01 foot); for the 500-year event, there is a decrease in peak stage of 0.03 feet 5 miles downstream of the project, and the decreased downstream water surface elevations persist at diminished levels 25 miles downstream (0.01 foot) (Appendix B.2). This indirect effect is considered less than significant because of the extremely low values of the modeled increases.

These flood risk–reduction measures would be consistent with the principles that have guided the management of the SRFCP over the past century and with the policies adopted by the state legislature calling for an immediate and comprehensive effort to increase the level of performance provided to West Sacramento and the other urban areas in the SRFCP area. Indirect effects on downstream reaches are considered less than significant.

Effect FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage

Direct and indirect effects associated with Effect FR-2 under Alternative 2 are similar to those described for Effect FR-2 under Alternative 1. However, Effect FR-2 under Alternative 2 is considered more beneficial because the setback levee would also minimize shear stress by creating a wider channel platform in the Sacramento River, thereby benefiting bank stability in the project reach.

Effect FR-3: Alteration of Existing Drainage Pattern of Site or Area

Direct and indirect effects associated with Effect FR-3 under Alternative 2 are similar to those described for Effect FR-3 under Alternative 1. Effect FR-3 under Alternative 2 is considered more adverse, however, because the setback levee on Segments A–F would require more landward disturbance. Implementation of Mitigation Measure FR-MM-1 would reduce this effect to a less-than-significant level.

Effect FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees

Out-of-bank flows under the levee setback condition associated with Alternative 2 would affect the frequency of bankfull events to a negligible extent, and therefore are not likely to influence channel morphology over time. Locally, shear stresses through the project reach should be substantially reduced, and existing bank erosion issues would benefit as a result. Additionally, Alternative 2 would create a more erosion-resistant levee, thus most likely benefiting existing bank erosion rates. There would be no direct effect on channel bed incision in the project reach, nor an indirect effect downstream.

Removal or reduction of riparian vegetation could increase bank erosion through loss of vegetation and disruption of soil structure. However, these effects are not considered adverse because geotechnical bank stabilization (through either bio-engineering or hardscape methods) would be required after vegetation removal. As such, there would neither be a direct effect on bank erosion in the project reach nor an indirect effect downstream.

Effect FR-5: Decrease in Levee Erosion through Rock Slope Protection

Direct and indirect effects associated with Effect FR-5 under Alternative 2 are similar to those described for Effect FR-5 under Alternative 1. Alternative 2, however, would be more beneficial because all erosion sites in Segments C–F, as identified by cbec, will be protected with rock slope protection. There is no indirect effect on upstream or downstream levees.

Effect FR-6: Decrease in Through- and Under-Seepage

Direct effects associated with Effect FR-6 under Alternative 2 are similar to those described for Effect FR-6 under Alternative 1. Effect FR-6 under Alternative 2 is considered more beneficial, however, because the setback levee materials would be engineered to resist through- and under-seepage. There is no indirect effect on upstream or downstream levees.

Effect FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition

It is presently assumed that floodplain inundation will occur approximately at the 1-year recurrence interval event for Alternative 2 at depths between 0.5 and 3 feet. For the 2-year recurrence interval event, flood depths will range from 9 to 12 feet. Depths may exceed these ranges within the low-flow swales of the offset area.

Because of the increased conveyance area associated with the setback conditions, the magnitude of boundary shears within the project reach would be generally slightly less than that of the existing condition, but would remain adequate to transport the input sediment load, similar to the existing condition. Indirect changes upstream and downstream of the project reach are anticipated to be negligible.

Out-of-bank flows under the levee setback condition associated with Alternative 2 would affect the frequency of bankfull events to a negligible extent, and therefore are not likely to influence channel morphology over time. In general, shear stresses through the project reach will be slightly reduced, with no significant direct effect on main channel erosion or deposition. The proposed levee setback most likely will not significantly affect the location and size of the depositional features described in the Environmental Setting sections (i.e., natural bar features on the right bank between the Sacramento Yacht Club and Sherwood Harbor and on the left bank at Chicory Bend, both of which support mature riparian vegetation) (Appendix B.7[13]); however, significant effects on the geomorphic landforms and associated riparian vegetation in the project reach could occur if project construction activities disrupt these features. Mitigation Measure FR-MM-2 would reduce this effect to a less-than-significant level.

Hydraulically connecting Bees Lakes to the Sacramento River during high flows under Alternative 2 would generally provide beneficial effects to Bees Lakes as the flows high flows would serve to flush out the lakes and provide for a more geomorphologically dynamic environment. Localized scour, deposition, and recruitment of large wood would all increase the diversity of the local ecosystem. However, since the exact nature of hydraulic connectivity from the mainstem Sacramento River to Bees Lakes has not yet been fully determined, the magnitude and results of geomorphic processes under these higher flows is uncertain. As such, significant direct effects on the geomorphic landforms and associated lacustrine vegetation in Bees Lakes could occur if higher flows disrupt these features. Mitigation Measure FR-MM-3 would reduce this direct effect to a less-than-significant level. There are no indirect effects.

[13] cbec's rationale for this assumption is based primarily on the fact that MBK Engineers' initial 1-D modeling results showed that Alternative 2 had a very marginal effects on the hydraulics of the project reach (Stofleth pers. comm. 2011). This has been verified with 2-D sediment transport modeling (see Appendix C.8).

Mitigation Measure FR-MM-2: Monitor Depositional Feature Integrity and Stability Postconstruction, and Remediate Effects through Restoration Activities

The agencies implementing project components and the primary contractors for engineering design and construction will ensure that the following measures are implemented to avoid adverse effects associated with alteration of preexisting depositional features.

After project construction, a monitoring plan will be developed by a team of qualified biologists and geomorphologists with expertise in channel and floodplain restoration. The monitoring plan will outline the procedures necessary to detect significant geomorphic or riparian vegetation changes to the depositional features. If the depositional features are found to have been compromised as a result of project activities, the team will identify opportunities and constraints for restoration at the sites of the depositional features or elsewhere in the project reach and develop a restoration plan.

Mitigation Measure FR-MM-3: Monitor Geomorphic Stability and Vegetation Community after High Flow Events and Remediate Effects through Restoration Activities if Necessary

The agencies implementing project components and their primary contractors for engineering design and construction will ensure that the following measures are implemented to avoid adverse effects associated with alteration of geomorphic stability.

Before Bees Lakes are hydraulically connected to the Sacramento River, a monitoring plan will be developed by a team of qualified biologists and geomorphologists with expertise in floodplain restoration. The monitoring plan will outline the procedures necessary to detect significant geomorphic and/or riparian vegetation changes to Bees Lakes. If the geomorphic stability of Bees Lakes is found to have been compromised as a result of hydraulic connectivity, the team will identify opportunities and constraints for restoration of the geomorphic features in Bees Lakes and develop a restoration plan.

3.1.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on hydrologic, hydraulic, geomorphic, and flood risk management conditions (Table 3.1-12).

Table 3.1-12. Flood Risk Management and Geomorphic Conditions Effects and Mitigation Measures for Alternative 3

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
FR-1: Change in Flood Risk Associated with Water Surface Elevation	Local: less than significant	Upstream: less than significant Downstream: no effect	NA	None
FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage	Beneficial	No effect	NA	None

	Finding		With	
Effect	Direct	Indirect	Mitigation	Mitigation Measure
FR-3: Alteration of Existing Drainage Pattern of Site or Area	Significant	Significant	Less than significant	FR-MM-1: Coordinate with Owners and Operators, Prepare Drainage Studies as Needed, and Remediate Effects through Project Design
FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees	Channel bed incision: no effect Bank erosion: beneficial	Channel bed incision: no effect Bank erosion: less than significant	NA	None
FR-5: Decrease in Levee Erosion through Rock Slope Protection	Beneficial	No effect	NA	None
FR-6: Decrease in Through- and Under-Seepage	Beneficial	No effect	NA	None
FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition	Significant	No effect	Less than significant	FR-MM-2: Monitor Depositional Feature Integrity and Stability Postconstruction, and Remediate Effects through Restoration Activities

Effect FR-1: Change in Flood Risk Associated with Water Surface Elevation

Local, Upstream, and Downstream Effects

Local, upstream, and/or downstream direct and indirect effects associated with Effect FR-1 under Alternative 3 are similar to those described for Effect FR-1 under Alternative 1. The slope flattening flood risk–reduction measures would neither alter water surface elevations in the project reach nor significantly change the geometry of the Sacramento River and, therefore, would not cause significant changes to water flow in the river or cause negative hydraulic effects in the project reach.

Similar to the effects described for Effect FR-1 under Alternative 1, indirect effects on upstream reaches are considered less than significant, and there would be no indirect effect downstream of the project reach.

Effect FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage

Slope-flattening would help decrease relative erosion rates by alleviating over-steepened banks. Slope-flattening would involve up-to-date design and construction methods to avoid erosion, and it is assumed that bank erosion on the newly reshaped bank on the waterside would remain minimal because features associated with this flood risk–reduction measure would be engineered to withstand the forces of erosion by flowing water. This would be a direct beneficial effect. Indirect effects associated with Effect FC-FR-2 under Alternative 3 are similar to those described for Effect FC-FR-2 under Alternatives 1 and 2.

Slope flattening is not anticipated to have a measurable effect on through- and under-seepage potential. Flood risk–reduction measures discussed in Effect FR-6 aim to rectify through- and under-seepage concerns.

Effect FR-3: Alteration of Existing Drainage Pattern of Site or Area

Direct and indirect effects associated with Effect FR-3 under Alternative 3 are similar to those described under Alternative 1. Effect FR-3 under Alternative 3 is considered of lesser magnitude, however, because the only proposed landward modification would be associated with the seepage berm flood risk–reduction measure. As with Alternative 1, implementation of Mitigation Measure FR-MM-1 would reduce this effect to a less-than-significant level.

Effect FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees

Direct and indirect effects associated with Effect FR-4 under Alternative 3 are similar to those described for Effect FR-4 under Alternative 1. It is assumed that levee heights would be raised in only certain locations in the project reach so that they would meet associated regulatory criteria, but they would not be raised enough to be considered a significant effect, as described under Alternative 1.

Effect FR-5: Decrease in Levee Erosion through Rock Slope Protection

Direct and indirect effects associated with Effect FR-5 under Alternative 3 are identical to those described for Effect FR-5 under Alternative 1.

Effect FR-6: Decrease in Through- and Under-Seepage

Direct effects associated with Effect FR-6 under Alternative 3 are similar to those described for Effect FR-6 under Alternative 1. Effect FR-6 under Alternative 3 is considered slightly less beneficial, however, because it does not include a setback levee with materials that would be engineered to resist through- and under-seepage. Nonetheless, through- and under-seepage potential will be decreased with the implementation of Alternative 3.

Effect FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition

Because Alternative 3 would leave the existing levee in place, no geomorphic assessment of scour or deposition patterns was completed. Floodplain capacity, stream energy, and associated scour and depositional regimes would remain similar to existing conditions. Slope-flattening would help to decrease relative erosion rates by alleviating over-steepened banks, but it would not have a measurable effect on stream energy. However, slope-flattening activities could affect the observed depositional features in the project reach. Significant direct effects on the geomorphic landforms and associated riparian vegetation in the project reach could occur if project construction activities disrupt these features. Mitigation Measure FR-MM-2 would reduce this effect to a less-than-significant level. There are no indirect effects.

3.1.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on hydrologic, hydraulic, geomorphic, and flood risk management conditions (Table 3.1-13).

Table 3.1-13. Flood Risk Management and Geomorphic Conditions Effects and Mitigation Measures for Alternative 4

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
FR-1: Change in Flood Risk Associated with Water Surface Elevation	Local: less than significant	Upstream: less than significant Downstream, hydraulic: no effect Downstream, general: less than significant	NA	None
FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage	Beneficial	No effect	NA	None
FR-3: Alteration of Existing Drainage Pattern of Site or Area	Significant	Significant	Less than significant	FR-MM-1: Coordinate with Owners and Operators, Prepare Drainage Studies as Needed, and Remediate Effects through Project Design
FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees	Channel bed incision: no effect Bank erosion: beneficial	Channel bed incision: no effect Bank erosion: less than significant	NA	None
FR-5: Decrease in Levee Erosion through Rock Slope Protection	Beneficial	No effect	NA	None
FR-6: Decrease in Through- and Under-Seepage	Beneficial	No effect	NA	None
FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition	Significant	No effect	Less than significant	FR-MM-2: Monitor Depositional Feature Integrity and Stability Postconstruction, and Remediate Effects through Restoration Activities

Effect FR-1: Change in Risk Associated with Water Surface Elevation

Local, Upstream, and Downstream Effects

Local, upstream, and downstream direct and indirect effects associated with Effect FR-1 under Alternative 4 are similar to those described for Effect FR-1 under Alternative 2. Locally, the modeling results for Alternative 4 (for the 100-, 200-, and 500-year events) suggest that both the modeled increases in the peak stage at the upstream end of the project reach are not present in Alternative 4.

Upstream, the percentage increases in peak flow in the Sacramento River below the American River (for the 100-, 200-, and 500-year events) are slightly higher under Alternative 4 than under Alternative 2. However, the change in percentage never exceeds more than three-tenths of a percent.

Downstream, the increase in peak stage at the Freeport Bridge and at Walnut Grove are the same under Alternative 4 than for those under Alternative 2.

Effect FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage

Direct and indirect effects associated with Effect FR-2 under Alternative 4 are identical to those described for Effect FR-2 under Alternatives 1 and 2.

Effect FR-3: Alteration of Existing Drainage Pattern of Site or Area

Direct and indirect effects associated with Effect FR-3 under Alternative 4 are similar to those described for Effect FR-3 under Alternatives 1 and 2. Effect FR-3 under Alternative 4 is considered more adverse than both alternatives, however, because the construction of both an adjacent levee in Segment F and a ring levee around the Bees Lakes area would require more landward disturbance. However, implementation of Mitigation Measure FR-MM-1 would reduce this effect to a less-than-significant level.

Effect FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees

Direct and indirect effects associated with Effect FR-4 under Alternative 4 are similar to those described for Effect FR-4 under Alternative 2. Effect FR-4 under Alternative 4 is considered potentially more significant, however, because it is assumed that levee heights will need to be raised in more locations in the project reach for them to meet associated regulatory criteria.

Effect FR-5: Decrease in Levee Erosion through Rock Slope Protection

Direct and indirect effects associated with Effect FR-5 under Alternative 4 are similar to those described for Effect FR-5 under Alternative 2. Alternative 4 however, would be slightly less beneficial because the erosion sites in Segment F as identified by cbec would not be protected with rock slope protection.

Effect FR-6: Decrease in Through- and Under-Seepage

Direct effects associated with Effect FR-6 under Alternative 4 are similar to those described for Effect FR-6 under Alternative 2. Effect FR-6 under Alternative 4 is considered slightly less beneficial, however, because the setback levee is shorter in length. Nonetheless, through- and under-seepage potential would be decreased with the implementation of Alternative 4.

Effect FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition

Direct and indirect effects associated with Effect FR-7 under Alternative 4 are similar to those described for Effect FR-7 under Alternative 2. However, effects associated with Effect FR-7 under Alternative 4 are less in magnitude than those effects described under Alternative 2 because Bees

Lakes would not be hydraulically connected to the Sacramento River under Alternative 4. Mitigation Measure FR-MM-2 would reduce the other effects to a less-than-significant level.

3.1.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on hydrologic, hydraulic, geomorphic, and flood risk management conditions (Table 3.1-14).

Table 3.1-14. Flood Risk Management and Geomorphic Conditions Effects and Mitigation Measures for Alternative 5

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
FR-1: Change in Flood Risk Associated with Water Surface Elevation	Local: less than significant	Upstream: less than significant Downstream, hydraulic: no effect Downstream, general: less than significant	NA	None
FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage	Beneficial	No effect	NA	None
FR-3: Alteration of Existing Drainage Pattern of Site or Area	Significant	Significant	Less than significant	FR-MM-1: Coordinate with Owners and Operators, Prepare Drainage Studies as Needed, and Remediate Effects through Project Design
FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees	Channel bed incision: no effect Bank erosion: beneficial	Channel bed incision: no effect Bank erosion: less than significant	NA	None
FR-5: Decrease in Levee Erosion through Rock Slope Protection	Beneficial	No effect	NA	None
FR-6: Decrease in Through- and Under-Seepage	Beneficial	No effect	NA	None
FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition	Significant	No effect	Less than significant	FR-MM-2: Monitor Depositional Feature Integrity and Stability Postconstruction, and Remediate Effects through Restoration Activities

Effect FR-1: Change in Flood Risk Associated with Water Surface Elevation

Local, Upstream, and Downstream Effects

Local, upstream, and downstream direct and indirect effects associated with Effect FR-1 under Alternative 5 are identical to those described for Effect FR-1 under Alternative 2.

Locally, the modeling results for Alternative 5 are the same as the results shown above for Alternative 2. Specifically, the peak increase would be expected to occur at River Mile 54, across from Davis Road, where an increase of 0.13 feet, 0.17 feet, and 0.27 feet would result from a 100-year, 200-year, and 500-year event, respectively.

Upstream, the percentage increases in peak flow in the Sacramento River below the American River (for the 100-, 200-, and 500-year events) are identical under Alternative 5 and Alternative 2. That is, the modeled peak flow values are increases of 0.9%, 1.1% and 1.2%, respectively, for these events.

Downstream, the change in peak stage at the Freeport Bridge and at Walnut Grove are identical under Alternative 5 and Alternative 2. Specifically, at the Freeport Bridge and Walnut Grove, respectively, there would be a change in peak stage of +0.01 feet and 0.00 feet for the 1% AEP; -0.02 feet and -0.01 feet for the 0.5% AEP; and -0.03 feet and -0.01 feet for the 0.2% AEP.

The staggered schedule for remnant levee breaching described in Chapter 2, which would occur over two construction seasons, would inundate the expanded floodplain by creating a backwater condition rather than through-flow following the first year of construction. This 1-year interim condition would result in upstream and downstream peak stages similar to the Alternative 5 buildout conditions (Appendix B.3). Specifically, hydraulic modeling of the backwater condition showed a local maximum change in peak stage of +0.05 feet upstream of Bees Lakes and +0.12 feet downstream of Bees Lakes in the 1% AEP. In the 0.5% AEP, increases of +0.10 feet and +0.20 feet occurred upstream and downstream of Bees Lakes, respectively.

Effect FR-2: Decrease in Risk of Levee Failure as a Result of Erosion or Seepage

Direct and indirect effects associated with Effect FR-2 under Alternative 5 are identical to those for Effect FR-2 under Alternatives 1 and 2. None of these flood risk–reduction measures are anticipated to have a measurable effect on through- and under-seepage potential. Flood risk–reduction measures described under Effect FR-6 aim to rectify through- and under-seepage concerns.

Effect FR-3: Alteration of Existing Drainage Pattern of Site or Area

Direct and indirect effects associated with Effect FR-3 under Alternative 5 are identical to those described for Effect FR-3 under Alternative 4. However, implementation of Mitigation Measure FR-MM-1 would reduce this effect to a less-than-significant level.

Effect FR-4: Increase in Channel Bed Incision and Bank Erosion Attributable to Heightened Levees

Direct and indirect effects associated with Effect FR-4 under Alternative 5 are identical to those described for Effect FR-4 under Alternative 2.

Effect FR-5: Decrease in Levee Erosion through Rock Slope Protection

Direct and indirect effects associated with Effect FR-5 under Alternative 5 are identical to those described for Effect FR-5 under Alternative 2.

Effect FR-6: Decrease in Through- and Under-Seepage

Direct effects associated with Effect FR-6 under Alternative 5 are identical to those described for Effect FR-6 under Alternative 2.

Effect FR-7: Change in Stream Energy and Modification of Floodplain Scour/Deposition

Direct and indirect effects associated with Effect FR-7 under Alternative 5 are identical to those described for Effect FR-7 under Alternative 4. Mitigation Measure FR-MM-2 would reduce this effect to a less-than-significant level.

3.2 Water Quality and Groundwater Resources

3.2.1 Affected Environment

This section describes the affected environment for water quality and groundwater resources in the Southport project area.

3.2.1.1 Regulatory Framework

Federal, state, and local regulations related to water quality and groundwater resources that apply to the implementation of the Southport project are summarized below.

Federal

Clean Water Act

The State Water Resources Control Board (State Water Board) is the state agency with primary responsibility for implementing the Federal Clean Water Act (CWA) in California, which establishes regulations relating to water resource issues.

Section 404: Permits for Fill Placement in Waters and Wetlands

Section 404 of the CWA requires that a permit be obtained from USACE for the discharge of dredged or fill material into "waters of the United States, including wetlands."

Section 402: Permits for Discharge to Surface Waters

CWA Section 402 regulates discharges to surface waters through the NPDES program, administered by the EPA.

Construction Activities

Most construction activities that disturb 1 acre of land or more are required to obtain coverage under the NPDES General Permit for Construction Activities (General Construction Permit) (Order No. 2009-0009-DWQ), which requires the applicant to file an NOI to discharge stormwater and to prepare and implement a SWPPP.

Dewatering Activities

While small amounts of construction-related dewatering are covered under the General Construction Permit, the Regional Water Board also has adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Dewatering Permit) (General Permit Order No. R5-2008-0081).

Municipal Activities

The City of West Sacramento has its own NPDES municipal stormwater permit for the regulation of stormwater discharges. This permit requires controls be implemented to reduce the discharge of pollutants in stormwater discharges to the maximum extent possible, including management practices, control techniques, system design and engineering methods, and other measures as appropriate. As part of permit compliance, the City of West Sacramento has created a stormwater management plan (SWMP). This plan outlines stormwater requirements for municipal operations, industrial and commercial businesses, construction sites, and planning and land development. These requirements may include multiple measures to control pollutants in stormwater discharge. During implementation of specific projects, project applicants will be required to follow the guidance contained in the SWMP.

Section 401: Water Quality Certification

Under CWA Section 401, applicants for a Federal license or permit to conduct activities that might result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate.

Section 303: Impaired Waters

In California, the State Water Board develops the list of water quality–limited segments; the EPA approves each state's list. Waters on the list do not meet water quality standards, even after point sources of pollution have installed required pollution control technology. Section 303(d) also establishes the total maximum daily load (TMDL) process to improve water quality in listed waterways.

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act was enacted in 1969 to preserve, enhance, and restore the quality of the state's water resources. It established the State Water Board and nine Regional Water Quality Control Boards (RWQCBs).

Central Valley Regional Water Quality Control Board

The Regional Water Board is responsible for implementing its Water Quality Control Plan (Basin Plan) (2011) for the Sacramento River and its tributaries. The Basin Plan identifies beneficial uses of the river and its tributaries and water quality objectives to protect those uses. Numerical and narrative criteria are contained in the Basin Plan for several key water quality constituents, including dissolved oxygen (DO), water temperature, trace metals, turbidity, suspended material, pesticides, salinity, radioactivity, and other related constituents.

Local

City of West Sacramento General Plan

The City is in the process of updating the City of West Sacramento General Plan, adopted in 1990 and amended in 2004 (City of West Sacramento 2004). The Natural Resources section of the general plan contains a number of goals and policies related to water quality. The following goal from the City of West Sacramento General Plan could apply to the project.

- **Goal A:** To protect water quality in the Sacramento River, Sacramento Deep Water Ship Channel, Lake Washington, and the area's groundwater basin.

Yolo County 2030 Countywide General Plan

The Public Facilities and Services Element and Conservation and Open Space Element of Yolo County's 2030 Countywide General Plan contain goals and policies related to water resources. The following goals from the Yolo County 2030 Countywide General Plan could apply to the project. (Yolo County 2009.)

- **Goal CO-5:** Water Resources. Ensure an abundant, safe, and sustainable water supply to support the needs of existing and future generations.
- **Goal PF-2:** Provide efficient and sustainable stormwater management to reduce local flooding in existing and planned land uses.

3.2.1.2 Environmental Setting

The following considerations are relevant to water quality and groundwater resources conditions in the proposed Southport project area.

Surface Water Quality

The construction footprint extends along the reach of the Sacramento River South Levee adjacent to the right bank of the Sacramento River from the entrance of the Sacramento River Barge Canal downstream approximately 5.6 miles to the South Cross Levee. The project area comprises approximately 3.6 square miles in West Sacramento and includes multiple borrow areas, as well as the Sacramento River South Levee area.

Water management operations at Shasta Dam and other flow-regulating facilities substantially influence the flow regime of the Sacramento River. Water quality dynamics also have been influenced by the operation of these flow-regulating facilities. Although the water in the Sacramento River includes agricultural return flows, urban runoff, and natural sedimentation from scouring, the water quality of the Sacramento River is good to excellent. It has relatively low biochemical oxygen demand (BOD), medium to high DO, and low mineral and nutrient content.

As previously discussed, CWA Section 303(d) establishes the TMDL process to assist in guiding the application of state water quality standards. It requires states to identify streams in which water quality is impaired (i.e., affected by the presence of pollutants or contaminants) and to establish a TMDL—the maximum quantity of a particular contaminant that a water body can assimilate without experiencing adverse effects. On the 303(d) list, the Sacramento River is divided into four reaches: Keswick Dam to Cottonwood Creek, Cottonwood Creek to Red Bluff, Red Bluff to Knights Landing, and Knights Landing to the Delta. The portion of the Sacramento River adjacent to the project area falls in the Knights Landing to the Delta reach. All sections of the Sacramento River are listed on the 303(d) list for unknown toxicity, and the Knights Landing to the Delta reach is listed for mercury as well. Mercury is primarily a legacy of gold mining.

The following sections discuss specific contaminants of concern in relation to the implementation of the project on the Sacramento River.

Total Suspended Solids and Turbidity

Total suspended solids (TSS) in a stream generally are indicative of upstream scouring, bank erosion, and agricultural return flow transporting and depositing sediment. Suspended sediment is considered a pollutant by the Regional Water Board and can transport other contaminants such as phosphorus, and hydrophobic contaminants such as organochlorine pesticides. For the 10-year period from 1999 to 2009, average monthly TSS in the Sacramento River at Freeport ranged from 24 milligrams per liter (mg/L) in November to 86 mg/L in January (Table 3.2-1). During the same period, average monthly flow (discharge) for the Sacramento River at Freeport ranged from 11,200 cfs (October) to 38,600 cfs (February), and the average sediment load ranged from 809 tons per day (November) to 10,500 tons per day (January) (Table 3.2-1).

Turbidity is another indicator of suspended material in water. The Basin Plan states that where ambient turbidity is between 5 and 50 NTUs, projects must not increase turbidity by more than 20% above the ambient conditions. Where the ambient turbidity is between 50 and 100 NTUs, a project must not exceed 10 NTUs above ambient conditions. In determining compliance with these limits, appropriate averaging periods may be applied if beneficial uses for the water body will be fully protected. Average monthly turbidity for the Sacramento River at Freeport ranged from 8 NTUs (October and November) to 48 NTUs (January) (Table 3.2-2).

Table 3.2-1. Average Monthly Discharge and Total Suspended Solids for the Sacramento River at Freeport[a]

Month	Discharge (cfs)	TSS (mg/L)	TSS Load (tons/day)
January	33,900	86	10,500
February	38,600	71	8,530
March	36,700	64	7,610
April	25,700	51	3,910
May	20,600	50	3,930
June	16,400	25	1,320
July	18,900	33	1,750
August	16,700	24	1,120
September	14,500	28	1,220
October	11,200	29	908
November	12,300	24	809
December	22,400	72	6,550

Source: U.S. Geological Survey (<http://waterdata.usgs.gov/ca/nwis/sw>).

[a] Discharge and TSS monthly averages for the 10-year period from January 1999 through December 2008.

cfs = cubic feet per second.

TSS = total suspended solids.

mg/L = milligrams per liter.

Table 3.2-2. Average Monthly Turbidity for the Sacramento River at Freeport[a]

Month	Turbidity (NTU)
January	48
February	36
March	27
April	28
May	17
June	15
July	9
August	13
September	25
October	8
November	8
December	28

Source: California Data Exchange Center (<http://cdec.water.ca.gov>).

[a] Turbidity data are from the Sacramento River at Freeport station. The monthly average was calculated from daily event data covering the period from December 2009 through June 2011.

NTU = nephelometric turbidity unit.

Dissolved Oxygen, Temperature, pH, and Electrical Conductivity

DO is a critical water constituent for all forms of aquatic life. Its concentration in surface waters can be highly variable and subject to large oscillations over short periods of time. With calm waters and low flows, water bodies can stratify thermally, potentially resulting in low DO concentrations in the deeper zones. Additionally, high levels of nutrient loading can cause algal blooms. These blooms can cause large fluctuations in DO concentration as the algae populations fluctuate in size, producing oxygen while growing and consuming it while decaying. When DO concentrations fall below certain limits, the resulting low-DO zones can act as a barrier to fish migration and potentially adversely affect spawning success. In extreme cases, persistently low DO concentrations can result in mortality of benthic organisms and other aquatic species. The Basin Plan objective for DO in the Sacramento River from the I Street Bridge to the Delta is 7.0 mg/L (Central Valley Regional Water Quality Control Board 2011). Based on data from 2003 to 2009, monthly average DO concentrations in the Sacramento River at Hood (south of Sacramento) range from 7.8 mg/L (August) to 10.5 mg/L (January) (Table 3.2-3).

Water temperature is a critical constituent from the standpoint of aquatic life. The Basin Plan does not contain temperature objectives specific to the reach of the Sacramento River bordering the project area. However, the plan states that at no time should the temperature of cold or warm intrastate waters be increased more than 5°F above natural receiving water temperature (Central Valley Regional Water Quality Control Board 2011). Based on data from 2003 to 2009, monthly average temperatures in the Sacramento River at Hood range from 48.7°F in January to 71.1°F in July (Table 3.2-3).

The effective concentration (activity) of hydrogen ions in water is represented as pH and is reported on a scale from 0 (acidic) to 14 (alkaline). Many biological functions can occur only within a narrow range of pH values. The Basin Plan objective for pH is between 6.5 and 8.5. Furthermore, discharges cannot result in changes of pH that exceed 0.5. Based on data from 2003 to 2009, the monthly average pH of the Sacramento River at Hood is relatively stable throughout the year and ranges from 7.2 to 7.5 (Table 3.2-3). Construction materials such as concrete or other chemicals could affect the pH of the Sacramento River if a discharge were to occur.

Electrical conductivity is a measure of a material's ability to conduct an electric current. The amount of total dissolved solids (TDS) in water is related directly to electrical conductivity (i.e., high electrical conductivity is an indicator of high TDS). TDS and electrical conductivity are general indicators of salinity and are regulated under the Basin Plan. The Basin Plan objective for electrical conductivity on the Sacramento River is for electrical conductivity to be less than 340 microSiemens per centimeter (μS/cm). Based on data from 2003 to 2009, monthly average electrical conductivity in the Sacramento River at Hood ranged from 134 μS/cm (July) to 186 μS/cm (November and December) (Table 3.2-3).

Table 3.2-3. Average Monthly Physical Data for the Sacramento River at Hood[a]

Month	Temperature (°F)	pH	DO (mg/L)	EC (μS/cm)
January	48.7	7.5	10.5	170
February	50.9	7.4	10.1	170
March	55.3	7.5	9.7	154
April	58.3	7.4	9.6	138
May	64.3	7.4	8.6	145
June	68.8	7.3	8.2	139
July	71.1	7.3	7.9	134
August	71.0	7.4	7.8	156
September	67.9	7.5	8.0	166
October	62.5	7.2	8.6	145
November	55.9	7.4	8.9	186
December	49.5	7.4	10.2	186

Source: California Data Exchange Center data (<http://cdec.water.ca.gov/>).
[a] monthly average data are from 2003 to 2009.
DO = dissolved oxygen.
EC = electrical conductivity.
°F = degrees Fahrenheit.
mg/L = milligrams per liter.
μS/cm = microSiemens per centimeter.

Bees Lakes Water Quality

Bees Lakes are a group of small water bodies next to the Sacramento River in Segment E located south of Linden Road and north of Davis Road on the landside of the existing levee. Because the proposed Alternative 2 would involve hydraulically connecting Bees Lakes to the Sacramento River during seasonal high flow regimes, ICF conducted surface water sampling of Bees Lakes on December 14, 2012 to determine in-situ water quality conditions.

Table 3.2-4 contains the surface water sampling results for Bees Lakes. Only a few of the constituents were detected in Bees Lakes: copper, arsenic, and oil and grease. The copper detection of 21.0 μg/L is below the California Department of Public Health's (CDPH) drinking water threshold of 300 µg/L. However, arsenic was detected in the water at a concentration of 16 µg/L, well above the EPA and CDPH maximum contaminant level (MCL) of 10 µg/L. Oil and grease was detected at 2.5 mg/L. CDPH and EPA do not have drinking water criteria for oil and grease, however, EPA has a recommended criteria of 51 mg/L for fresh water aquatic life.

Table 3.2-4. Surface Water Quality Results for Bees Lakes

Analyte	Result	Units	Reporting Limit	EPA	CDPH
Bolstar	ND	µg/kg	2	NI	NI
Fenthion	ND	µg/kg	2	NI	NI
Guthion	ND	µg/kg	5	NI	NI
Malathion	ND	µg/kg	2	NI	NI
Merphos	ND	µg/kg	2	NI	NI
Methyl parathion	ND	µg/kg	2	NI	NI
Mevinphos	ND	µg/kg	2	NI	NI
Phorate	ND	µg/kg	2	NI	NI
Prothiofos	ND	µg/kg	2	NI	NI
Chlorpyrifos	ND	µg/kg	2	NI	NI
Ronnel	ND	µg/kg	2	NI	NI
Stirophos	ND	µg/kg	2	NI	NI
Trichloronate	ND	µg/kg	2	NI	NI
Coumaphos	ND	µg/kg	5	NI	NI
Demeton	ND	µg/kg	5	NI	NI
Diazinon	ND	µg/kg	2	NI	NI
Dichlorvos	ND	µg/kg	5	NI	NI
Disulfoton	ND	µg/kg	2	NI	NI
Ethoprop	ND	µg/kg	2	NI	NI
Fensulfothion	ND	µg/kg	2	NI	NI
Antimony	ND	µg/L	50	NI	NI
Beryllium	ND	µg/L	10	NI	NI
Cadmium	ND	µg/L	10	NI	NI
Chromium	ND	µg/L	20	NI	NI
Copper	21	µg/L	20	1,300	300
Nickel	ND	µg/L	20	NI	NI
Zinc	ND	µg/L	20	NI	NI
Arsenic	16	µg/L	5	10	10
Silver	ND	µg/L	0.5	NI	NI
Lead	ND	µg/L	5	NI	NI
Selenium	ND	µg/L	5	NI	NI
Thallium	ND	µg/L	5	NI	NI
Mercury	ND	µg/L	0.2	NI	NI
Alachlor	ND	µg/L	1	NI	NI
Prometryn	ND	µg/L	2	NI	NI
Propachlor	ND	µg/L	0.5	NI	NI
Simazine	ND	µg/L	1	NI	NI
Thiobencarb	ND	µg/L	1	NI	NI
Atrazine	ND	µg/L	0.5	NI	NI
Bromacil	ND	µg/L	10	NI	NI

Analyte	Result	Units	Reporting Limit	EPA	CDPH
Butachlor	ND	µg/L	0.38	NI	NI
Diazinon	ND	µg/L	0.25	NI	NI
Dimethoate	ND	µg/L	10	NI	NI
Metolachlor	ND	µg/L	1	NI	NI
Metribuzin	ND	µg/L	1	NI	NI
Molinate	ND	µg/L	2	NI	NI
Diesel	ND	mg/L	0.05	NI	NI
Oil & Grease[1]	2.5	mg/L	2	51	NA
Gasoline	ND	µg/L	50	NI	NI
Aldrin	ND	µg/L	0.05	NI	NI
Dieldrin	ND	µg/L	0.1	NI	NI
Endosulfan I	ND	µg/L	0.05	NI	NI
Endosulfan II	ND	µg/L	0.1	NI	NI
Endosulfan sulfate	ND	µg/L	0.1	NI	NI
Endrin	ND	µg/L	0.1	NI	NI
Endrin aldehyde	ND	µg/L	0.1	NI	NI
Heptachlor	ND	µg/L	0.05	NI	NI
Heptachlor epoxide	ND	µg/L	0.05	NI	NI
Methoxychlor	ND	µg/L	0.5	NI	NI
Mirex	ND	µg/L	0.1	NI	NI
alpha-BHC	ND	µg/L	0.05	NI	NI
Toxaphene	ND	µg/L	1	NI	NI
beta-BHC	ND	µg/L	0.05	NI	NI
gamma-BHC (Lindane)	ND	µg/L	0.05	NI	NI
delta-BHC	ND	µg/L	0.05	NI	NI
Chlordane	ND	µg/L	0.5	NI	NI
4,4´-DDD	ND	µg/L	0.5	NI	NI
4,4´-DDE	ND	µg/L	0.1	NI	NI
4,4´-DDT	ND	µg/L	0.1	NI	NI
Pyrethroids[2]	ND	ng/L	See note[2]	NI	NI

µg/kg = micrograms per kilogram.
µg/L = micrograms per liter.
CDPH = California Department of Public Health MCL.
EPA = EPA Maximum Control Limit.
mg/L = milligrams per liter.
ng/L = nanograms per liter.
ND = non-detection.
NA = not available.
NI = not included because the constituent was a ND.
[1] EPA Fresh Water Aquatic Life Criteria.
[2] Pyrethroid compounds include: allethrin (RL: 2 ng/L), bifenthrin (RL: 2 ng/L), cyfluthrin (RL: 2 ng/L), cypermethrin (RL: 2 ng/L), deltamethrin/tralomethrin (RL: 2 ng/L), dichloran (RL: 2 ng/L), fenpropathrin (danitol) (RL: 2 ng/L), fenvalerate/esfenvalerate (RL: 2 ng/L), L-Cyhalothrin (RL: 2 ng/L), pendimethalin (RL: 2 ng/L), permethrin (RL: 5 ng/L), prallethrin (RL: 2 ng/L), sumithrin (RL: 10 ng/L), and tefluthrin (RL: 2 ng/L).

Hydrogeologic Conditions

DWR delineates groundwater basins throughout California under the state's Groundwater Bulletin 118. The Southport project is located in the Sacramento Valley groundwater basin, overlying portions of the Yolo Subbasin (Basin No. 5-21.67) and the Solano Subbasin (Basin No. 5-21.66). According to the subbasin boundaries as defined by DWR (2004a, 2004b), the northern portion of the Southport area is in the Yolo Subbasin, including the northern half of Segment C and all of Segments D, E, F, and G. Segments A and B and the southern half of Segment C are located in the Solano Subbasin (see Plate 3.2-1). Some DWR subbasin boundaries are geographic or institutional; there are no hydrologic or geologic boundaries separating the Yolo and Solano Subbasins in the West Sacramento area (Luhdorff & Scalmanini 2012).

The primary water-bearing formations that make up the Yolo and Solano Subbasins are sedimentary continental deposits of late Tertiary and Quaternary age (20 million years ago to the present). The cumulative thickness of these units ranges from a few hundred feet near the Coast Range to nearly 3,000 feet at the Sacramento River. These units overlie thousands of feet of marine sediments that accumulated in a structural trough formed during the late Mesozoic through most of the Tertiary periods (approximately 100 million to 20 million years ago). The contact between the continental and marine deposits generally represents the base of fresh water (California Department of Water Resources 2004 a, 2004b).

Locally, the geology of the Southport area is defined by the depositional processes of the Sacramento River, the American River, and the Delta. The surficial geology consists primarily of modern alluvium deposited in recent geologic time (the last 10,000 years) by the Sacramento River. Typical of a fluvial geologic setting, the recent alluvium is composed predominantly of fine-grained flood deposits (silts and clays) dissected by a series of meandering, interconnected, coarse-grained channel deposits (sands and gravels) and near channel deposits (sands and silty sands). The topographically low position of the area and its position near the confluence of the Sacramento and American Rivers have resulted in repeated flooding over the past several thousand years. Floodwaters exit the main river channel via distributary channels and floodplain overflow, depositing fine sand and silt along the flanks of the riverbank and finer-grained clay and silt onto the distal floodplain and flood basins.

Although the recent alluvium is highly permeable, it is too thin to represent a significant groundwater source. Wells completed in the recent alluvium typically also draw groundwater from underlying formations such as the Riverbank and Modesto Formations of Pleistocene age. These units consist of a heterogeneous mixture of silt, sand, gravel, and clay and exhibit large variability in grain size over short distances, both laterally and vertically. On average, these units have moderate permeability but contain some coarser-grained materials with high permeability (Olmstead and Davis 1961). The Riverbank and Modesto Formations are underlain by the Turlock Lake Formation of early Pleistocene age (2.6 million to 10,000 years ago) and the Laguna Formation of Pliocene age (5 to 2.6 million years ago). Both formations consist primarily of a heterogeneous mixture of interbedded silt, clay, and sand. These units are underlain by the Mehrten Formation, which typically contains a smaller percentage of coarse-grained sediments, though individual coarse-grained zones within the Mehrten Formation are typically thicker than in overlying formations (Luhdorff & Scalmanini 2012).

Extensive subsurface investigations near the Southport levee include a large number of borings conducted by Kleinfelder (2007) and Blackburn Consulting (2012). In addition, continuous core samples up to 175 feet deep were collected by Luhdorff & Scalmanini (2012) during construction of seven piezometers installed for WSAFCA in 2012. In spite of the volume of available data, it is difficult to summarize the lithology of the area because there is a high degree of variability between borings, and most borings are less than 100 feet deep. Lithologic data for deeper zones are available from drillers' logs of domestic and irrigation wells near the levee. However, these data are limited because locations are not available for the wells shown on most drillers' logs. Some generalizations that can be made about geologic conditions near the levee based on the available data include the following (Luhdorff & Scalmanini 2012):

- The uppermost sediments generally consist of clay, silt, and silty sand. These fine-grained deposits tend to be thicker (40 to 50 feet) in the southern portion of the Southport area (Segments A and B). Thicknesses of 20 to 30 feet are more common in Segments F and G.
- The shallow, fine-grain sediments are underlain by a shallow, coarse-grained unit with relatively continuous, clean sand that is increasingly coarse-grained with depth and is generally underlain by gravel. The presence of the underlying gravel is unknown in some areas (especially Segment A) because the borings are too shallow. The presence of gravel and cobbles becomes increasingly common to the north; and the shallow, coarse-grained unit contains a higher percentage of gravel than sand in Segment G. In that area, the gravel often transitions to cobbles near the bottom of the unit. The total thickness of the shallow coarse-grained deposits ranges from less than 40 feet to more than 100 feet, and the base of this unit ranges in depth from 50 to 120 feet below ground surface (bgs). This coarse-grained unit represents the primary water-bearing zone of the shallow aquifer.
- The shallow coarse-grained unit is underlain by a clay layer. In most cases, the thickness of this clay is unknown because it extends below the bottom of the borings, but it is known to extend to at least 160 feet bgs at one location in Segment B.
- Drillers' logs for domestic and irrigation wells in the area indicate that the clay layer is underlain by a deeper sand and gravel unit. Useable logs are available for only a few deep wells, and these show the depth to the top of the lower sand and gravel unit to be between 160 and 180 feet bgs. The variability of this depth is unknown because most borings in the area are too shallow to show the deeper aquifer unit.

In order to evaluate groundwater conditions in the Southport area, the aquifer system was divided into shallow and deep zones. This division is somewhat arbitrary but is based on available lithologic data. The shallow zone is defined as the uppermost 120 feet of sediment because this is the maximum depth of the shallow sand and gravel unit shown on the boring logs. The shallow aquifer is bounded above and below by fine-grained (clay and silt) aquitards. As a result, the aquifer exhibits semi-confined (leaky) conditions. The degree of confinement is relatively small, however, and there is no overlying aquifer to provide a source of significant leakage. Most of the recharge to the shallow aquifer occurs as seepage from the Sacramento River. The lower portion of this aquifer is used for water supply by a few older domestic and irrigation wells located near the river.

The deep aquifer (below 120 feet in depth) exhibits more confined conditions but is still classified as semi-confined. Most water supply wells in the Southport area appear to be perforated in that zone. No wells in the area are known to be more than 400 feet deep, so the deep aquifer is generally considered to represent the zone between 120 and 400 feet in depth. This zone receives direct recharge from as far away as the Coast, Klamath, and Sierra Nevada mountain ranges, but the majority of the recharge occurs as leakage from the overlying shallow aquifer through the aquitard that separates the two primary water-bearing zones.

Groundwater Resources

Groundwater Levels and Flow

Most groundwater flow in the study area occurs within the interconnected network of coarse-grained channel and near channel deposits produced by the meandering Sacramento and American Rivers. Shallow groundwater recharge is expected where these coarse units intersect the modern Sacramento River or other surface water bodies such as the Deep Water Ship Channel.

Long-term hydrographs of deep wells in or near the City of West Sacramento generally show stable groundwater levels with only small seasonal fluctuations. High and stable water levels in deep wells are due in part to the relatively small amount of groundwater pumping in the area. Groundwater elevation contour maps prepared by Luhdorff & Scalmanini (2012) show that the direction of groundwater flow varies with depth and location. In the Southport area, groundwater flow in the deep zone is typically to the southeast toward a pumping depression beneath Elk Grove. In the northern portion of West Sacramento, the direction of deep groundwater flow is generally to the northeast toward a pumping depression beneath McClellan Air Force Base.

Short-term groundwater level data for the shallow zone (<120 feet bgs) are available for numerous piezometers, monitoring wells, and test pits in the Southport area, but only four piezometers have a period of record longer than 2 years. More than 60 shallow piezometers were constructed to monitor groundwater levels during 2002–2004 as part of the Lower Northwest Interceptor (LNWI) project. Water levels measured in these piezometers show generally high groundwater levels and a close correlation with Sacramento River stage (Luhdorff & Scalmanini 2012).

More current groundwater level data are available from 20 piezometers installed on or near the Southport levee in recent years. Four piezometers were installed in Segments C and G on behalf of DWR in 2008. A total of 16 piezometers have been constructed on behalf of WSAFCA, including 9 installed by Blackburn Consulting in 2011 and 7 installed by Luhdorff & Scalmanini in 2012. All of these newer piezometers are outfitted with pressure transducers for automated water level measurements, and water level data are collected at least hourly.

Data from the DWR and WSAFCA piezometers show a close and dynamic hydraulic connection between the shallow aquifer and the Sacramento River. The data show groundwater flow away from the river (losing conditions) during periods of high or increasing stage and flow toward the river (gaining conditions) during periods of low stage and on the falling limb of storm hydrographs. On average, the shallow aquifer receives recharge from the river, but gradient reversals caused by tidal fluctuations typically occur on a daily basis in proximity to the river. Hydrographs of piezometers located farther from the river show fewer gradient reversals and a more consistent gradient for groundwater flow in a westerly direction (Luhdorff & Scalmanini 2012).

Shallow groundwater elevation contour maps prepared by Luhdorff & Scalmanini (2012) indicate that the prevailing direction of shallow groundwater flow in the Southport area is away from the river to the west and northwest (toward the Deep Water Ship Channel and Barge Canal), which reflects losing conditions in the river. The generally westerly direction of groundwater flow in the shallow zone is opposite of that observed in the deeper aquifer.

Groundwater Quality

Groundwater quality in the Yolo Subbasin is characterized as a sodium magnesium, calcium magnesium, or magnesium bicarbonate type. The quality is considered good for both agricultural and municipal uses, despite elevated concentrations of several constituents. Groundwater salinity in the subbasin tends to be high, and TDS concentrations range from about 100 to 1,300 mg/L, with an average of 574 mg/L, based on data from public supply wells. The groundwater hardness is typically above 180 mg/L as calcium carbonate, which is considered very hard. Localized impairments to groundwater quality include elevated concentrations of nitrate, boron, manganese, and selenium (California Department of Water Resources 2004a). Concentrations of several constituents exceed the MCLs for drinking water established by the California Department of Public Health (2012). Primary MCLs are developed for the protection of public health, and secondary MCLs are developed for aesthetics such as taste, odor, and color.

Although the majority of the project area is in the Yolo Subbasin, the southernmost portion of the Southport area is the Solano Subbasin. Groundwater quality in the Solano Subbasin is variable but is characterized as sodium bicarbonate type in the eastern area near the Sacramento River. Like the Yolo Subbasin, groundwater quality is generally considered good for both domestic and agricultural uses. TDS concentrations range from 250 to 500 mg/L in the eastern portion of the subbasin. Boron concentrations are generally lower than in the Yolo Subbasin (typically less than 0.75 mg/L except in the southern portion of the subbasin), whereas hardness and arsenic concentrations tend to be higher. Hardness generally ranges from 180 to 400 mg/L, and arsenic concentrations are typically between 0.02 and 0.05 mg/L. There is no drinking water MCL for hardness, but the arsenic concentration in most wells exceeds the primary MCL of 0.01 mg/L (California Department of Public Health 2012). Manganese concentrations are also high, especially in the eastern portion of the subbasin (California Department of Water Resources 2004b).

Historical groundwater quality data for the Southport area are available from the USGS, Yolo County, CDPH, and the LNWI project. Luhdorff & Scalmanini collected additional data from 15 private wells near the Southport levee in May 2012. The water quality data span the time period from 1970 to 2012, but the data are limited because most wells were only sampled once and most of the samples were not analyzed for a complete suite of constituents. In the Southport area, the available data suggest that groundwater quality in deeper zones is generally better than in the shallow zone (Luhdorff & Scalmanini 2012).

Much of the groundwater quality data available for shallow wells are from electrical conductivity measurements made in 2002 in LNWI wells. These data indicate that the salinity of shallow groundwater is highly variable with electrical conductivity values ranging from less than 200 µS/cm to above 5,000 µS/cm, with an average of about 2,300 µS/cm. The electrical conductivity values exceed the secondary MCL of 900 µS/cm in 16 out of 20 wells analyzed for this parameter. The salinity indicated by these electrical conductivity values is higher than the rest of the Yolo and Solano Subbasins (California Department of Water Resources 2004a, 2004b).

More complete shallow water quality data are available for two LNWI dewatering wells sampled in 2002 and two private wells sampled in 2012. Hardness concentrations in the LNWI wells indicate hard to very hard water with values of 164 and 303 mg/L measured as calcium carbonate. Hardness was much lower (72 to 82 mg/L) in the two private wells sampled in 2012. Concentrations of nitrate as nitrogen in seven shallow wells ranged from less than the laboratory reporting limit to 5.6 mg/L. None of the nitrate concentrations exceeded the primary MCL of 10 mg/L.

Water quality analyses conducted for trace elements in shallow wells include arsenic, boron, iron, and manganese. Arsenic concentrations in the two private wells sampled in 2012 were slightly less than the primary MCL of 0.01 mg/L. Boron concentrations ranged from non-detect (<0.1 mg/L) to 2.9 mg/L. Water with boron concentrations above 2 mg/L is suitable only for moderately to highly boron tolerant crops. Iron concentrations were generally low in the four sampled wells, but manganese concentrations ranged from 0.054 to 0.92 mg/L, all above the secondary MCL of 0.05 mg/L (Luhdorff & Scalmanini 2012).

More water quality data are available for deep wells because most water supply wells in the area are classified as deep. Salinity is generally lower in the deep wells, and electrical conductivity values ranged from 200 to 1,470 µS/cm, with an average of 863 µS/cm. Electrical conductivity results for 6 out of 22 deep wells exceed the secondary MCL of 900 µS/cm. Hardness as calcium carbonate ranged from 30 to 250 mg/L, with an average of 114 mg/L. Several wells had hardness concentrations above 180 mg/L, which is considered very hard. Sulfate concentrations in all wells were below the secondary MCL of 250 mg/L. Chloride concentrations ranged from about 5 to 350 mg/L, with five wells exceeding the secondary MCL of 250 mg/L. Nitrate concentrations in most wells were below the laboratory reporting limit. The highest concentration of nitrate as nitrogen was about 8 mg/L, and concentrations at all other wells were below 4 mg/L. Nitrate concentrations in all wells were below the primary MCL of 10 mg/L (Luhdorff & Scalmanini 2012).

Water quality samples from 28 deep wells were analyzed for metals and other trace elements. Detectable arsenic concentrations ranged from 0.001 to 0.012 mg/L, and arsenic concentrations in two domestic wells were slightly above the primary MCL of 0.01 mg/L. Boron concentrations ranged from non-detect (<0.1 mg/L) to 2 mg/L, with an average of 1.1 mg/L. Iron concentrations ranged from less than the reporting limit to 0.8 mg/L. Iron concentrations in five deep wells exceeded the secondary MCL of 0.3 mg/L. Manganese concentrations were generally high, ranging from 0.026 to 0.7 mg/L. with most wells exceeding the secondary MCL of 0.05 mg/L. Elevated manganese concentrations is the most common water quality problem observed in deep wells in the Southport area (Luhdorff & Scalmanini 2012).

3.2.2 Environmental Consequences

This section describes the environmental consequences relating to water quality and groundwater resources for the Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings of significance with or without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.2.2.1 Assessment Methods

This evaluation of water quality and groundwater resources is based on professional standards and information cited throughout the section.

The key effects were identified and evaluated based on the environmental characteristics of the Southport project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project.

3.2.2.2 Determination of Effects

For this analysis, an environmental effect was significant related to water quality and groundwater resources if it would result in any of the effects listed below. These effects are based on NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge, resulting in a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted).[1]
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- Substantially degrade water quality.

As part of the project, five ECs could reduce or eliminate water quality and groundwater effects (see Chapter 2, "Alternatives," for a full description). These ECs were included in the project description. These commitments call for development and implementation of five plans:

- An SWPPP.
- A BSSCP.
- An SPCCP.
- A soil hazards testing and soil disposal plan.
- A turbidity monitoring plan.

3.2.3 Effects and Mitigation Measures

3.2.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach starting approximately 0.25 mile south of the Barge Canal and extending south to the Cross Levee. No flood risk–reduction measures would be implemented, and no construction-related effects relating to water quality and groundwater resources such as release of contaminants or sediments to surface water would occur. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

As discussed in Chapter 2, there are three possible scenarios related to the levee vegetation policy under the No Action Alternative.

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[1] During the public scoping period, residents inquired about potential effects on swimming pools from changes to groundwater levels. While the project alternatives may result in varying degrees of seasonal groundwater elevation changes, all potential changes would be within the range of observed water levels present in the project area. Therefore, none of the alternatives is expected to affect swimming pools near the project area, and this potential effect is not discussed further in this document. Other possible effects of reduced groundwater levels or supplies are discussed in Section 3.8, Vegetation and Wetlands, and Section 3.15, Utilities and Public Services.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

There would be no effect on water quality or groundwater resources by the implementation of the No Action Alternative and any of its three vegetation management scenarios.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.2.3.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on water quality and groundwater resources (Table 3.2-5).

Table 3.2-5. Water Quality and Groundwater Resources Effects and Mitigation Measures for Alternative 1

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids	Less than significant	Less than significant	NA	None
WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials	Less than significant	Less than significant	NA	None
WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table	Significant	Significant	Less than significant	WQ-MM-1: Implement Provisions for Dewatering
WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls	Less than significant	No effect	NA	None

Effect WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids

Construction of Alternative 1 would require the construction of adjacent levees landward of the Sacramento River levee, while maintaining South River Road in its present alignment atop the existing levee. Alternative 1 also involves construction of a setback levee in Segment E. These construction activities would include earth disturbance that could directly cause erosion and sedimentation in adjacent water bodies. Although this type of construction would occur close to the Sacramento River, significant sedimentation and turbidity would be unlikely to occur in the river because the majority of the construction would occur on the landside of the existing levee. However, this alternative requires the placement of riprap on the riverside of the levee, which could cause additional sedimentation in the river, indirectly affecting downstream water quality.

Two ECs reduce or eliminate direct and indirect effects: the SWPPP EC and the turbidity monitoring EC. The SWPPP will include erosion control measures to ensure the land disturbance activities do not cause erosion that could increase sediment in the Sacramento River. Site-specific erosion control measures would be developed as part of a SWPPP, a requirement of the NPDES General Construction Permit.

As part of a turbidity monitoring program, WSAFCA or its contractor will monitor turbidity in the adjacent water bodies, where applicable criteria apply, to determine whether turbidity is being affected by construction and ensure that construction does not result in a substantial rise in turbidity levels above ambient conditions, in accordance with the Regional Water Board Basin Plan turbidity objectives.

If turbidity limits exceed Basin Plan standards, construction-related earth-disturbing activities will slow to a point that results in alleviating the problem. WSAFCA or its contractor will notify the Regional Water Board of the issue and provide an explanation of the cause.

The implementation of these ECs would make potential direct and indirect increases in turbidity or total suspended solids less than significant.

Effect WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials

Alternative 1 could involve storage and use of toxic and other harmful substances near the Sacramento River (or in areas that drain to the Sacramento River or other water bodies), which could result in discharge of these substances to the Sacramento River or other water bodies. Construction activities would involve the use of heavy equipment, cranes, compactors, and other construction equipment that uses potentially harmful products such as fuels, lubricants, hydraulic fluids, and coolants, all of which can be toxic to fish and other aquatic organisms. In addition, placement of riprap would involve the use of a tow boat/crane along with a barge carrying the riprap. The use of this equipment could be a direct source of contamination if equipment and construction practices were not properly followed. An accidental spill or inadvertent discharge from such equipment could directly affect the water quality of the river or water body in the project area, and indirectly affect regional water quality of the river or water body. However, because Alternative 1 involves construction of a levee adjacent to the existing levee, there would be no in-water construction, and the likelihood of this alternative affecting water quality would be limited.

Four of the ECs cited in Section 3.2.2.2, Determination of Effects, and included in the project description (Chapter 2) would reduce the likelihood that a release would occur and would reduce the effect of such a release should it occur. These ECs are the development of a SWPPP, an SPCCP, a BSSCP, and a turbidity monitoring program. These plans and the monitoring program would be prepared prior to the start of construction activities. These ECs are described in detail in Chapter 2. The SWPPP and turbidity monitoring plan are summarized in Effect WQ-1.

An SPCCP is intended to prevent discharge of petroleum products into navigable water or adjoining shorelines. If the SWPPP and SPCCP fail to prevent a spill that adversely affects water quality, a detailed analysis would be performed to identify the cause of contamination and to identify methods to reduce or eliminate the contamination.

A BSSCP is typically developed for activities that involve the use of bentonite materials (e.g., the construction of slurry walls). The BSSCP is intended to minimize the potential for accidental release of bentonite (which is used in excavation and tunneling activities), provide for timely detection of accidental bentonite release, and ensure a "minimum-effect" response in the event of an accidental bentonite release.

The implementation of these ECs would make potential direct and indirect effects less than significant.

Effect WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table

Construction of an adjacent levee and setback levee under Alternative 1 could bring construction-related contaminants such as oil and grease and hazardous materials in contact with the water table. Trenching and excavation associated with a cutoff wall and drilling of relief wells could extend to a depth that would expose the water table, creating an immediate and direct path to groundwater that could allow contaminants to enter the groundwater system and indirectly affect water quality throughout the basin. In addition, dewatering of the construction area and borrow sites (e.g., removing groundwater that may fill trenches dug for cutoff wall construction or initial dewatering of relief wells) could result in the release of contaminants to surface or groundwater. Lastly, uncapped groundwater wells located near construction activities could also provide a direct path to the aquifer.

Direct effects on water quality due to the construction of slurry cutoff walls would be localized in the vicinity of the cutoff wall trench. The slurry wall material is relatively benign and would not remain in a liquid state long enough to allow significant lateral movement in the aquifer. In addition, the aquifer tapped by most wells near the Southport levee is deeper than the base of the proposed cutoff walls, further reducing the likelihood that slurry wall material would significantly affect any wells.

To contain construction-related contaminants and prevent them from entering dewatered areas or groundwater wells, the contractor would adhere to the SWPPP, SPCCP, and BSSCP ECs (as described for Effects WQ-1 and WQ-2). To further prevent the risk of well contamination, well protection measures would be implemented as described in the Groundwater Well Protection Measures EC described in Chapter 2. These ECs and implementation of Mitigation Measure WQ-MM-1 would reduce direct and indirect effects to a less-than-significant level.

Mitigation Measure WQ-MM-1: Implement Provisions for Dewatering

Before discharging any dewatered effluent to surface water, WSAFCA or its contractors will obtain a Low Threat Discharge and Dewatering NPDES permit from the Regional Water Board if the dewatering is not covered under the Regional Water Board's NPDES Construction General Permit. Under the dewatering permit, discharging activities include extensive water quality monitoring in order to adhere to the strict effluent and receiving water quality criteria outlined in the permit. As part of the permit, the permittee will design and implement measures as necessary to meet the discharge limits identified in the relevant permit.

For example, if dewatering is needed during the construction of the cutoff wall in the southern portion of Segment B or for removal of borrow material in Segment C, the Low Threat Discharge and Dewatering NPDES permit would require treatment or proper disposal of the water prior to discharge if it is contaminated. These measures will be selected to achieve maximum sediment removal and represent the best available technology that is economically achievable. Implemented measures could include the retention of dewatering effluent until particulate matter has settled before it is discharged, use of infiltration areas, and other BMPs.

Final selection of water quality control measures will be subject to approval by WSAFCA. WSAFCA will verify that coverage under the appropriate NPDES permit has been obtained before allowing dewatering activities to begin. WSAFCA or its agent will perform routine inspections of the construction area to verify that the water quality control measures are properly implemented and maintained. WSAFCA will notify its contractors immediately if there is a non-compliance issue and will require compliance.

Effect WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls

Alternative 1 involves construction of slurry cutoff walls in Segments A, D, E, G, and the southern portion of Segment B. Slurry cutoff walls have the potential to hydraulically reduce Sacramento River water seeping into the shallow aquifer on the landside of the levees. Table 3.2-6 exhibits seasonal fluctuations that generally follow Sacramento River stage. Slurry cutoff walls could potentially reduce this hydraulic connection. In Section 3.2.1.2, Environmental Setting, the local aquifer is subdivided into a deep and shallow aquifer for analysis purposes. The deep aquifer is defined as a semi-confined aquifer below the depth of 120 feet. It is overlain by a shallow aquifer that ranges from semi-confined to unconfined.

Luhdorff & Scalmanini (2012) developed groundwater flow models to estimate the potential effects of proposed slurry cutoff walls on shallow groundwater levels, which could affect vegetation, and on deeper groundwater levels that could affect private wells near the levee. One model was developed for Segments A through C, and the results were considered applicable to Segments D and E due to similar geologic conditions in both areas. A separate model was created for Segments F and G because geologic conditions are different, and a deeper cutoff wall is proposed for that area.

The estimated effects on static (non-pumping) groundwater levels for each alternative are reported at different locations for the shallow and deep zones. In the shallow zone, the effects are reported at the location of maximum impact near the center of the cutoff wall immediately adjacent to the wall (landside and waterside). In the deep zone, effects are reported at known well locations approximately 150 feet landside of the wall. The estimated effects vary seasonally, and groundwater levels on the landside of the walls would be lower during the winter and spring, especially during periods of high river stage. The cutoff walls would cause slightly higher groundwater levels during the summer and fall because the gradient for flow tends to be toward the river during periods of low stage. The average water level decrease is much lower than the maximum decrease because high stage events have short durations. Effects would be smallest during the irrigation season. In all cases where effects are estimated to occur, the average effect is a small decrease in static groundwater levels (maximum of 1.5 feet). Additional effects on pumping water levels in the deep zone are discussed in Section 3.15, Utilities and Public Services.

In Alternative 1, a 30-foot-deep by 3-foot-wide slurry cutoff wall would be installed along the length of the proposed adjacent and setback levees in Segment D and along most of the proposed setback levee in Segment E. A 40-foot-deep slurry cutoff wall would be constructed along the length of Segment A and into the southernmost end of Segment B. These shallow walls would result in negligible groundwater level changes in the deeper zones at well locations landside of the cutoff walls. However, static groundwater levels in the shallow zone in Segment A and B would decrease by an average of about 1.5 feet adjacent to the wall. An 84-foot-deep slurry cutoff wall would be constructed within Segment G. It is anticipated that the deeper cutoff wall would have a similar effect on shallow groundwater levels, with an average of about 1.3 feet. There would also be a small effect in the deeper zones that are tapped for water supply by wells near the levee. The average decrease in groundwater levels in the deep aquifer is estimated to be about 1 foot at a distance of 150 feet landside from the Segment G cutoff wall. These changes in groundwater levels would not significantly affect the aquifer as a resource. Direct effects are, therefore, less than significant. No mitigation is required. For a discussion of effects of reduced groundwater levels on vegetation, wetlands, and private wells, see Sections 3.8, Vegetation and Wetlands, and 3.15, Utilities and Public Services.

Slurry cutoff walls can also affect groundwater quality by reducing the inflow of good quality recharge from the river to the shallow and deep aquifers. The static water level changes anticipated indicate the magnitude of this potential impact because the amount of flow reduction would be directly proportional to changes in static water levels in the deeper zones as simulated with the models. The model results show no changes in shallow or deeper groundwater levels in Segments C through F, so no water quality impacts would be expected in those areas. The results predict an average of 1.3 to 1.5 feet of decline in shallow groundwater levels in Segments A, B, and G and an average of 1 foot of decline in deeper groundwater levels in Segment G. This is a very small change that would be unlikely to affect groundwater quality. For all segments, the direct effect of slurry cutoff walls on groundwater quality is less than significant.

Table 3.2-6. Alternative 1: Estimated Effects on Groundwater Levels

		Change in Static Groundwater Levels (feet)			
		Waterside[1]		Landside[2]	
Model Layer	Levee Segment	Range	Average	Range	Average
Layer 1[3]	A	NA		+0.8 to -11.8	-1.5
	B	+4.4 to -0.2	0.8	+0.1 to -8.4	-1.5
	C	0	0	0	0
	D	0	0	0	0
	E	0	0	0	0
	F	0	0	0	0
	G	NA		+2.2 to -11.6	-1.3
Layer 3–4[4]	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	D	0	0	0	0
	E	0	0	0	0
	F	0	0	0	0
	G	NA		+1.9 to -10.5	-1.0

[1] Static water level changes on the waterside of a setback levee are reported at the location of maximum impact adjacent to the slurry cutoff wall. Waterside impacts are not reported for adjacent levees.

[2] In Layer 1, water level changes on the landside of the levee are reported directly across the cutoff wall from the waterside reported value. In Layers 3 and 4, changes are reported at known well locations.

[3] Changes to shallow groundwater levels will not affect wells unless they also occur in deeper zones such as Layers 3 or 4.

[4] The maximum static water level changes that could affect wells occur in Layer 4 for the Segment A/B/C model and in Layer 3 for the Segment F/G model.

3.2.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on water quality and groundwater resources (Table 3.2-7).

Table 3.2-7. Water Quality and Groundwater Resources Effects and Mitigation Measures for Alternative 2

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids	Less than significant	Less than significant	NA	None
WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials	Less than significant	Less than significant	NA	None
WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table	Significant	Significant	Less than significant	WQ-MM-1: Implement Provisions for Dewatering
WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls	Less than significant	No effect	NA	None
WQ-5: Release of Contaminants into Adjacent Surface Water Bodies from Disturbance of Existing Ambient Contaminants	Significant	Significant	Less than significant	WQ-MM-2: Implement Measure to Remediate Arsenic and Debris in Bees Lakes

Effect WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids

Construction of Alternative 2 would involve placement of a setback levee in areas of Segments B through F and breaching and degradation of the existing levee in the offset area and excavation of adjacent soils to restore the historical Sacramento River floodplain. Alternative 2 also involves construction of adjacent levees in Segments A, B, and G. Construction practices occurring under this alternative would be similar to those occurring under Alternative 1, including a cutoff wall. However, because this alternative involves degrading some existing levees, Alternative 2 could have greater potential than Alternative 1 to affect surface water quality because construction would be on top and on part of the waterside of the existing levee. However, implementation of ECs described for Effect WQ-1 under Alternative 1 would ensure that water quality is protected from excessive turbidity and TSS. The implementation of these ECs would make potential direct and indirect effects less than significant.

Effect WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials

As described in Effect WQ-1 above for turbidity and TSS, the potential of Alternative 2 to release construction-related contaminants into adjacent surface water bodies is greater than that described under Alternative 1. However, implementation of the ECs described for Effect WQ-2 under Alternative 1 would ensure that water quality is protected from construction-related hazardous materials. The implementation of these ECs would make direct and indirect effects less than significant.

Effect WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table

Construction practices and potentially significant effects occurring under this alternative would be similar to those occurring under Alternative 1. To contain construction-related contaminants and prevent them from entering dewatered areas or groundwater wells as described in Effect WQ-3 of Alternative 1, the contractor would adhere to the SWPPP, SPCCP, and BSSCP ECs.

Additionally, under Alternative 2, the setback levee would encroach inland a minimum of 400 feet from the existing levee, a distance that is much greater than that under Alternative 1 (approximately 76 feet from the levee centerline). As described under Groundwater Resources in Section 3.2.1.2, many wells exist within 500 feet of the existing levee, resulting in a greater number of wells within the construction footprint of Alternative 2 than of Alternative 1. However, as under Alternative 1, this potential effect would be prevented through the use of the Groundwater Well Protection Measures EC in Chapter 2.

Implementation of these ECs and implementation of Mitigation Measure WQ-MM-1 would reduce direct and indirect effects to a less-than-significant level.

Effect WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls

Alternative 2 involves construction of slurry cutoff walls for the entire length of the project. A 30-foot-deep by 3-foot-wide slurry cutoff wall would be installed along the proposed setback levees the lengths of Segments C, D and E. A 24-foot-deep by 3-foot-deep wall would be installed in the southernmost part of Segment F, and an 84-foot-deep by 3-foot-wide wall installed in the remaining portion of Segment F and continuing into Segment G. A 30- to 40-foot-deep slurry cutoff wall would be constructed along the length of Segments A and B. Slurry cutoff walls have the potential to hydraulically reduce Sacramento River water seeping into the shallow aquifer on the landside of the levees. Table 3.2-8 exhibits seasonal fluctuations that generally follow Sacramento River stage. Slurry cutoff walls could potentially reduce this hydraulic connection.

The shallow wall in Segments A through F would result in negligible groundwater level changes in the deeper zones at well locations landside of the cutoff wall. Shallow groundwater levels in Segments A, B, C, and G would decline by 1.3 to 1.5 feet, on average, and the effects in Segments D, E and F would be negligible. The 84-foot-deep slurry cutoff wall in Segment G would cause groundwater levels in the deep zone to decline by an average of about 1 foot. These changes would not significantly affect the aquifer as a resource, nor affect groundwater quality, as discussed in Alternative 1. Direct effects are, therefore, less than significant. There is no indirect effect, and no mitigation is required.

Table 3.2-8. Alternative 2: Estimated Effects on Groundwater Levels

		Change in Static Groundwater Levels (feet)			
		Waterside[1]		Landside[2]	
Model Layer	Levee Segment	Range	Average	Range	Average
Shallow Zones: Layer 1[3]	A	NA		+0.8 to -11.8	-1.5
	B	+4.4 to -0.2	0.8	+0.1 to -8.4	-1.5
	C	+3.5 to -0.1	0.7	-0.2 to -5.9	-1.3
	D	0	0	0	0
	E	0	0	0	0
	F	0	0	0	0
	G	NA		+2.2 to -11.6	-1.3
Deeper Zones: Layer 3–4[4]	A	0	0	0	0
	B	0	0	0	0
	C	0	0	0	0
	D	0	0	0	0
	E	0	0	0	0
	F	0	0	0	0
	G	NA		+1.9 to -10.5	-1.0

[1] Static water level changes on the waterside of a setback levee are reported at the location of maximum impact adjacent to the slurry cutoff wall. Waterside impacts are not reported for adjacent levees.

[2] In Layer 1, water level changes on the landside of the levee are reported directly across the cutoff wall from the waterside reported value. In Layers 3 and 4, changes are reported at known well locations.

[3] Changes to shallow groundwater levels will not affect wells unless they also occur in deeper zones such as Layers 3 or 4.

[4] The maximum static water level changes that could affect wells occur in Layer 4 for the Segment A/B/C model and in Layer 3 for the Segment F/G model.

Effect WQ-5: Release of Contaminants into Adjacent Surface Water Bodies from Disturbance of Existing Ambient Contaminants

Borrow material obtained from non-commercial borrow sources, as well as material excavated from the offset area, could contain contaminants hazardous to water quality. Because the existing levee would be breached to create a shallow floodplain within the offset area, borrow material used under Alternative 2 to build the setback levee and material excavated from the offset area would be exposed to adjacent surface waters. This could provide a direct path for soils containing ambient contaminants to mix with adjacent surface water bodies, which would result in hazardous material in the water column.

As discussed in Section 3.16, Public Health and Environmental Hazards, WSAFCA has completed an Area-Wide Assessment for the project construction area and will complete a Phase II investigation prior to all construction activities. If hazardous substances are found, WSAFCA or its contractor will implement required measures for the proper transport and disposal of such materials in accordance with the appropriate local, state, and Federal laws and regulations. Implementation of the Soil Hazards Testing and Soil Disposal Plan EC described in Chapter 2 will determine whether contaminants exist in proposed borrow materials or soils disturbed in the offset area prior to their exposure to the adjacent surface waters. If testing reveals ambient contaminants are present, this EC will require proper treatment or disposal to Title 22 standards. The implementation of this EC will keep direct and indirect effects from soil contamination to a less-than-significant level.

In addition, implementation of Alternative 2 involves hydraulically connecting Bees Lakes during seasonal flow events to the Sacramento River. According to surface water data collected from Bees Lakes on December 14, 2012, Bees Lakes contains elevated levels of arsenic (see Section 3.2.1.2). In addition, visual inspection of Bees Lakes showed that the lake has been used as a dumping site for residential and commercial refuse. Because the volume of water in the Sacramento River is far greater than that of Bees Lakes, the likelihood of the elevated arsenic levels indirectly affecting the Sacramento River water quality is low. However, to ensure elevated arsenic levels do not reach the Sacramento River, implementation of Mitigation Measure WQ-MM-2 would reduce potential direct and indirect effects to a less-than-significant level.

Mitigation Measure WQ-MM-2: Implement Measure to Remediate Arsenic Debris in Bees Lakes

Prior to hydraulically connecting Bees Lakes to the Sacramento River, the City or their contractor will implement arsenic remediation measures in Bees Lakes. Use of ferrate or ferrate/ferrous combinations along with pH adjustments has proven to be a cost effective and efficient way to remove arsenic. As part of this mitigation measure, the City or their contractor will continue to sample for arsenic to determine whether remediation has occurred and arsenic levels are within acceptable thresholds. If additional sampling prior to arsenic remediation shows that arsenic concentrations are at acceptable levels, arsenic remediation is not needed. Additionally, removal and proper disposal of debris will occur to ensure no additional debris is contributed to the Sacramento River.

3.2.3.4 Alternative 3

Implementation of Alternative 3 could result in the following effects on water quality and groundwater resources (Table 3.2-9).

Table 3.2-9. Water Quality and Groundwater Resources Effects and Mitigation Measures for Alternative 3

	Finding		With	
Effect	Direct	Indirect	Mitigation	Mitigation Measure
WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids	Less than significant	Less than significant	NA	None
WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials	Less than significant	Less than significant	NA	None
WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table	Significant	Significant	Less than significant	WQ-MM-1: Implement Provisions for Dewatering
WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls	Less than significant	No effect	NA	None

Effect WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids

Alternative 3 involves construction practices similar to those of the other alternatives, along with levee slope flattening in areas where the levee is steep. Because slope flattening construction would occur on the waterside of the levee, this alternative would have a greater chance of affecting water quality than Alternative 1 and Alternative 2. However, implementation of the ECs described for Effect WQ-1 under Alternative 1 would make potential direct and indirect effects less than significant.

Effect WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials

As described in Effect WQ-1 above, the potential of Alternative 3 to release contaminants into adjacent surface water bodies is greater than that described under Alternative 1 because more construction activities would occur on the waterside of the levee. Implementation of the ECs described for Effect WQ-1 under Alternative 1 would make potential direct and indirect effects less than significant.

Effect WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table

Under Alternative 3, a cutoff wall would still be constructed in certain segments; the wall would not be as close to domestic wells as the wall proposed under Alternative 1 and Alternative 2, reducing potential effects under this alternative. However, because dewatering could occur under this alternative, contaminants could come in contact with surface water or the water table, as described for Alternative 1. Implementation of the ECs described for Effect WQ-3 under Alternative 1 and Mitigation Measure WQ-MM-1 would reduce direct and indirect effects to a less-than-significant level.

Effect WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls

Alternative 3 involves construction of shallow slurry cutoff walls for Segments A, B, D, and E, and a deep cutoff wall in Segment G similar to those constructed under Alternative 1. Unlike Alternative 1, the 30-foot-deep shallow slurry cutoff wall in Segment E would be constructed on the waterside of the Bees Lakes, rather than the landside. However, effects to groundwater levels and quality would be the same as those discussed in Alternative 1. Direct effects are less than significant and no mitigation is required.

3.2.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on water quality and groundwater resources (Table 3.2-10).

Table 3.2-10. Water Quality and Groundwater Resources Effects and Mitigation Measures for Alternative 4

Effect	Finding		With	
	Direct	Indirect	Mitigation	Mitigation Measure
WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids	Less than significant	Less than significant	NA	None
WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials	Less than significant	Less than significant	NA	None
WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table	Significant	Significant	Less than significant	WQ-MM-1: Implement Provisions for Dewatering
WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls	Less than significant	No effect	NA	None
WQ-5: Release of Contaminants into Adjacent Surface Water Bodies from Disturbance of Existing Ambient Contaminants	Less than significant	Less than significant	NA	None

Effect WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids

Construction of Alternative 4 involves placement of setback levees in Segments C–E and breaching and degradation of the existing levee and excavation of adjacent soils to restore the historical Sacramento River floodplain. In addition, a portion of Segment B also involves construction of an adjacent levee. This alternative is similar to Alternative 2 but includes a smaller floodplain restoration element and maintains the hydraulic isolation of the Bees Lakes area.

Alternative 4 involves construction practices and effects on surface water quality from excessive turbidity or TSS that are the same as those that would occur under Alternative 2. Implementation of ECs described for Effect WQ-1 under Alternative 1 would make potential direct and indirect effects less than significant.

Effect WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials

Alternative 4 involves construction practices and construction-related contamination effects that are the same as those that would occur under Alternative 2. Implementation of ECs described for Effect WQ-2 under Alternative 1 would make potential direct and indirect effects less than significant.

Effect WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table

Alternative 4 involves construction practices and effects associated with contact with the water table that are the same as those that would occur under Alternative 2. To contain construction-related contaminants and prevent them from entering dewatered areas or groundwater wells, as described in Effect WQ-3 of Alternative 2, the contractor would adhere to the SWPPP, SPCCP, BSSCP, and Groundwater Well Protection Measures ECs.

Implementation of these ECs and implementation of Mitigation Measure WQ-MM-1 would reduce direct and indirect effects to a less-than-significant level.

Effect WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls

Similar to Alternative 1, Alternative 4 involves construction of shallow 40-foot-deep slurry cutoff walls for Segment A, continuing into a small southern portion of Segment B; a 30-foot-deep by 3-foot-wide wall in Segments D and E, terminating at the origin of the seepage berm in Segment E; and an 84-foot-deep by 3-foot-wide wall in Segment G. See Plate 2-5b (revised) for further detail.

Direct effects to groundwater levels and quality would be the same as those discussed in Alternative 1. Effects are less than significant and no mitigation is required.

Effect WQ-5: Release of Contaminants into Adjacent Surface Water Bodies from Disturbance of Existing Ambient Contaminants

Alternative 4 involves construction practices and effects of contact with contaminated substrate that are the same to those that would occur under Alternative 2, with the exception that Bees Lake would remain hydraulically isolated under this alternative. Implementation of the Soil Hazards Testing and Soil Disposal Plan EC described in Chapter 2 would make potential direct and indirect effects less than significant.

3.2.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on water quality and groundwater resources (Table 3.2-11).

Table 3.2-11. Water Quality and Groundwater Resources Effects and Mitigation Measures for Alternative 5

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids	Less than significant	Less than significant	NA	None
WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials	Less than significant	Less than significant	NA	None
WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table	Significant	Significant	Less than significant	WQ-MM-1: Implement Provisions for Dewatering
WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls	Less than significant	No effect	NA	None
WQ-5: Release of Contaminants into Adjacent Surface Water Bodies from Disturbance of Existing Ambient Contaminants	Less than significant	Less than significant	NA	None

Effect WQ-1: Effects on Surface Water Quality from Excessive Turbidity or Total Suspended Solids

Construction of Alternative 5 involves placement of setback levees in Segments C–F and breaching and degradation of the existing levee and excavation of adjacent soils to restore the historical Sacramento River floodplain. In addition, Alternative 5 involves construction of adjacent levees in Segments B and G and slope flattening in Segment A. This alternative is similar to Alternative 2 but includes a slightly smaller floodplain restoration element, maintaining the hydraulic isolation of the Bees Lakes area and staggering levee breaching to establish a 1-year backwater interim condition.

Alternative 5 involves construction practices and effects on surface water quality from excessive turbidity or TSS that are similar to those that would occur under Alternative 2. Implementation of ECs described for Effect WQ-1 under Alternative 1 would make potential direct and indirect effects less than significant.

Effect WQ-2: Release of Contaminants into Adjacent Surface Water Bodies from Construction-Related Hazardous Materials

Alternative 5 involves construction practices and construction-related contamination effects that are similar to those that would occur under Alternative 2. Implementation of ECs described for Effect WQ-2 under Alternative 2 and in Chapter 2 would make potential direct and indirect effects less than significant.

Effect WQ-3: Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table

Alternative 5 involves construction practices and effects associated with contacting the water table that are similar to those that would occur under Alternative 2. To contain construction-related contaminants and prevent them from entering dewatered areas or groundwater wells, as described in Effect WQ-3 of Alternative 2, the contractor would adhere to the SWPPP, SPCCP, BSSCP, and Groundwater Well Protection Measures ECs.

Implementation of these ECs and implementation of Mitigation Measure WQ-MM-1 would reduce direct and indirect effects to a less-than-significant level.

Effect WQ-4: Effects on Groundwater Levels and Quality from Construction of Slurry Cutoff Walls

Slurry cutoff wall construction and effects under Alternative 5 are the same as under Alternative 2, involving construction of slurry cutoff walls for the entire length of the project, with a 30- to 40-foot-deep wall in Segments A and B; a 30-foot-deep by 3-foot-wide wall in Segments C, D, and E; a 24-foot-deep by 3-foot-wide wall in Segment F; and a 84-foot-deep by 3-foot-wide wall in Segment G. Changes in groundwater levels would neither significantly affect the aquifer as a resource nor affect groundwater quality. Direct effects are, therefore, less than significant. No mitigation is required.

Effect WQ-5: Release of Contaminants into Adjacent Surface Water Bodies from Disturbance of Existing Ambient Contaminants

Alternative 5 involves construction practices and effects of contact with contaminated substrate that are similar to those that would occur under Alternative 2, with the exception of the water quality effects of hydraulically connecting Bees Lakes to the Sacramento River. Implementation of the Soil Hazards Testing and Soil Disposal Plan EC described in Chapter 2 would make potential direct and indirect effects less than significant.

3.3 Geology, Seismicity, Soils, and Mineral Resources

3.3.1 Affected Environment

This section describes the affected environment for geology, seismicity, soils, and mineral resources in the Southport project area.

3.3.1.1 Regulatory Framework

Federal

The following Federal regulations related to geology, seismicity, soils, and mineral resources may apply to implementation of the Southport project.

Clean Water Act Section 402 (National Pollutant Discharge Elimination System Program)

As introduced in Section 3.2, Water Quality and Groundwater Resources, CWA Section 402 regulates discharges to surface waters through the NPDES program, administered by the EPA. In California, the State Water Board is authorized by EPA to oversee the NPDES program through the RWQCBs. The NPDES program provides for both general permits (those that cover a number of similar or related activities) and individual permits. A SWPPP and pollution prevention and monitoring program (PPMP) may be required for construction of the Southport project to comply with the Construction General Permit and General Dewatering Permit, respectively, under Section 402.

State

The following state regulations related to geology, seismicity, soils, and mineral resources may apply to implementation of the Southport project.

Alquist-Priolo Earthquake Fault Zoning Act and Seismic Hazards Mapping Act

California's Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) (Public Resources Code [PRC] Section 2621 et seq.) and the Seismic Hazards Mapping Act of 1990 (PRC Sections 2690–2699.6) are intended to reduce damage resulting from earthquakes.

California Building Standards Code

California's minimum standards for structural design and construction are given in the California Building Standards Code (CBSC) (24 CCR). The CBSC provides standards for various aspects of construction, including excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, certain aspects of the project would be required to comply with all provisions of the CBSC.

California Surface Mining and Reclamation Act

The principal legislation addressing mineral resources in California is the Surface Mining and Reclamation Act of 1975 (SMARA) (PRC Sections 2710–2719), which was enacted to provide a comprehensive surface mining and reclamation policy that would encourage the production and conservation of mineral resources while ensuring that adverse environmental effects of mining are prevented or minimized; that mined lands are reclaimed and residual hazards to public health and safety are eliminated; and that consideration is given to recreation, watershed, wildlife, aesthetic, and other related values. Although the state of California is responsible for identifying areas containing mineral resources, the county or city is responsible for SMARA implementation and enforcement by providing annual mining inspection reports and coordinating with California Geological Survey (CGS).

Mining activities that disturb more than 1 acre or 1,000 cubic yards of material require a SMARA permit from the lead agency, which is the county, city, or board that is responsible for ensuring that adverse environmental effects of mining are prevented or minimized. The lead agency establishes its own local regulations and requires a mining applicant to obtain a surface mining permit, submit a reclamation plan, and provide financial assurances, pursuant to SMARA.

Certain mining activities such as excavation related to farming, grading related to restoring the site of a natural disaster, and grading related to construction do not require a permit. Yolo County's SMARA implementing regulations are contained in Chapter 8 of Title 10 of the County Code.

Local

Yolo County and the City of West Sacramento have adopted policies related to seismic safety, geologic hazards, erosion and siltation control, geotechnical investigations, and soil and mineral resource conservation.

In addition to Yolo County's adopted policies, the County's Agricultural Surface Mining Ordinance requires any entity proposing to mine soil from one parcel and use it on another non-adjacent parcel to obtain an Agricultural Surface Mining Permit. These permits are discretionary, and compliance with CEQA is part of the County's review process.

3.3.1.2 Environmental Setting

The following considerations are relevant to geology, seismicity, soil, and mineral resource conditions in the proposed Southport project area.

Geology

Regional Physiographic Setting

The project area is located in the southern portion of the Sacramento Valley within the northern portion of California's Great Valley Geomorphic Province. The Great Valley, also called the Central Valley, is a nearly flat alluvial plain that lies between the Sierra Nevada on the east and the Coast Ranges on the west. Its south end is defined by the Tehachapi Mountains north of Los Angeles, and its north end is defined by the Klamath Mountains. Subdivided into the Sacramento Valley to the north and the San Joaquin Valley to the south, the Great Valley has an average width of about 50 miles and is about 400 miles long overall (Norris and Webb 1990:412–417; Bartow 1991:1).

The Sacramento Valley contains thousands of feet of accumulated fluvial, overbank, and fan deposits resulting from erosion of these surrounding ranges (Hackel 1966). The sediments vary from a thin veneer at the edges of the valley to 50,000 feet in the west-central portion and are estimated to be about 8,000 feet thick in the project area (Northwest Hydraulic Consultants 2007).

The Sacramento River is the main drainage of the northern Sacramento Valley, flowing generally south from the Klamath Mountains to its discharge point into the Suisun Bay in the San Francisco Bay Area. In the Sacramento area the Sacramento and American Rivers have been confined by human-made levees since the turn of the nineteenth century. In the project area, these levees generally were constructed on Holocene age (less than 11,000 years old) alluvial and fluvial deposits deposited by the current and historic Sacramento River and its tributaries. (Kleinfelder 2007.)

Geology of the Project Area

The surface and subsurface distributions of sandy and clayey deposits are a function of former river positions on the landscape and present-day geomorphic processes adjacent to the river channel (i.e., flooding and deposition) (William Lettis & Associates 2009 as cited in Blackburn Consulting 2010). Helley and Harwood (1985) compiled previous regional studies of the quaternary geology of the Sacramento Valley, which, in the project area, classified the surficial deposits as Quaternary stream alluvium (Qa) near to the modern river channel and undifferentiated Quaternary basin (Qb) deposits away from the modern river channel. Helley and Harwood (1985) differentiate basin deposits from stream alluvium primarily on the basis of texture (more clays versus sands and silty sands, and occasionally organic-rich), and they suggest that these deposits are floodplain sediments that settled out slowly where flow energy was much lower than along the river. Both of these map units are considered Holocene age.

Subsequent mapping by William Lettis & Associates (as cited in Blackburn Consulting 2010) confirms that the entire Southport project area is underlain by stream alluvium and basin deposits (see Section 3.1, Plate 3.1-1). Importantly, however, the data does not show evidence of deep peat (thick layers) or other organic soils in this area (Blackburn Consulting 2011). (Peat deposits are decomposing organic deposits with minor inclusions of clay and silt.)

Quaternary sedimentary units (fluvial and basin) in the area (e.g. as described by Kleinfelder [2007]) are:

- undivided recent alluvium deposits (Qal): undivided gravel, sand, and silt deposited during the Holocene and Pleistocene. The resistance of these deposits to modern stream erosion is relatively weak;
- Modesto formation (upper and lower member) (Qmu and Qml): weakly consolidated, unweathered to slightly weathered gravel, sand, silt, and clay. These deposits tend to be relatively resistant to modern stream erosion;
- Riverbank formation (upper and lower member) (Qru and Qrl): weakly consolidated and compact, dark brown to red gravel, sand, and silt with some clay. These deposits tend to be relatively resistant to modern stream erosion.

The Qru/Qrl and the Qmu/Qml deposits represent ancestral river channels and alluvial fans. These semi-consolidated deposits are characterized by localized paleochannels and lateral and vertical stratigraphic complexity related to past fluvial processes and buried paleo-topography. They are mantled by unconsolidated deposits of Holocene age that comprise most of the surficial geologic deposits within the project area.

Soils

Soil map units of the project area where soil disturbance may occur, as described by the *Soil Survey of Yolo County* (Andrews 1972) and the U.S. Department of Agriculture Natural Resources Conservation Service (2009), are shown on Plate 3.3-1 and characterized in Table 3.3-1. Soil characteristics shown on the table can be summarized as follows.

- Soils are sandy loams, silt loams, and silty clay loams. The sandy surface layers have relatively rapid infiltration capacity when drained, however they may become wet in the rainy season and then exhibit relatively slow infiltration rates. Rates of runoff remain low, however, because these soils are flat-lying.
- Soil erodibility is low because of the generally flat topography. Erosion of levee slopes and other embankments can be significant, however. Additionally, bank erosion on the waterside of the levee results from high flows in the Sacramento River.
- Some of these soils present a moderate to high shrink-swell potential (expansion and contraction cycle when wetted and dried), are called *expansive soils*.
- None have operability constraints (i.e. seasonally dusty, muddy, or saturated surface soils).
- The suitabilities of these soils for cultivation ranges from fair to good (as measured by Storrie Index classes). The presence of a relatively shallow water table throughout the project area (~3 feet) indicates that vegetation, once established, should thrive. (Although revegetation requires irrigation for a 2- to 3- year period to allow plants to access this groundwater, longer in drought periods.)

Table 3.3-1. Soils in the Project Area

Soil Series Name	Depth (inches)	USDA Texture	Shrink-Swell Potential	Hydrologic Group	Erosion Hazard	Storrie Index	Depth to Water Table (inches)	Operability Constraints[a]
Lang sandy loam (La)	0–13 13–19 19–60	Sandy loam and loamy fine sand Loamy fine sand Stratified fine sand, loamy fine sand, and silt loam	Low	B, drained; C, undrained	None to slight	Good	36	None
Lang sandy loam, deep (Lb)	0–13 13–19 19–40 40–60	Sandy loam and loamy fine sand Loamy fine sand Fine sand to loamy fine sand Clay to heavy clay	Low at 0–40 inches, High at 40–60 inches	B, drained; C, undrained	None to slight	Good	36	None
Lang silt loam (Ld)	0–10 10–16 16–40 40–60	Sandy loam and loamy fine sand Silt loam Fine sand to loamy fine sand Clay to heavy silty clay loam	Low at 0–40 inches, High at 40–60 inches	B, drained; C, undrained	None to slight	Good	36	None
Tyndall very fine sandy loam, deep (Te)	0–16 16–40 40–60	Very fine sandy loam Very fine sandy loam Clay	Low	C	Slight	Fair	36	None
Merritt silty clay loam (Mk)	0–18 18–27 27–42	Silty clay loam Silt loam Very fine sandy loam	Low	C	Slight	Fair	18	Shallow saturation
Sacramento silty clay loam (Sa)	0–20 20–60	Silty clay loam Clay	High	C	None to slight	Fair	36	None
Sycamore silt loam (So)	0–14 14–60	Silt loam Silt loam	Mod–High	C	Slight	Good	36	None
Valdez silt loam, deep (Vb)	0–14 14–21 21–65	Silt loam Very fine sandy loam Silt loam	High	C	None to slight	Fair	36	None
Yolo silty clay loam (Yb)	0–26 26–65	Silty clay loam Silty clay loam	Moderate	B	None to slight	Good	> 80	
Made land (Ma)	no data; characteristics are variable							

[a] Include seasonally dusty, muddy, or wet surface (ponded water).
Source: U.S. Department of Agriculture Natural Resources Conservation Service 2009.

Mineral Resources

No commercial mining operations are known to have occurred in West Sacramento. Most of the area is classified as MRZ-1 by the California Division of Mines and Geology (Cupras 1988), which indicates no significant mineral deposits are present. The project area is classified as MRZ-3, which means aggregate deposits of undetermined significance occur there. Lands classified as MRZ-1 or MRZ-3 are not affected by state policies pertaining to the maintenance of access to regionally significant mineral deposits under the California Surface Mining and Reclamation Act of 1975. However, as noted in an early geotechnical report for the proposed West Sacramento program (Kleinfelder 2007), the project area contains discontinuous pockets of sand (sand and aggregate being the mineable mineral resources typically found in the program region); therefore, the project area could not be effectively or economically mined and is considered not to contain regionally or locally important mineral resources. Obviously portions of it do, however, contain material suitable for construction of levees, but levee materials are finer grained than mineable aggregates.

Seismic Hazards

Seismic hazards refer to surface rupture of earthquake faults[1] and ground shaking (primary hazards), as well as liquefaction and earthquake-induced slope failure (secondary hazards). Localized ground shaking and liquefaction are the most significant seismic hazards in the project area portion of Yolo County (Yolo County 2005, 2009).

Primary Seismic Hazards—Surface Fault Rupture[1] and Groundshaking

The project area is located in a region of California characterized by low seismic activity. The project area is not identified as being located in an Alquist-Priolo Earthquake Fault Zone (i.e., no active faults are known to cross or be near the project area) (Bryant and Hart 2007; California Division of Mines and Geology 2001) and the International Conference of Building Officials (ICBO) recognizes no seismic sources in the region (International Conference of Building Officials 1998).

Three pre-Quaternary faults/fault zones are located within an approximately 20-mile radius of the project area. The Willows fault zone runs northwest to southeast of the project area; the East Valley fault runs to the west of the project area; and the Midland fault zone runs to the southeast of the project area (City of West Sacramento 2009; California Geological Survey 2010; International Conference of Building Officials 1998). None of these faults/fault zones are within an Alquist-Priolo Special Studies Zone (Bryant and Hart 2007; California Division of Mines and Geology 2001). The active fault nearest to the project area is the Dunnigan Hills fault, which is 30 miles to the northwest (City of West Sacramento 2009; California Geological Survey 2010; International Conference of Building Officials 1998).

Based on a probabilistic seismic hazard map that depicts the peak horizontal ground acceleration values exceeded at a 10% probability in 50 years (California Geological Survey 2003; Cao et al. 2003), the probabilistic peak horizontal ground acceleration (PGA) values for the project area are 0.1 to 0.2g (where g equals the acceleration speed of gravity). Blackburn Consulting (2011: 7–8) used the USGS 2008 Interactive Deaggregations website (<https://geohazards.usgs.gov/deaggint/2008/>) to complete a probabilistic analysis and develop

[1] *Surface fault rupture* is a rupture at the ground surface along an active fault, caused by earthquake or creep activity.

the PGA for an earthquake with a 200-year return period. Their analysis resulted in a PGA that varies from approximately 0.183 g at the north end of the project area to approximately 0.193 g at the south end. Therefore, they selected a PGA equal to 0.19 g for analysis purposes. Faults that contribute most significantly to the probabilistic PGA hazard are (1) Hunting Creek-Berryessa, (2) Green Valley, (3) Great Valley 4a (Trout Creek) and, (4) Great Valley 4b (Gordon Valley). The applicable moment magnitude for the 200-year return period event is equal to 6.7.

As a point of comparison, probabilistic peak horizontal ground acceleration values for the San Francisco Bay Area range from 0.4 g to more than 0.8 g. This indicates that the groundshaking hazard in the project area is low. Farther to the west and east, the ground shaking hazard increases, coinciding with the increase in abundance of associated faults and fault complexes in the Coast Ranges and Sierra Nevada (California Geological Survey 2003).

This conclusion is consistent with additional studies conducted with regard to the project-reach levee system: URS Corporation evaluated the seismic vulnerability and liquefaction potential of project-area levees in the report *Phase 1 Geotechnical Evaluation Report (P1GER) West Sacramento Region,* dated September 2007. Seismic evaluations have been completed in the form of two reports: *West Sacramento Levee System Problem Identification and Alternative Analysis: Volume 1—Geotechnical Problem Identification Solano and Yolo Counties, California* completed by Kleinfelder (September 2007) and *Phase 1 Geotechnical Evaluation Report (P1GER) West Sacramento Region* completed by URS Corporation (November 2007) for DWR. Data collection included drilling 323 borings and soundings along the levees of the project area.

Liquefaction and Differential Settlement

Liquefaction is the liquefying of certain sediments during groundshaking of an earthquake, resulting in temporary loss of support to overlying sediments and structures. Differential settlement occurs when the layers that liquefy are not of uniform thickness, a common problem when the liquefaction occurs in artificial fills. Poorly consolidated, water-saturated fine sands located within 30 to 50 feet of the surface typically are considered the most susceptible to liquefaction. Soils and sediments that are not water-saturated and that consist of coarser or finer materials are generally not susceptible to liquefaction (California Geological Survey 2008).

URS Corporation performed a liquefaction-triggering analysis to evaluate whether any levee or underlying foundation materials in the project area potentially would liquefy during the considered earthquake events. Criteria for susceptibility to liquefaction included soil type, liquid limit, plasticity index, water content, and fines content. If the material was considered to be susceptible to liquefaction, steps were completed to further evaluate the liquefaction potential of the material considering the earthquake loading. In contrast, if the plasticity of the material was high enough to preclude liquefaction, the material was classified as non-liquefiable, irrespective of the earthquake loading. (URS Corporation 2007.) Samples from the project area levees were subject to this analysis. The result is that ground under portions of the Southport Sacramento River levee may exhibit liquefaction during a seismic event (HDR 2008.)

Settlement can range from 1 to 5%, depending on the cohesiveness of the sediments (Tokimatsu and Seed 1984). In the project area, where poorly consolidated, water-saturated fine sands and silts are not uncommon, differential settlement is also considered to be possible result of an earthquake.

3.3.2 Environmental Consequences

This section describes the environmental consequences relating to geology, seismicity, soils, and mineral resources for the Southport project. It first describes the criteria used to determine whether effects of the project would be considered significant. The effects that would result from implementation of the project alternatives, with or without mitigation, and applicable mitigation measures then are described.

3.3.2.1 Assessment Methods

Evaluation of effects of the project alternatives on geology, seismicity soils, and mineral resources is based on the information provided by a series of technical maps, reports, and other documents that describe the geotechnical, geologic, seismic, and soil resources of the project area. This information was applied to the type and location of proposed flood management alternatives by a qualified expert to determine whether effects would occur.

3.3.2.2 Determination of Effects

For this analysis, an environmental effect was considered potentially significant related to geology, seismicity, soils, and mineral resources if it would result in any of the effects listed below. These effects are based on common NEPA standards, State CEQA Guidelines Appendix G (14 CCR 150000 et seq.), and standards of professional practice.

- Expose people or structures to potential substantial adverse effects, 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 (refer to California Geological Survey Special Publication 42 [Bryant and Hart 2007])
  - strong seismic ground shaking
  - seismic-related ground failure, including liquefaction and settlement or
  - landslides.
- Result in substantial soil erosion or the loss of topsoil.
- Result in loss of soil productivity.
- 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 an on-site or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.
- Be located on expansive soil, as defined in Table 18-1-B of the UBC (International Code Council 1997), creating substantial risks to life or property.
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems in areas where sewers are not available for the disposal of wastewater.
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.
- Directly or indirectly destroy a unique paleontological resource or site, or unique geologic feature.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating a geologic hazard or adverse effect upon soil, geologic, mineral, or paleontological resource.

3.3.3 Effects and Mitigation Measures

3.3.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be implemented to increase the levee's level of performance. Accordingly, no borrow sites would be created, and no soil would be disturbed. Material suitable for levee construction (which is not in a significant mineral resource zone [MRZ-2] designated by the State of California) would remain in place behind and near the current levee. Therefore, no direct effect on geology, seismicity, soils, and mineral resources attributable to the implementation of the No Action Alternative would occur. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, "Alternatives," Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

Specific to vegetation, the No Action Alternative is characterized by three possible future scenarios, as presented in Chapter 2.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

As described in Section 3.1, Flood Risk Management and Geomorphic Conditions, there would be no effects associated with bank erosion under any of the three vegetation management scenarios.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.3.3.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on geology, seismicity, soils, and mineral resources (Table 3.3-2).

Table 3.3-2. Geology, Seismicity, Soils, and Mineral Resources Effects and Mitigation Measures for Alternative 1

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
GEO-1: Negative Effects on Levee Stability	Beneficial See Section 3.1	No effect	NA	None
GEO-2: Negative Effects on Streamflow Erosion of Levees	Beneficial See Section 3.1	No effect	NA	None
GEO-3: Potential Earthquake Damage to Flood Management Structures	Less than significant	Less than significant	NA	None
GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance	Less than significant	No effect	NA	None
GEO-5: Potential Structural Damage from Encountering Expansive Soils	Less than significant	Less than significant	NA	None
GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material	Less than significant	Less than significant	NA	None
GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas	Unknown, potentially significant	Unknown, potentially significant	Less than significant	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan

Effect GEO-1: Negative Effects on Levee Stability

Under Alternative 1, the proposed project would address deficiency related to levee stability in the Southport Sacramento River reach by reducing seepage and especially the potential for under-seepage-related failures, as well as making levee slopes more stable and levee heights uniform. Therefore, this direct effect would be beneficial. This issue is discussed in more detail in Section 3.1.

Effect GEO-2: Negative Effects on Streamflow Erosion of Levees

Evidence of localized erosion caused by wave action and channel flows is displayed in the project area. Installation of rock slope protection at key locations would substantially reduce bank erosion rates and address deficiency related to overall levee stability. Therefore under Alternative 1, the project would have a direct beneficial effect on levee bank erosion potential. This issue is discussed in detail in Section 3.1.

Effect GEO-3: Potential Earthquake Damage to Flood Management Structures

Based on historical data about fault locations and locations of earthquake epicenters, the risk of groundshaking in the project area is low. Nonetheless, a large earthquake on a regional fault could cause moderately severe groundshaking in the project area, which could result in liquefaction or associated ground failure, such as lateral spreading or differential settlement, which in turn could result in direct structural damage or indirectly contribute to the structural degradation of flood management structures. If a large regional earthquake occurred during a major floodflow event, these potential direct and indirect effects would be magnified, and the potential for levee breach would be increased.

Levees will be designed to withstand expected groundshaking[2], the magnitude of which is fairly well established. Some soils, or rather underlying sediments in the project area, may be subject to liquefaction. Locations and magnitudes of such potential failure locations cannot be defined, and in fact there may be none. Regardless, implementation of the project would not substantially alter the composition of the subject levees or foundation soils or change their susceptibility to liquefaction.

Because of the relatively small likelihood of coincidence of large floodflow and a major earthquake, and because the expected magnitude of groundshaking from large regional earthquakes is relatively low in the project area, the potential for failure or significant damage of project structures is low. Regardless, because under Alternative 1 the project would not substantially alter the composition of the subject levees or foundation soils or change their susceptibility to liquefaction, the change in seismic hazard to project levees is considered to be less than significant. No mitigation is required.

Effect GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance

The earthwork that would be conducted during construction would result in substantial ground and vegetation disturbance both at levee sites and at borrow sites. These disturbances would increase the hazard of soil erosion, generally in proportion to area disturbed, and could temporarily increase erosion and sedimentation rates above existing levels. Alternative 1 would involve up to 428 acres of ground disturbance (83 acres of temporary and 345 acres of permanent ground disturbance).

Erosion control measures would be implemented in the form of the required SWPPP (see Section 3.3.1.1 above), which is included in the ECs of the project described in Chapter 2. The planned SWPPP would include at least seven BMPs specified in Chapter 2, including one for permanent site stabilization. Under this BMP, the construction contractor will use structural and vegetative methods to permanently stabilize all graded or otherwise disturbed areas once construction is complete. Structural methods may include the installation of biodegradable fiber rolls and erosion-control blankets. Vegetative methods may involve the application of organic mulch and tackifier and/or the application of an erosion control seed mix. Accordingly, implementation of a SWPPP is expected to substantially minimize the potential for soil erosion.

In addition, WSAFCA or its contractor would monitor turbidity in the Sacramento River to determine whether turbidity is being increased by construction and ensure that construction does not increase turbidity levels beyond acceptable limits (as discussed in Section 3.2).

With these ECs, direct erosion and sediment-related effects under Alternative 1 would be less than significant. No mitigation is required.

[2] Refer to Section 3.1.1.1 for a discussion about levee design criteria.

Effect GEO-5: Potential Structural Damage from Encountering Expansive Soils

According to the soil survey for Yolo County (Andrews 1972), moderate to high shrink-swell potential (soil expansiveness) exists in portions of the project area. Expansive soil and sediments were encountered at various depths below the levees in the project area during geotechnical investigations (Kleinfelder 2007). Expansive soils have the potential to compromise the structural integrity of proposed slurry walls, relocated utilities, and any future development in borrow areas.

To prevent issues related to expansive soils, WSAFCA would continuously monitor expansiveness of project area soils based on existing or new soil borings as construction proceeds. If expansive or weak soils were encountered, corrective action would be determined, such as removal and backfill or accommodation through engineered design. This process would prevent structural damage to proposed flood management structures and relocated utilities that encounter expansive soils. It also would address the suitability of borrow areas for reclamation. Direct and indirect effects of exposure to expansive soils under this alternative, therefore, would be less than significant.

Effect GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material

Alternative 1 would involve the excavation and use of 2.2 million cubic yards of mineral soil to implement flood risk–reduction measures. Most of this material would be mixed sands, silts, and clays; minor (un-economic) amounts of aggregate (sand and gravel) would be encountered. This material would primarily come from nearby borrow parcels shown on Plate 1-5, Southport Project Area. It is unclear whether other potential uses for this material exist (e.g., in post-project development of the borrow areas), but use of the material for the flood risk–reduction measures could forgo potential uses for other purposes. However, as flood risk management is a major issue in the region, the use of this material for nearby levees to reduce flood risk in areas of existing and future development is a priority demand.

The project area is classified as MRZ-1 (which indicates no significant mineral deposits are present) and MRZ-3 (which means aggregate deposits of undetermined significance occur there). Lands classified as MRZ-1 or MRZ-3 are not affected by state policies pertaining to the maintenance of access to regionally significant mineral deposits under the California Surface Mining and Reclamation Act of 1975. As such, the proposed use would not result in the loss or availability of a known mineral resource that would be of value to the region and the residents of the state, other than for the purposes purposed. Direct and indirect effects, therefore, are considered less than significant.

Effect GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas

One or more borrow sites shown on Plate 1-5 would undergo substantial topographic alteration under Alternative 1. Large quantities of mineral soil meeting gradation specifications for levee construction would be removed, which could directly affect soil quality and indirectly affect future agricultural productivity on the site. Alternative 1 potentially requires the second largest amount of embankment fill material (2.2 million cubic yards).

Depth of excavation in borrow areas has not been determined yet, but would generally be limited to approximately 7 feet to avoid effects on groundwater (Blackburn Consulting 2010). One foot of topsoil would be stripped and stockpiled prior to excavation of borrow material. Following material extraction, Southport-area borrow sites would be graded to a depth of no greater than 3 feet. Where feasible, excess embankment fill material deemed unsuitable for reuse could be placed in the borrow site pits, compacted, and the top soil replaced, returning the site to its original elevation. The borrow sites would then be reseeded and returned to pre-use vegetated conditions. Depths, side slopes, bottom slopes, and drainage of the initial depressions caused by the excavation currently are undefined, but the borrow areas would be incorporated into development planning that has been initiated for these areas. It is likely that these areas eventually would be converted from agriculture (primarily irrigated pasture) to residential and commercial uses in some new topographic configuration that could include depressions (e.g., detention basins, lakes).

Project proponents anticipate that encroachment on the water table during excavation would be avoided wherever feasible, reducing the likelihood dewatering during excavation of borrow areas would be necessary under this alternative. According to Table 3.3-1, soils in the project area generally have a shallow water table, estimated by the NRCS to average only about 3 feet below the existing ground surface. However, based on extensive borings, project geotechnical engineers conclude that water table depths in the project area are 5–15 feet, noting that depth is strongly influenced by rainfall, river level, temperature, and irrigation practices (Blackburn Consulting 2010). Shallow water table depths may limit depth of borrow in some areas, thereby requiring excavation of larger portions of the available borrow areas.

If borrow areas remain in agricultural use, site productivity in the form of forage production of the borrow-area soils would have been changed. In some areas forage production may be increased, in others decreased. The overall effect is difficult to gage and depends on characteristics (e.g., gradation) of residual soils, water table depths, finished slopes, and other factors.

The productivity of the borrow site soils, and their potential reuse, would be altered under all alternatives. The nature of the likely effects is not known with specificity at this time, and they therefore are considered potentially significant. Implementation of Mitigation Measure GEO-MM-1 would reduce direct and indirect effects to less than significant.

Mitigation Measure GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan

WSAFCA will develop a reclamation plan for the borrow areas and ensure it is implemented as construction activities begin. This plan will define land surface configuration at the completion of the project, including all ground elevations and slopes, expected depth and duration of inundation of any depressions, erosion control and drainage practices, and, where future agricultural or habitat uses are planned, an assessment of the change in characteristics of mineral soils and an analysis of their suitability and productivity for planned uses.

If any SMARA reclamation plans are required, they will be consistent with this plan. SMARA governs the use and conservation of a wide variety of mineral resources, although some resources and activities are exempt from its provisions, including excavation and grading conducted for farming, construction, and recovery from flooding or other natural disaster.

3.3.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on geology, seismicity, soils, and mineral resources (Table 3.3-3).

Table 3.3-3. Geology, Seismicity, Soils, and Mineral Resources Effects and Mitigation Measures for Alternative 2

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
GEO-1: Negative Effects on Levee Stability	Beneficial See Section 3.1	No effect	NA	None
GEO-2: Negative Effects on Streamflow Erosion of Levees	Beneficial See Section 3.1	No effect	NA	None
GEO-3: Potential Earthquake Damage to Flood Management Structures	Less than significant	Less than significant	NA	None
GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance	Less than significant	No effect	NA	None
GEO-5: Potential Structural Damage from Encountering Expansive Soils	Less than significant	Less than significant	NA	None
GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material	Less than significant	Less than significant	NA	None
GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas	Unknown, potentially significant	Unknown, potentially significant	Less than significant	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan

Effect GEO-1: Negative Effects on Levee Stability

Under Alternative 2, this direct effect would be the same as described under Alternative 1. This effect is considered beneficial. No mitigation is required. This issue is discussed in more detail in Section 3.1.

Effect GEO-2: Negative Effects on Streamflow Erosion of Levees

Under Alternative 2, this direct effect would be the same as described under Alternative 1. This effect is considered beneficial. No mitigation is required.

Effect GEO-3: Potential Earthquake Damage to Flood Management Structures

Under Alternative 2, direct and indirect effects would be the same as described under Alternative 1. This effect is considered less than significant. No mitigation is required.

Effect GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance

The earthwork that would be conducted during construction would result in substantial ground and vegetation disturbance at levee sites, borrow sites, and in the Bees Lakes area where hydraulic connectivity to the Sacramento River would be established. These disturbances would directly increase the hazard of soil erosion, generally in proportion to area disturbed under each alternative, and could temporarily increase erosion and sedimentation rates above existing levels. Alternative 2 would involve up to 502 acres of ground disturbance (26 acres of temporary and 476 acres of permanent ground disturbance). Although the extent of potential erosion is greater for Alternative 2 than for Alternative 1, this direct effect is considered less than significant with the EC requiring implementation of a SWPPP (described in Chapter 2). No mitigation is required.

Effect GEO-5: Potential Structural Damage from Encountering Expansive Soils

Under Alternative 2, direct and indirect effects would be the same as described under Alternative 1. This effect is considered less than significant. No mitigation is required.

Effect GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material

Alternative 2 would involve the excavation and use of 2.4 million cubic yards of mineral soil to implement flood risk–reduction measures, more than under Alternative 1. Direct and indirect effects would be less than significant, however, as described under Alternative 1.

Effect GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas

One or more borrow sites shown on Plate 1-5 would undergo substantial topographic alteration under Alternative 2. Large quantities of mineral soil meeting gradation specifications for levee construction would be removed. Alternative 2 potentially requires the most amount of embankment fill material (2.4 million cubic yards). As with Alternative 1, direct and indirect effects from potential loss in soil productivity and change in site usability are considered potentially significant. With implementation of Mitigation Measure GEO-MM-1, the finding remains less than significant, as described under Alternative 1.

3.3.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on geology, seismicity, soils, and mineral resources (Table 3.3-4)

Table 3.3-4. Geology, Seismicity, Soils, and Mineral Resources Effects and Mitigation Measures for Alternative 3

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
GEO-1: Negative Effects on Levee Stability	Beneficial See Section 3.1	No effect	NA	None
GEO-2: Negative Effects on Streamflow Erosion of Levees	Beneficial See Section 3.1	No effect	NA	None
GEO-3: Potential Earthquake Damage to Flood Management Structures	Less than significant	Less than significant	NA	None
GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance	Less than significant	No effect	NA	None
GEO-5: Potential Structural Damage from Encountering Expansive Soils	Less than significant	Less than significant	NA	None
GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material	Less than significant	Less than significant	NA	None
GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas	Unknown, potentially significant	Unknown, potentially significant	Less than significant	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan

Effect GEO-1: Negative Effects on Levee Stability

Under Alternative 3, this direct effect would be the same as described under Alternative 1. This effect is considered beneficial. No mitigation is required. This issue is discussed in more detail in Section 3.1.

Effect GEO-2: Negative Effects on Streamflow Erosion of Levees

Under Alternative 3, this direct effect would be the same as described under Alternative 1. This effect is considered beneficial. No mitigation is required.

Effect GEO-3: Potential Earthquake Damage to Flood Management Structures

Under Alternative 3, direct and indirect effects would be the same as described under Alternative 1. This effect is considered less than significant. No mitigation is required.

Effect GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance

The earthwork that would be conducted during construction would result in substantial ground and vegetation disturbance, both at levee sites and at borrow sites. These disturbances would directly increase the hazard of soil erosion, generally in proportion to area disturbed under each the alternative, and could temporarily increase erosion and sedimentation rates above existing levels. Alternative 3 would involve up to 425 acres of ground disturbance (89 acres of temporary and 336 acres of permanent ground disturbance). The extent of potential erosion is the least under Alternative 3 compared to the other alternatives, and this direct effect is considered less than significant with the EC requiring implementation of a SWPPP (described in Chapter 2). No mitigation is required.

Effect GEO-5: Potential Structural Damage from Encountering Expansive Soils

Under Alternative 3, direct and indirect effects would be the same as described under Alternative 1. This effect is considered less than significant. No mitigation is required.

Effect GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material

Alternative 3 would involve the excavation and use of 1.1 million cubic yards of mineral soil to implement flood risk–reduction measures. Direct and indirect effects remain less than significant, as described under Alternative 1.

Effect GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas

One or more borrow sites shown on Plate 1-5 would undergo substantial topographic alteration under Alternative 3. Large quantities of mineral soil meeting gradation specifications for levee construction would be removed. Alternative 3 potentially requires the least amount of embankment fill material (1.1 million cubic yards).

As with Alternative 1, direct and indirect effects from the potential loss in soil productivity and change in site usability are considered potentially significant. With implementation of Mitigation Measure GEO-MM-1, the finding remains less than significant, as described under Alternative 1.

3.3.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on geology, seismicity, soils, and mineral resources (Table 3.3-5)

Table 3.3-5. Geology, Seismicity, Soils, and Mineral Resources Effects and Mitigation Measures for Alternative 4

	Finding		With	
Effect	**Direct**	**Indirect**	**Mitigation**	**Mitigation Measure**
GEO-1: Negative Effects on Levee Stability	Beneficial See Section 3.1	No effect	NA	None
GEO-2: Negative Effects on Streamflow Erosion of Levees	Beneficial See Section 3.1	No effect	NA	None
GEO-3: Potential Earthquake Damage to Flood Management Structures	Less than significant	Less than significant	NA	None
GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance	Less than significant	No effect	NA	None
GEO-5: Potential Structural Damage from Encountering Expansive Soils	Less than significant	Less than significant	NA	None
GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material	Less than significant	Less than significant	NA	None
GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas	Unknown, potentially significant	Unknown, potentially significant	Less than significant	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan

Effect GEO-1: Negative Effects on Levee Stability

Under Alternative 4, this direct effect would be the same as described under Alternative 1. This effect is considered beneficial. No mitigation is required. Effects on levee stability are discussed in more detail in Section 3.1.

Effect GEO-2: Negative Effects on Streamflow Erosion of Levees

Under Alternative 4, this direct effect would be the same as described under Alternative 1. This effect is considered beneficial. No mitigation is required.

Effect GEO-3: Potential Earthquake Damage to Flood Management Structures

Under Alternative 4, the direct and indirect effects would be the same as described under Alternative 1. This effect is considered less than significant. No mitigation is required.

Effect GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance

The earthwork that would be conducted during construction would result in substantial ground and vegetation disturbance, both at levee sites and at borrow sites. These disturbances would directly increase the hazard of soil erosion, generally in proportion to area disturbed, and could temporarily increase erosion and sedimentation rates above existing levels. Alternative 4 would involve up to 464 acres of ground disturbance (25 acres of temporary and 439 acres of permanent ground disturbance). Although the extent of potential erosion is greater for Alternative 4 than for Alternative 1, this direct effect is considered less than significant with the EC requiring implementation of a SWPPP (described in Chapter 2). No mitigation is required.

Effect GEO-5: Potential Structural Damage from Encountering Expansive Soils

Under Alternative 4, direct and indirect effects would be the same as described under Alternative 1. This effect is considered less than significant. No mitigation is required.

Effect GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material

Alternative 4 would involve the excavation and use of up to 2 million cubic yards of mineral soil to implement flood risk–reduction measures. Direct and indirect effects remain less than significant, as described under Alternative 1.

Effect GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas

One or more borrow sites shown on Plate 1-5 would undergo substantial topographic alteration under Alternative 4. Large quantities of mineral soil meeting gradation specifications for levee construction would be removed. Alternative 4 potentially requires the third-highest amount of embankment fill material (2.0 million cubic yards). As with Alternative 1, direct and indirect effects from the potential loss in soil productivity and change in site usability are considered potentially significant. With implementation of Mitigation Measure GEO-MM-1, the finding remains less than significant, as described under Alternative 1.

Borrow sites that become waterside of a setback levee as under Alternative 4 would be incorporated into a habitat restoration design that reflects finished ground elevation.

3.3.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on geology, seismicity, soils, and mineral resources (Table 3.3-6).

Table 3.3-6. Geology, Seismicity, Soils, and Mineral Resources Effects and Mitigation Measures for Alternative 5

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
GEO-1: Negative Effects on Levee Stability	Beneficial See Section 3.1	No effect	NA	None
GEO-2: Negative Effects on Streamflow Erosion of Levees	Beneficial See Section 3.1	No effect	NA	None
GEO-3: Potential Earthquake Damage to Flood Management Structures	Less than significant	Less than significant	NA	None
GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance	Less than significant	No effect	NA	None
GEO-5: Potential Structural Damage from Encountering Expansive Soils	Less than significant	Less than significant	NA	None
GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material	Less than significant	Less than significant	NA	None
GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas	Unknown, potentially significant	Unknown, potentially significant	Less than significant	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan

Effect GEO-1: Negative Effects on Levee Stability

Under Alternative 5, this direct effect would be the same as described under Alternative 1. This effect is considered beneficial. No mitigation is required.

Effect GEO-2: Negative Effects on Streamflow Erosion of Levees

Under Alternative 5, this direct effect would be the same as described under Alternative 1. This effect is considered beneficial. No mitigation is required.

Effect GEO-3: Potential Earthquake Damage to Flood Management Structures

Under Alternative 5, direct and indirect effects would be the same as described under Alternative 1. This effect is considered less than significant. No mitigation is required.

Effect GEO-4: Accelerated Erosion and Sedimentation Resulting from Construction-Related Ground Disturbance

Under Alternative 5, this direct effect would be similar as described under Alternative 2, with the exception that Bees Lakes would not be hydraulically connected to the Sacramento River.

Alternative 5 would involve up to 491 acres of ground disturbance (26 acres of temporary and 465 acres of permanent ground disturbance). Although the extent of potential erosion is greater for Alternative 5 than for Alternative 1, this direct effect is considered less than significant with the EC requiring implementation of a SWPPP (described in Chapter 2). No mitigation is required.

Effect GEO-5: Potential Structural Damage from Encountering Expansive Soils

Under Alternative 5, direct and indirect effects would be the same as described under Alternative 1. This effect is considered less than significant. No mitigation is required.

Effect GEO-6: Decrease in Supply of Mineral Soil as a Result of Its Use for Levee Material

Under Alternative 5, direct and indirect effects would be the same as described under Alternative 2. The finding remains less than significant, as described under Alternative 2.

Effect GEO-7: Potential Loss of Soil Productivity and Change in Site Usability of Borrow Areas

Under Alternative 5, direct and indirect effects would be the same as described under Alternative 2. The finding remains less than significant, as described under Alternative 2.

3.4 Transportation and Navigation

3.4.1 Affected Environment

This section describes the affected environment for transportation and navigation in the Southport project area.

3.4.1.1 Regulatory Framework

Federal

River and Harbors Appropriation Act of 1899

The River and Harbors Appropriation Act of 1899 addresses activities that involve the construction of dams, bridges, dikes, and other structures that cross any navigable water; that place obstructions to navigation outside established Federal lines; that use or alter public works; and that excavate from or deposit material in such waters. Such activities require permits from USACE.

In the USACE Sacramento District, navigable waters of the United States in the project vicinity that are subject to the requirements of the River and Harbors Appropriation Act include Sacramento River, American River, the DWSC, and all waterways in the Sacramento–San Joaquin drainage basin affected by tidal action (U.S. Army Corps of Engineers 2003).

Local

City of West Sacramento General Plan

Cities and counties use various criteria to determine acceptable level of service (LOS) on their roadway systems. LOS is a scale used to determine the operating quality of a roadway segment or intersection based on volume-to-capacity (V/C) ratios or average delay experienced by vehicles on the facility. The levels range from A to F with LOS A representing free-flow traffic and LOS F representing severe traffic congestion. Agencies adopt LOS standards that define the levels of operations that are acceptable within their jurisdictions. According to the Transportation and Circulation Element of the City of West Sacramento General Plan, the City requires that an LOS C be maintained on all streets within the city, except at intersections and on roadway segments within one-quarter mile of a freeway interchange or bridge crossing of the DWSC, barge canal, or Sacramento River, where a LOS D shall be deemed acceptable (City of West Sacramento 2004). Table 3.4-1 quantifies the acceptable average daily traffic (ADT) of urban streets for corresponding LOS and roadway width.

Table 3.4-1. Level of Service Criteria for Roadway Segments

Facility Type	No. of Lanes	Maximum ADT (vehicles/day) per LOS				
		A	B	C	D	E
Residential	2	600	1,200	2,000	3,000	4,500
Residential collector with access	2	1600	3,200	4,800	6,400	8,000
Residential collector without access	2	6,000	7,000	8,000	9,000	10,000
Arterial, low access control (4+ stops/mile, many driveways, 25–35 mph)	2	9,000	10,500	12,000	13,500	15,000
	4	18,000	21,000	24,000	27,000	30,000
	6	27,000	31,500	36,000	40,500	45,000
Arterial, moderate access control (2–4 stops/mile, few driveways, 35–45 mph)	2	10,800	12,600	14,400	16,200	18,000
	4	21,600	25,200	28,800	32,400	36,000
	6	32,400	37,800	43,200	48,600	54,000
Arterial, high access control (1–2 stops/mile, no driveways, 45–55 mph)	2	12,000	14,000	16,000	18,000	20,000
	4	24,000	28,000	32,000	36,000	40,000
	6	36,000	42,000	48,000	54,000	60,000
Rural, 2-lane highway	2	2,400	4,800	7,900	13,500	22,900
Rural, 2-lane road, 24–36 feet, paved, shoulder	2	2,200	4,300	7,100	12,200	20,000
Rural, 2-lane road, 24–36 feet, paved, no shoulder	2	1,800	3,600	5,900	10,100	17,000

Source: City of West Sacramento 2006.

Yolo County General Plan

The Circulation Element of the Yolo County 2030 General Plan includes specific goals, policies, and actions designed to maintain acceptable traffic operations and to reduce congestion on county roadways. The 2030 Countywide General Plan establishes the LOS standards for local county roadways (LOS C), but it acknowledges higher levels of congestion on regional highways and roadways. For South River Road between the West Sacramento city limit and Freeport Bridge, LOS D is acceptable. For I-80 between the Davis city limit and West Sacramento city limit, LOS F is acceptable to the County. For I-5 between the Woodland city limit and Sacramento county line, LOS F is acceptable to the County (Yolo County 2009).

In addition to the goals and policies of the general plan, Yolo County has the discretionary authority to issue permits for vehicles and loads exceeding statutory limitations on the size, weight, and loading of vehicles contained in Division 15 of the California Vehicle Code. An application for a transportation permit may be required for borrow material hauling on County roads.

3.4.1.2 Environmental Setting

Roadway System

Access to the project area from freeways is provided by I-5, I-80, and US 50. From US 50, access to the project area is provided via the Jefferson Boulevard interchange, and then heading south on Jefferson to various project sites.

Table 3.4-2 shows the average annual daily traffic (AADT) for the highway segments that would be most affected by project-related traffic.

Table 3.4-2. Average Annual Daily Traffic of Major Access Highways in Project Area

Highway	Segment	2011 AADT (vehicles/day)
I-80	W Capitol Avenue–US 50	149,000
I-80	US 50–W El Camino Avenue	86,000
I-5	Sutterville Road–US 50	142,000
I-5	US 50–Richards Boulevard	186,000
US 50	I-80–Harbor Boulevard	86,000
US 50	Harbor Boulevard–Jefferson Boulevard	114,000
US 50	Jefferson Boulevard–I-5	176,000
US 50	I-5–SR 160	226,000

Source: California Department of Transportation 2011.
AADT = average annual daily traffic.
I-5 = Interstate 5.
I-80 = Interstate 80.
US 50 = U.S. Highway 50.

Jefferson Boulevard is a principal arterial that extends from Sacramento Avenue on the north to south of the city limits. Jefferson Boulevard is a four-lane road with a center turn lane from Sacramento Avenue to just south of Linden Road and a two-lane arterial south of Linden Road.

Jefferson Boulevard connects to Linden Road, Davis Road, Gregory Avenue, and Burrows Avenue, each of which provides major local access to various project sites. Linden Road (between Jefferson Boulevard and Stonegate Drive), Davis Road, and Gregory Avenue are two-lane minor arterials; and Linden Road between Stonegate Drive and South River Road is a two-lane collector in the project area. Lake Washington Boulevard, Industrial Boulevard, and Enterprise Boulevard are four-lane principal arterials and are designated as a haul route for material borrows between the DWSC and the project sites. Table 3.4-3 shows the road type, ADT, and LOS for these roadway segments. Plate 3.4-1 shows the local roadway system in the project area.

As part of planned Southport development, the City has planned to remove South River Road and replace its function with Village Parkway (Shpak pers. comm. 2011). Village Parkway would extend south from its current alignment to eventually meet Jefferson Boulevard near the southern end of Southport Parkway. The City plans on eventually making Village Parkway a four-lane arterial with bike lanes.

Table 3.4-3. Average Daily Traffic and Level of Service of Major Local Access Roads

Street	Segments	Road Type	ADT	LOS	Count Year
Burrows Ave	Jefferson Blvd to S River Rd	2-Lane Local Road	No data available		
Davis Rd	Jefferson Blvd to S River Rd	2-Lane Minor Arterial	269	A	2006
Gregory Ave	Jefferson Blvd to S River Rd	2-Lane Minor Arterial	1,395	A	2007
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	4-Lane Principal Arterial	34,938	E	2006
Jefferson Blvd	Lake Washington to Linden Rd (S)	4-Lane Principal Arterial	19,015	A	2006
Jefferson Blvd	Linden Rd (S) to city limits (S)	2-Lane Principal Arterial	15,864	D	2006
Linden Rd	Jefferson Blvd to Stonegate Dr.	2-Lane Minor Arterial	3,995	A	2007
Linden Rd	Stonegate Dr. to S River Rd	2-Lane Collector	1,491	A	2007
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	4-Lane Principal Arterial	7,483	A	2006
Industrial Blvd	Parkway Blvd to Stone Blvd	4-Lane Principal Arterial	18,851	A	2008
Industrial Blvd	Enterprise Blvd to Parkway Blvd	4-Lane Principal Arterial	8,036	A	2007
Enterprise Blvd	Seaport Blvd to Industrial Blvd	4-Lane Principal Arterial	16,424	A	2004

Sources: City of West Sacramento 2008, 2009a.

According to the City's LOS standards, all road segments have an acceptable LOS, except Jefferson Boulevard from West Capitol Avenue to Lake Washington Boulevard, which has an LOS E.

Transit

Yolobus transit service operates in the city of West Sacramento and provides access to the surrounding communities. In the project area along the major access roads, Yolobus routes 35 (Southport Local) and 39 (Southport/Sacramento Commute) run on Jefferson Boulevard, Lake Washington Boulevard, and Village Parkway (Yolo County Transportation District 2009). Table 3.4-4 summarizes the bus service on major local access roads in the project area.

Table 3.4-4. Bus Service and Bikeways on Major Local Access Roadways in Project Area

Street	Segments	Bus Service	Bikeway
Bevan Rd	Jefferson Blvd to Gregory Ave	No bus service	No designated bikeway
Davis Rd	Jefferson Blvd to S River Rd	No bus service	No designated bikeway
Gregory Ave	Jefferson Blvd to S River Rd	No bus service	No designated bikeway
Jefferson Blvd	W Capitol Ave to Lake Washington	Yolobus 35 and 39	Class II bike lane
Jefferson Blvd	Lake Washington to Linden Rd (S)	Yolobus 35 and 39	Class II bike lane
Jefferson Blvd	Linden Rd (S) to city limits (S)	Yolobus 35 and 39	Class II bike lane
Linden Rd	Jefferson Blvd to Redwood Ave	No bus service	Class II bike lane
Linden Rd	Redwood Ave to S River Rd	No bus service	No designated bikeway
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	No bus service	Class II bike lane
Industrial Blvd	Parkway Blvd to Stone Blvd	Yolobus 241	Class II bike lane
Industrial Blvd	Enterprise Blvd to Parkway Blvd	Yolobus 241	Class II bike lane
Enterprise Blvd	Seaport Blvd to Industrial Blvd	Yolobus 241	Class II bike lane

Source: Yolo County Transportation District 2009; City of West Sacramento 2009b.

Bikeway

Bicycle facilities in the city of West Sacramento are divided into three classes: Class I separate multi-use path or trail, Class II striped lane on street, and Class III route designated with signage only. In the project area along the major access routes, there are Class II bike lanes on Jefferson Boulevard north of Davis Road and on Linden Road between Jefferson Boulevard and Redwood Avenue (City of West Sacramento 2009b). Table 3.4-4 summarizes the bicycle facilities on major local access roads in the project area. In addition to the designated bikeways, the Clarksburg Branch Line Trail is an off-street path that runs from the Barge Canal in the north to South River Road near the southern end of the city limits.

River Navigation

The Sacramento River forms the eastern edge of the project area. The river flows in a generally southward direction, and widths vary with water elevations. Navigation in the Sacramento River is limited to recreational watercraft because the river's size and fluctuating water levels prevent the accommodation of large commercial vessels.

Access to the Sacramento River in the project area is provided by Sherwood Harbor Marina and the Sacramento Yacht Club, both located along South River Road between Davis Road and Linden Road. Sherwood Harbor Marina has 130 boat slips, and the Sacramento Yacht Club provides space for more than 100 boats (Sherwood Harbor Marina 2011; Sacramento Yacht Club 2011).

The waterways from the project area to the San Rafael Quarry consist of the San Francisco Bay Delta and the Sacramento River. Both are wide, navigable waters that are used for both transport and recreation.

3.4.2 Environmental Consequences

This section describes the environmental consequences relating to transportation and navigation for the proposed Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the project, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.4.2.1 Assessment Methods

Almost all increased vehicle trips associated with the project would be generated by construction-related activities. Therefore, the focus of the transportation analysis is to evaluate whether the construction-related trips would degrade the traffic operation of major project access roads. After the project is constructed, O&M of the project facilities generally would be performed as needed. Maintenance work is less extensive than the construction activities and takes place over a few days per year. In addition, O&M activities are part of the existing environmental baseline and thus would not create a substantial increase of vehicle trips. Consequently, the O&M of the project would not result in any adverse effect under NEPA, would not result in a significant impact under CEQA on traffic circulation, and are not quantified in this analysis because they are part of the existing environmental baseline.

Construction-related trips associated with the project, including truck trips and worker commute trips, are estimated based on the construction data provided by HDR (Appendix C), which include schedules, pieces of off-road construction equipment, and haul truck trips for each segment and each alternative. While it is likely that much of the material excavated onsite would be suitable for reuse as levee building material, the quantity is unknown at this time. Thus, the traffic analysis conservatively estimated the daily construction trips generated by each alternative by assuming all excavated material and demolished debris would be hauled off site and would not be reused for the project, which would result in higher hauling truck trips.

The construction trips are estimated for the project site–related activities and off-site material borrow activities with the following assumptions:

- **Project Site–Related Activities**: Daily trips associated with the activities include truck trips to bring in construction equipment and material (except borrow material described below), truck trips to haul away excavated material and demolished debris, and worker commute trips. The worker commute trips are estimated based on a daily workforce of 20 workers plus one person per piece of construction equipment. Because construction material is most likely to come from or be disposed of outside the project area, the truck trips associated with the activities are expected to be beyond Jefferson Boulevard north of Lake Washington Boulevard and would access the regional roadways via Jefferson Boulevard. It is assumed that 25% of the material would come from or be disposed of in the vicinity of the project sites using unpaved haul roads and 75% of the truck trips would use the public roads to access the project sites.
- **Off-Site Material Borrow Activities:** Daily trips associated with the activities include truck trips to bring in the levee fill material and worker commute trips. Because the levee fill material is mostly like to come from off-site borrow pits in the project area, the truck trips associated with the activities are assumed to be on Jefferson Boulevard south of Lake Washington Boulevard and would access the project sites via major local haute routes shown in Plate 3.4-1. It is assumed that 25% of the borrow material would come from the vicinity of the project sites using unpaved haul roads and 75% of the truck trips would use the public roads to access the project sites. To estimate the traffic operation effect on the haul route between the DWSC and the project sites, it is assumed that 50% of the levee fill material would be imported from the dredged material previously removed from the DWSC and presently stockpiled along the western bank of the canal.

The trip generation is estimated for the maximum daily trips and average daily trips based on the construction schedule provided by HDR (Appendix C). The maximum daily trips reflect the overlapping activities between segments and the timeframe would be much shorter than the entire construction period. The average daily trips reflect the average trips that would occur over the construction period.

The construction trips generated by each segment and the borrow sites are distributed to the major haul routes based on the locations of the segments relevant to the haul roads. The trip distribution assumptions for each segment are listed below.

Year 1

- Segment C: 100% of trips access the sites on Jefferson Boulevard and Davis Road.
- Segment D: 100% of trips access the sites on Jefferson Boulevard and Davis Road.
- Segment E: 50% of trips access the sites on Jefferson Boulevard and Davis Road, and 50% of trips access the sites on Jefferson Boulevard and Linden Road.

- Segment F: 100% of trips access the sites on Jefferson Boulevard and Linden Road.
- Segment G: 100% of trips access the sites on Jefferson Boulevard and Linden Road.

Year 2

- Segment A: 100% of trips access the sites on Jefferson Boulevard and Burrows Avenue.
- Segment B: 100% of trips access the sites on Jefferson Boulevard and Gregory Avenue.

Table 3.4-5 summarizes the maximum and average daily trip generation and distribution for each alternative. Calculations of trips generated by the project construction and distribution of estimated trips to designated haul roads are included in Appendix C.

Table 3.4-5. Maximum and Average Daily Trip Distribution on Major Haul Routes

	Year 1			Year 2		
Haul Road	Maximum Daily Trips	Average Daily Trip	Duration (Weeks)	Maximum Daily Trips	Average Daily Trip	Duration (Weeks)
Alternative 1						
Jefferson Blvd north of Industrial Blvd	1,160	419	19	650	194	24
Jefferson Blvd south of Industrial Blvd	3,510	1,632	19	1,038	669	24
Industrial Blvd	2,340	1,707	9	692	692	11
Enterprise Blvd	2,340	1,707	9	692	692	11
Linden Rd	1,745	797	18	-	-	-
Davis Rd	1,752	847	18	-	-	-
Gregory Ave	-	-	-	1,392	433	24
Burrows Ave	-	-	-	1,395	413	12
Alternative 2						
Jefferson Blvd north of Industrial Blvd	995	422	30	579	305	28
Jefferson Blvd south of Industrial Blvd	3,120	1,397	30	2,084	862	28
Industrial Blvd	2,080	1,026	19	1389	945	11
Enterprise Blvd	2,080	1,026	19	1389	945	11
Linden Rd	1,442	687	30	-	-	-
Davis Rd	1,577	681	30	-	-	-
Gregory Ave	-	-	-	1,460	537	28
Burrows Ave	-	-	-	1,322	295	24
Alternative 3						
Jefferson Blvd north of Industrial Blvd	1,973	484	24	635	250	23
Jefferson Blvd south of Industrial Blvd	4,152	1,349	24	2,076	656	23
Industrial Blvd	2,768	1,977	7	1,384	890	7
Enterprise Blvd	2,768	1,977	7	1,384	890	7

Haul Road	Year 1 Maximum Daily Trips	Year 1 Average Daily Trip	Year 1 Duration (Weeks)	Year 2 Maximum Daily Trips	Year 2 Average Daily Trip	Year 2 Duration (Weeks)
Linden Rd	1,590	777	21	-	-	-
Davis Rd	1,592	667	23	-	-	-
Gregory Ave	-	-	-	1,407	287	22
Burrows Ave	-	-	-	1,584	339	23
Alternative 4						
Jefferson Blvd north of Industrial Blvd	2,625	552	30	579	279	30
Jefferson Blvd south of Industrial Blvd	6,249	2,433	30	4,215	1,175	30
Industrial Blvd	4,166	2,509	15	2,810	1,792	10
Enterprise Blvd	4,166	2,509	15	2,810	1,792	10
Linden Rd	5,253	1,610	22	-	-	-
Davis Rd	2,711	1,359	27	-	-	-
Gregory Ave	-	-	-	2,309	800	30
Burrows Ave	-	-	-	2,456	345	24
Alternative 5						
Jefferson Blvd north of Industrial Blvd	1227	422	30	1158	431	30
Jefferson Blvd south of Industrial Blvd	3,120	1,432	30	2,084	986	30
Industrial Blvd	2,080	962	21	1389	924	12
Enterprise Blvd	2,080	962	21	1,389	924	12
Linden Rd	1,442	695	27	-	-	-
Davis Rd	1,577	755	27	-	-	-
Gregory Ave	-	-	-	1,778	578	30
Burrows Ave	-	-	-	1,697	379	27

3.4.2.2 Determination of Effects

For this analysis, an environmental effect was considered potentially significant related to transportation and navigation if it would result in any of the effects listed below. These effects are based on NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), standards of professional practice, *City of West Sacramento General Plan Policy Document*, and the City's LOS policies:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;

- Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Effects related to emergency access are discussed in Section 3.15, Utilities and Public Services.

3.4.3 Effects and Mitigation Measures

3.4.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be implemented. No construction-related effects relating to transportation and navigation such as road closures and modifications would occur. Therefore, there would be no effect on transportation and navigation attributable to the implementation of the No Action Alternative. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

As discussed in Chapter 2, “Alternatives,” there are three possible scenarios related to the levee vegetation policy under the No Action Alternative.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

However, there would be no effect to transportation and navigation under the implementation of any of the three vegetation management scenarios.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.4.3.2 Alternative 1

Implementation of Alternative 1 would result in the following direct effects on transportation and navigation (Table 3.4-6). A description of these effects is provided below the summary table. No indirect effects on transportation and navigation would result from implementation of the Southport project alternatives.

Table 3.4-6. Transportation and Navigation Effects and Mitigation Measures for Alternative 1

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic	Significant and unavoidable	No effect	NA	None
TRA-2: Temporary Road Closures	Less than significant	No effect	NA	None
TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic	Less than significant	No effect	NA	None
TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures	Less than significant	No effect	NA	None
TRA-5: Temporary Changes to Navigation	Less than significant	No effect	NA	None

Effect TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic

Table 3.4-5 summarizes maximum and average daily trips generated by construction activities of Alternative 1 and distribution of the estimated trips to designated haul roads. Table 3.4-7 summarizes the estimated ADT and LOS on the major haul routes with the average daily trips shown in Table 3.4-5. The average daily trips in Year 1 are used to determine the LOS on Jefferson Boulevard, Lake Washington Boulevard, Industrial Boulevard, Enterprise Boulevard, Linden Road, and Davis Road because Year 1 would generate more construction trips on these roads than Year 2; while the average daily trips in Year 2 are used to determine the LOS on Gregory Avenue and Burrows Road because these road segments would be used to access Segment A and Segment B in Year 2.

Compared to existing LOS shown in Table 3.4-3, the construction generated trips would worsen the operation of Jefferson Boulevard between Stone Boulevard and Lake Washington Boulevard (that already operates at unacceptable LOS E) and would degrade the operation of Jefferson Boulevard between Linden Rd (south) and the south city limits from LOS D to unacceptable LOS E. The construction trips would not degrade the operation of other haul roads listed in Table 3.4-7 to an unacceptable LOS; however, the construction of the project would result in a substantial increase in traffic volumes on these roads. In addition, slow-moving, heavy trucks could affect traffic flow on all haul routes, particularly when construction activities of several project segments occur on the same day and generate many more construction trips on the haul routes. Therefore, the direct effect on the traffic operation on project haul routes would be significant.

Although WSAFCA is committed to implementing the traffic control and road maintenance plan EC, described in Chapter 2, to reduce the effects of construction traffic on all haul routes, the construction traffic effects would be temporarily significant and unavoidable.

Table 3.4-7. Average Daily Traffic and Levels of Service of Major Local Haul Routes with Construction Trips—Alternative 1

Street	Segments	Existing ADT[a]	Average Construction Daily Trips	ADT with Construction Trips[b]	LOS
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	34,938	419	35,567	E
Jefferson Blvd	Lake Washington to Linden Rd (S)	19,015	1,632	21,463	A
Jefferson Blvd	Linden Rd (S) to city limits (S)	15,864	1,632	18,312	E
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	7,483	1,707	10,043	A
Industrial Blvd	Parkway Blvd to Stone Blvd	18,851	1,707	21,411	A
Industrial Blvd	Enterprise Blvd to Parkway Blvd	8,036	1,707	10,596	A
Enterprise Blvd	Seaport Blvd to Industrial Blvd	16,424	1,707	18,984	A
Linden Rd	Jefferson Blvd to Stonegate Dr.	3,995	797	5,190	A
Linden Rd	Stonegate Dr to S River Rd	1,491	797	2,686	B
Davis Rd	Jefferson Blvd to S River Rd	269	847	1,540	A
Gregory Ave	Jefferson Blvd to S River Rd	1,395	433	2,045	B
Burrows Ave	Jefferson Blvd to S River Rd	No data available	413	619	A

[a] City of West Sacramento 2008, 2009a.

[b] A passenger-car equivalent of 1.5 is applied to the ADT to account for the heavy haul trucks.

Effect TRA-2: Temporary Road Closures

Implementation of Alternative 1 would involve the temporary closure and removal of South River Road throughout the project area and portions of Linden Road, Davis Road, Gregory Avenue, and Burrows Avenue adjacent the project sites. Temporary road closures would require a detour of normal traffic to adjacent streets. The detouring of traffic would increase daily traffic volumes on roads in the surrounding areas. The EC to develop and implement a traffic control and road maintenance plan, as described in Chapter 2, would reduce this direct effect to a less-than-significant level. No mitigation is required.

Effect TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic

The maneuvering of construction-related vehicles and equipment among general-purpose traffic on local roads that provide access to the project area could cause safety hazards. However, execution of the EC to develop and implement a traffic control and road maintenance plan, described in Chapter 2, would minimize construction-related traffic hazards and reduce the intensity of this effect. This direct effect would be less than significant. No mitigation is required.

Effect TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures

Temporary road closures along South River Road, Linden Road, Gregory Avenue, and Burrows Avenue adjacent to the project sites could interfere with bicycle travel along these roads. Implementation of the traffic control and road maintenance plan EC, described in Chapter 2, would minimize construction-related traffic conflicts with bicycle travel. Therefore, this direct effect would be less than significant. No mitigation is required.

Effect TRA-5: Temporary Changes to Navigation

Placement of rock slope protection along the waterside slope of the project levee would require the use of two barges along the Sacramento River, which could cause a temporary reduction in navigability. The use of barges would decrease the available space for navigation of watercraft. However, given the width of the waterways to be used, watercraft would still be able to pass along the section of the river adjacent to the project area. Navigation in the Sacramento River would return to normal conditions following the placement of riprap, and there would be no permanent effects. Additionally, WSAFCA is committed to minimizing construction-related effects on navigation as described in Chapter 2. Therefore, this direct effect would be less than significant. No mitigation is required.

3.4.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on transportation and navigation (Table 3.4-8). A description of these effects is provided below the summary table.

Table 3.4-8. Transportation and Navigation Effects and Mitigation Measures for Alternative 2

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic	Significant and unavoidable	No effect	NA	None
TRA-2: Temporary Road Closures	Less than significant	No effect	NA	None
TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic	Less than significant	No effect	NA	None
TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures	Less than significant	No effect	NA	None
TRA-5: Temporary Changes to Navigation	Less than significant	No effect	NA	None
TRA-6: Permanent Changes in Circulation Patterns	Less than significant	No effect	NA	None

Effect TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic

The construction effects of Alternative 2 would be the same as those under Alternative 1. Table 3.4-9 summarizes the estimated ADT and LOS on the major haul routes with the average daily trips shown in Table 3.4-5. Relative to Alternative 1, construction of Alternative 2 would generate slightly higher average daily trips on Gregory Avenue and Jefferson Road between West Capitol Avenue and Lake Washington Boulevard. ADT on all other roadways would be less than under Alternative 1. While the daily traffic volumes would differ slightly between Alternatives 1 and 2, direct effects on roadway LOS would be the same.

Although WSAFCA is committed to implementing the traffic control and road maintenance plan EC described in Chapter 2 to reduce the effects of construction traffic on all haul routes, the construction traffic effects described in Effect TRA-1 above would be temporarily significant and unavoidable.

Table 3.4-9. Average Daily Traffic and Levels of Service of Major Local Haul Routes with Construction Trips—Alternative 2

Street	Segments	Existing ADT[a]	Average Construction Daily Trips	ADT with Construction Trips[b]	LOS
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	34,938	422	35,571	E
Jefferson Blvd	Lake Washington to Linden Rd (S)	19,015	1,397	21,111	A
Jefferson Blvd	Linden Rd (S) to city limits (S)	15,864	1,397	17,960	E
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	7,483	1,026	9,023	A
Industrial Blvd	Parkway Blvd to Stone Blvd	18,851	1,026	20,391	A
Industrial Blvd	Enterprise Blvd to Parkway Blvd	8,036	1,026	9,576	A
Enterprise Blvd	Seaport Blvd to Industrial Blvd	16,424	1,026	17,964	A
Linden Rd	Jefferson Blvd to Stonegate Dr	3,995	687	5,025	A
Linden Rd	Stonegate Dr to S River Rd	1,491	687	2,521	B
Davis Rd	Jefferson Blvd to S River Rd	269	681	1,290	A
Gregory Ave	Jefferson Blvd to S River Rd	1,395	537	2,200	B
Burrows Ave	Jefferson Blvd to S River Rd	No data available	295	442	A

[a] City of West Sacramento 2008, 2009a.
[b] A passenger-car equivalent of 1.5 is applied to the ADT to account for the heavy haul trucks.

Effect TRA-2: Temporary Road Closures

Temporary road closures required during construction of Alternative 2 would be similar to those under Alternative 1. Both alternatives would temporarily close portions of Linden Road, Davis Road, Gregory Avenue, and Burrows Avenue adjacent to the project sites. In addition to these roadways, Alternative 2 may also require temporary closures on Village Parkway when the roadway is connected with the newly aligned South River Road. Temporary road closures would require a detour of normal traffic to adjacent streets. The detouring of traffic would increase daily traffic volumes on roads in the surrounding areas. The EC to develop and implement a traffic control and road maintenance plan, as described in Chapter 2, would reduce this direct effect to a less-than-significant level. No mitigation is required.

Effect TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic

The effects on increased safety hazards would be similar to Alternative 1. Execution of the EC to develop and implement a traffic control and road maintenance plan, described in Chapter 2, would minimize construction-related traffic hazards and reduce the intensity of this effect. This direct effect would be less than significant. No mitigation is required.

Effect TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures

Temporary road closures required for Alternative 2 (see Effect TRA-1) could interfere with bicycle travel along these roads. Implementation of the traffic control and road maintenance plan EC, described in Chapter 2, would minimize construction-related traffic conflicts with bicycle travel. Therefore, this direct effect would be less than significant. No mitigation is required.

Effect TRA-5: Temporary Changes to Navigation

Similar to Alternative 1, construction of Alternative 2 would require barges along the Sacramento River during rock slope placement. Use of barges could cause a temporary reduction in navigability. However, given the width of the waterways to be used, watercraft would still be able to pass along the section of the river adjacent to the project area. Navigation in the Sacramento River would return to normal conditions following the placement of riprap, and there would be no permanent effects. Additionally, WSAFCA is committed to minimizing construction-related effects on navigation as described in Chapter 2. Therefore, this direct effect would be less than significant. No mitigation is required.

Effect TRA-6: Permanent Changes in Circulation Patterns

In addition to effects evaluated under Alternative 1, South River Road would be realigned to join Village Parkway at the north end of the project area and would continue along the reserved right-of-way of the planned Village Parkway extension under Alternatives 2, 4, and 5. The new road would be two lanes and would be designed to meet traffic demands for both South River Road and the existing Village Parkway. Because the road would maintain the reserved right-of-way for the planned Village Parkway and allow expansion to meet future circulation needs, this direct effect would be less than significant. No mitigation is required.

3.4.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on transportation and navigation (Table 3.4-10). A description of these effects is provided below the summary table.

Table 3.4-10. Transportation and Navigation Effects and Mitigation Measures for Alternative 3

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic	Significant and unavoidable	No effect	NA	None
TRA-2: Temporary Road Closures	Less than significant	No effect	NA	None
TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic	Less than significant	No effect	NA	None
TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures	Less than significant	No effect	NA	None
TRA-5: Temporary Changes to Navigation	Less than significant	No effect	NA	None

Effect TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic

The construction effects of Alternative 3 would be similar to those under Alternative 1. Table 3.4-11 summarizes the estimated ADT and LOS on the major haul routes with the average daily trips shown in Table 3.4-5. Relative to Alternative 1, construction of Alternative 3 would generate slightly higher average daily trips on Lake Washington Boulevard, Industrial Boulevard, Enterprise Boulevard, and Jefferson Road between West Capitol Avenue and Lake Washington Boulevard. ADT on all other roadways would be less than under Alternative 1. Effects on roadway LOS would be the same as

Alternative 1, except for Industrial Boulevard (Parkway to Stone), which would observe an LOS decline from A to B.

Although WSAFCA is committed to implementing the traffic control and road maintenance plan EC described in Chapter 2 to reduce the effects of construction traffic on all haul routes, the direct construction traffic effects described in Effect TRA-1 above would be temporarily significant and unavoidable.

Table 3.4-11. Average Daily Traffic and Levels of Service of Major Local Haul Routes with Construction Trips—Alternative 3

Street	Segments	Existing ADT[a]	Average Construction Daily Trips	ADT with Construction Trips[b]	LOS
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	34,938	484	35,664	E
Jefferson Blvd	Lake Washington to Linden Rd (S)	19,015	1,349	21,038	A
Jefferson Blvd	Linden Rd (S) to city limits (S)	15,864	1,349	17,887	E
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	7,483	1,977	10,449	A
Industrial Blvd	Parkway Blvd to Stone Blvd	18,851	1,977	21,817	B
Industrial Blvd	Enterprise Blvd to Parkway Blvd	8,036	1,977	11,002	A
Enterprise Blvd	Seaport Blvd to Industrial Blvd	16,424	1,977	19,390	A
Linden Rd	Jefferson Blvd to Stonegate Dr	3,995	777	5,160	A
Linden Rd	Stonegate Dr to S River Rd	1,491	777	2,656	B
Davis Rd	Jefferson Blvd to S River Rd	269	667	1,270	A
Gregory Ave	Jefferson Blvd to S River Rd	1,395	287	1,826	B
Burrows Ave	Jefferson Blvd to S River Rd	No data available	339	508	A

[a] City of West Sacramento 2008, 2009a.
[b] A passenger-car equivalent of 1.5 is applied to the ADT to account for the heavy haul trucks.

Effect TRA-2: Temporary Road Closures

Temporary road closures required during construction of Alternative 3 would be the same as those under Alternative 1. Both alternatives would involve the temporary closure and removal of South River Road throughout the project area and portions of Linden Road, Davis Road, Gregory Avenue, and Burrows Avenue adjacent the project sites. Temporary road closures would require a detour of normal traffic to adjacent streets. The detouring of traffic would increase daily traffic volumes on roads in the surrounding areas. The EC to develop and implement a traffic control and road maintenance plan, as described in Chapter 2, would reduce this direct effect to a less-than-significant level. No mitigation is required.

Effect TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic

The effects on increased safety hazards would be the same as Alternative 1. Execution of the EC to develop and implement a traffic control and road maintenance plan, described in Chapter 2, would minimize construction-related traffic hazards and reduce the intensity of this effect. This direct effect would be less than significant. No mitigation is required.

Effect TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures

Effects on bicycle travel from temporary road closures would be the same as those under Alternative 1. Implementation of the traffic control and road maintenance plan EC, described in Chapter 2, would minimize construction-related traffic conflicts with bicycle travel. Therefore, this direct effect would be less than significant. No mitigation is required.

Effect TRA-5: Temporary Changes to Navigation

Similar to Alternative 1, construction of Alternative 3 would require barges along the Sacramento River during rock slope placement. Use of barges could cause a temporary reduction in navigability. However, given the width of the waterways to be used, watercraft would still be able to pass along the section of the river adjacent to the project area. Navigation in the Sacramento River would return to normal conditions following the placement of riprap, and there would be no permanent effects. Additionally, WSAFCA is committed to minimizing construction-related effects on navigation as described in Chapter 2. Therefore, this direct effect would be less than significant. No mitigation is required.

3.4.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on transportation and navigation (Table 3.4-12). A description of these effects is provided below the summary table.

Table 3.4-12. Transportation and Navigation Effects and Mitigation Measures for Alternative 4

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic	Significant and unavoidable	No effect	NA	None
TRA-2: Temporary Road Closures	Less than significant	No effect	NA	None
TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic	Less than significant	No effect	NA	None
TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures	Less than significant	No effect	NA	None
TRA-5: Temporary Changes to Navigation	Less than significant	No effect	NA	None
TRA-6: Permanent Changes in Circulation Patterns	Less than significant	No effect	NA	None

Effect TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic

The construction effects of Alternative 4 would be similar to those under Alternative 1. Table 3.4-13 summarizes the estimated ADT and LOS on the major haul routes with the average daily trips shown in Table 3.4-5. Relative to Alternative 1, construction of Alternative 4 would generate slightly higher average daily trips on haul routes other than on Burrows Avenue. The rise in ADT would be primarily due to increased vehicle activity at offsite borrow locations. LOS on the following roadways would decline from A to B, relative to Alternative 1: Industrial Boulevard between

Parkway and Stone, Linden Road between Jefferson and Stonegate, and Davis Road between Jefferson and South River Road. Effects on LOS for all other roadways would be the same as Alternative 1.

Although WSAFCA is committed to implementing the traffic control and road maintenance plan EC described in Chapter 2 to reduce the effects of construction traffic on all haul routes, the direct construction traffic effects described in Effect TRA-1 above would be temporarily significant and unavoidable. However, application of the EC would ensure Effects TRA-2 though TRA-6 would be less than significant.

Table 3.4-13. Average Daily Traffic and Levels of Service of Major Local Haul Routes with Construction Trips—Alternative 4

Street	Segments	Existing ADT[a]	Average Construction Daily Trips	ADT with Construction Trips[b]	LOS
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	34,938	552	35,766	E
Jefferson Blvd	Lake Washington to Linden Rd (S)	19,015	2,433	22,665	B
Jefferson Blvd	Linden Rd (S) to city limits (S)	15,864	2,433	19,514	E
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	7,483	2,509	11,246	A
Industrial Blvd	Parkway Blvd to Stone Blvd	18,851	2,509	22,614	B
Industrial Blvd	Enterprise Blvd to Parkway Blvd	8,036	2,509	11,799	A
Enterprise Blvd	Seaport Blvd to Industrial Blvd	16,424	2,509	20,187	A
Linden Rd	Jefferson Blvd to Stonegate Dr	3,995	1,610	6,410	B
Linden Rd	Stonegate Dr to S River Rd	1,491	1,610	3,906	B
Davis Rd	Jefferson Blvd to S River Rd	269	1,359	2,307	B
Gregory Ave	Jefferson Blvd to S River Rd	1,395	800	2,595	B
Burrows Ave	Jefferson Blvd to S River Rd	No data available	345	518	A

[a] City of West Sacramento 2008, 2009a.
[b] A passenger-car equivalent of 1.5 is applied to the ADT to account for the heavy haul trucks.

Effect TRA-2: Temporary Road Closures

Temporary road closures required during construction of Alternative 4 would be the same as those under Alternative 2. Both alternatives would temporarily close portions of Village Parkway, Linden Road, Davis Road, Gregory Avenue, and Burrows Avenue adjacent to the project sites. Temporary road closures would require a detour of normal traffic to adjacent streets. The detouring of traffic would increase daily traffic volumes on roads in the surrounding areas. The EC to develop and implement a traffic control and road maintenance plan, as described in Chapter 2, would reduce this direct effect to a less-than-significant level. No mitigation is required.

Effect TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic

The effects on increased safety hazards would be the same as Alternative 2. Execution of the EC to develop and implement a traffic control and road maintenance plan, described in Chapter 2, would minimize construction-related traffic hazards and reduce the intensity of this effect. This direct effect would be less than significant. No mitigation is required.

Effect TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures

Effects on bicycle travel from temporary road closures would be the same as those under Alternative 2. Implementation of the traffic control and road maintenance plan EC, described in Chapter 2, would minimize construction-related traffic conflicts with bicycle travel. Therefore, this direct effect would be less than significant. No mitigation is required.

Effect TRA-5: Temporary Changes to Navigation

Similar to Alternative 1, construction of Alternative 4 would require barges along the Sacramento River during rock slope placement. Use of barges could cause a temporary reduction in navigability. However, given the width of the waterways to be used, watercraft would still be able to pass along the section of the river adjacent to the project area. Navigation in the Sacramento River would return to normal conditions following the placement of riprap, and there would be no permanent effects. Additionally, WSAFCA is committed to minimizing construction-related effects on navigation as described in Chapter 2. Therefore, this direct effect would be less than significant. No mitigation is required.

Effect TRA-6: Permanent Changes in Circulation Patterns

Permanent changes to circulation patterns as a result of realigning South River Road would be the same as those under Alternative 2. The new road would be two lanes and would be designed to meet traffic demands for both South River Road and the existing Village Parkway. Because the road would maintain the reserved right-of-way for the planned Village Parkway and allow expansion to meet future circulation needs, this direct effect would be less than significant. No mitigation is required.

3.4.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on transportation and navigation (Table 3.4-14). A description of these effects is provided below the summary table.

Table 3.4-14. Transportation and Navigation Effects and Mitigation Measures for Alternative 5

	Finding		With	Mitigation
Effect	**Direct**	**Indirect**	**Mitigation**	**Measure**
TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic	Significant and unavoidable	No effect	NA	None
TRA-2: Temporary Road Closures	Less than significant	No effect	NA	None
TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic	Less than significant	No effect	NA	None
TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures	Less than significant	No effect	NA	None
TRA-5: Temporary Changes to Navigation	Less than significant	No effect	NA	None
TRA-6: Permanent Changes in Circulation Patterns	Less than significant	No effect	NA	None

Effect TRA-1: Temporary Increase in Traffic Volumes from Construction-Generated Traffic

The construction effects of Alternative 5 would be the same as those under Alternative 1. Table 3.4-15 summarizes the estimated ADT and LOS on the major haul routes with the average daily trips shown in Table 3.4-5. Relative to Alternative 1, construction of Alternative 5 would generate slightly higher average daily trips on Gregory Avenue between Jefferson Boulevard and South River Road. ADT on all other roadways would be less than under Alternative 1. While the daily traffic volumes would differ slightly between Alternatives 1 and 5, effects on roadway LOS would be the same.

Although WSAFCA is committed to implementing the traffic control and road maintenance plan EC described in Chapter 2 to reduce the effects of construction traffic on all haul routes, the direct construction traffic effects described in Effect TRA-1 above would be temporarily significant and unavoidable.

Table 3.4-15. Average Daily Traffic and Levels of Service of Major Local Haul Routes with Construction Trips—Alternative 5

Street	Segments	Existing ADT[a]	Average Construction Daily Trips	ADT with Construction Trips[b]	LOS
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	34,938	387	35,518	E
Jefferson Blvd	Lake Washington to Linden Rd (S)	19,015	1,396	21,110	A
Jefferson Blvd	Linden Rd (S) to city limits (S)	15,864	1,396	17,959	E
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	7,483	962	8,925	A
Industrial Blvd	Parkway Blvd to Stone Blvd	18,851	962	20,293	A
Industrial Blvd	Enterprise Blvd to Parkway Blvd	8,036	962	9,478	A
Enterprise Blvd	Seaport Blvd to Industrial Blvd	16,424	962	17,866	A
Linden Rd	Jefferson Blvd to Stonegate Dr	3,995	701	5,046	A
Linden Rd	Stonegate Dr to S River Rd	1,491	701	2,542	B
Davis Rd	Jefferson Blvd to S River Rd	269	794	1,460	A
Gregory Ave	Jefferson Blvd to S River Rd	1,395	596	2,289	B
Burrows Ave	Jefferson Blvd to S River Rd	No data available	397	596	A

[a] City of West Sacramento 2008, 2009a.

[b] A passenger-car equivalent of 1.5 is applied to the ADT to account for the heavy haul trucks.

Effect TRA-2: Temporary Road Closures

Temporary road closures required during construction of Alternative 5 would be the same as those under Alternative 2. Both alternatives would temporarily close portions of Village Parkway, Linden Road, Davis Road, Gregory Avenue, and Burrows Avenue adjacent to the project sites. Temporary road closures would require a detour of normal traffic to adjacent streets. The detouring of traffic would increase daily traffic volumes on roads in the surrounding areas. The EC to develop and implement a traffic control and road maintenance plan, as described in Chapter 2, would reduce this direct effect to a less-than-significant level. No mitigation is required.

Effect TRA-3: Increase in Safety Hazards Attributable to Construction-Generated Traffic

The effects on increased safety hazards would be the same as Alternative 2. Execution of the EC to develop and implement a traffic control and road maintenance plan, described in Chapter 2, would minimize construction-related traffic hazards and reduce the intensity of this effect. This direct effect would be less than significant. No mitigation is required.

Effect TRA-4: Disruption of Alternative Transportation Modes as a Result of Temporary Road Closures

Effects on bicycle travel from temporary road closures would be the same as those under Alternative 2. Implementation of the traffic control and road maintenance plan EC, described in Chapter 2, would minimize construction-related traffic conflicts with bicycle travel. Therefore, this direct effect would be less than significant. No mitigation is required.

Effect TRA-5: Temporary Changes to Navigation

Similar to Alternative 1, construction of Alternative 5 would require barges along the Sacramento River during rock slope placement. Use of barges could cause a temporary reduction in navigability. However, given the width of the waterways to be used, watercraft would still be able to pass along the section of the river adjacent to the project area. Navigation in the Sacramento River would return to normal conditions following the placement of riprap, and there would be no permanent effects. Additionally, WSAFCA is committed to minimizing construction-related effects on navigation as described in Chapter 2. Therefore, this direct effect would be less than significant. No mitigation is required.

Effect TRA-6: Permanent Changes in Circulation Patterns

Permanent changes to circulation patterns as a result of realigning South River Road would be the same as those under Alternative 2. The new road would be two lanes and would be designed to meet traffic demands for both South River Road and the existing Village Parkway. Because the road would maintain the reserved right-of-way for the planned Village Parkway and allow expansion to meet future circulation needs, this direct effect would be less than significant. No mitigation is required.

3.5 Air Quality

3.5.1 Affected Environment

This section describes the affected environment for air quality in the Southport project area.

3.5.1.1 Regulatory Framework

Air quality in the project area and surrounding areas is protected by the Federal Clean Air Act (CAA) and California Clean Air Acts (CCAA) and by local air district planning pursuant to the acts. At the Federal level, the EPA administers the CAA. In California, the CCAA is administered by the California Air Resources Board (ARB) at the state level and by the air quality management districts at the regional and local levels. The Yolo-Solano Air Quality Management District (YSAQMD), Sacramento Metropolitan Air Quality Management District (SMAQMD), and Bay Area Air Quality Management District (BAAQMD) have local jurisdiction over the project area.

Federal and State

The following Federal and state regulations related to air quality may apply to implementation of the Southport project.

Ambient Air Quality Standards and Area Attainment Designations

The EPA and ARB have established national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS), respectively, for the following six criteria air pollutants: carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); ozone; lead; and particulate matter (PM), including PM less than 10 microns in diameter (PM10) and PM less than 2.5 microns in diameter (PM2.5). The pollutants of greatest concern in the project area are ozone, CO; PM10, and PM2.5.

Based on local monitoring collected by air quality management districts, areas are classified as either in attainment or in nonattainment with respect to NAAQS and CAAQS. These classifications are made by comparing actual monitored air pollutant concentrations to NAAQS and CAAQS. If a pollutant concentration is lower than the state or Federal standard, the area is considered to be in attainment of the standard for that pollutant. If pollutant levels exceed a standard, the area is considered a nonattainment area. If data are insufficient to determine whether a pollutant is violating the standard, the area is designated unclassified. Table 3.5-1 summarizes the attainment status of the YSAQMD, SMAQMD, and BAAQMD with regard to the NAAQS and CAAQS.

Table 3.5-1. Federal and State Attainment Status

	YSAQMD		SMAQMD		BAAQMD	
Pollutant	**NAAQS**	**CAAQS**	**NAAQS**	**CAAQS**	**NAAQS**	**CAAQS**
1-hour Ozone	–	Serious Nonattainment	–	Serious Nonattainment	–	Serious Nonattainment
8-hour Ozone	Severe Nonattainment	Nonattainment	Severe Nonattainment	Nonattainment	Marginal Nonattainment	Nonattainment
CO	Moderate Maintenance	Attainment	Moderate Maintenance	Attainment	Moderate Maintenance	Attainment
PM10	Unclassified	Nonattainment	Maintenance	Nonattainment	Unclassified	Nonattainment
PM2.5	Nonattainment[a]	Unclassified	Nonattainment	Nonattainment	Nonattainment	Nonattainment

Sources: California Air Resources Board 2011a; U.S. Environmental Protection Agency 2011.
– = No applicable standard.
[a] The EPA is currently in the process of reclassifying YSAQMD as an attainment area for the 24-hour PM 2.5 NAAQS.
BAAQMD = Bay Area Air Quality Management District.
CAAQS = California ambient air quality standards.
CO = carbon monoxide.
NAAQS = national ambient air quality standards.
PM10 = particulate matter 10 microns in diameter or less.
PM2.5 = particulate matter 2.5 microns in diameter or less.
SMAQMD = Sacramento Metropolitan Air Quality Management District.
YSAQMD = Yolo-Solano Air Quality Management District.

Federal General Conformity Regulation and *de Minimis* Thresholds

EPA enacted the Federal General Conformity regulation (40 CFR Parts 5, 51, and 93) in 1993. The purpose of the General Conformity rule is to ensure that Federal actions do not generate emissions that interfere with state and local agencies' state implementation plans (SIPs) and emission-reduction strategies to ensure attainment of the NAAQS.

The General Conformity rule applies to all Federal actions located in nonattainment and maintenance areas that are not exempt from General Conformity (are either covered by Transportation Conformity or listed in the rule), are not covered by a Presumed-to-Conform approved list[1], or do not have clearly *de minimis* emissions. In addition, the General Conformity rule applies only to direct and indirect emissions associated with the portions of any Federal action that are subject to New Source Review (i.e., do not include stationary industrial sources requiring air quality permits from local air pollution control agencies) for which a Federal permitting agency has directly caused or initiated, has continued program responsibility for, or can practically control. Because of the involvement of the USACE and a required permit from USACE, all direct and indirect emissions generated by the project construction are subject to General Conformity.

The alternatives would generate air pollutant emissions from activities located in the Sacramento Valley Air Basin (SVAB) and San Francisco Bay Area Air Basin (SFBAAB). As indicated in Table 3.5-1,

[1] Category of activities designated by a Federal agency as having emissions below *de minimis* levels or otherwise do not interfere with the applicable SIP or the attainment and maintenance of the national ambient air quality standard.

the YSAQMD and SMAQMD are designated severe nonattainment areas for ozone NAAQS, nonattainment areas for PM2.5 NAAQS, and maintenance areas for CO NAAQS; the SMAQMD is a maintenance area for PM10 NAAQS; the BAAQMD is designated a marginal nonattainment area for ozone NAAQS, a nonattainment area for PM2.5 NAAQS, and a maintenance area for CO NAAQS. Consequently, a conformity evaluation must be undertaken to determine whether all emission sources (e.g., haul trucks, off-road equipment) that operate on Southport components are subject to the General Conformity rule. Because the alternatives are neither exempt nor presumed to conform and are not subject to transportation conformity, the evaluation of whether the alternatives are subject to the General Conformity rule is made by comparing all annual emissions to the applicable General Conformity *de minimis* thresholds (Section 3.5.2.2). If the conformity evaluation indicates that emissions are in excess of any of the General Conformity *de minimis* thresholds, the applicant must perform a conformity determination. A conformity determination is made by satisfying any of the following requirements.

- Showing that the emission increases caused by the Federal action are included in the SIP.
- Demonstrating that the state agrees to include the emission increases in the SIP.
- Offsetting the action's emissions in the same or nearby area.
- Mitigating to reduce the emission increase.
- Using a combination of the above strategies.

In the event that emissions associated with the alternatives exceed the General Conformity *de minimis* thresholds, the project applicant will consult with the applicable local air quality management or pollution control district to ensure conformity determination is made.

Local

The local air districts develop local air quality/pollutant regulations and prepare air quality plans that set goals and measures for achieving attainment with NAAQS and CAAQS. The districts also develop emission inventories, collect air monitoring data, and perform dispersion modeling simulations to establish strategies to reduce emissions and improve air quality. As part of an effort to attain and maintain NAAQS and CAAQS, the YSAQMD, SMAQMD, and BAAQMD have established CEQA thresholds of significance for criteria pollutants of greatest concern within the districts (discussed below in Section 3.5.2.2). The air districts have also established rules and regulations to reduce criteria pollutant emissions. Below are descriptions of air district rules that may apply to the project. This list of rules may not be all encompassing because additional rules may apply to the alternatives as specific components are identified.

- YSAQMD Rule 2.5 (Nuisance). This rule prevents dust emissions from creating a nuisance to surrounding properties.
- YSAQMD Rule 2.11 (Particulate Matter Concentration). This rule restricts emissions of PM greater than 0.1 grain per cubic foot of gas at dry standard conditions.
- YSAQMD Rule 2.28 (Cutback and Emulsified Asphalt Paving Materials). This rule limits the application of cutback and emulsified asphalt.
- YSAQMD Rule 2.32 (Stationary Internal Combustion Engines). This rule requires portable equipment greater than 50 horsepower, other than vehicles, to be registered with either ARB Portable Equipment Registration Program (PERP) or with YSAQMD.

- SMAQMD Rule 2020 (Nuisance). This rule prevents criteria pollutants from creating a nuisance to surrounding properties.
- SMAQMD Rule 403 (Fugitive Dust). This rule controls fugitive dust emissions through implementation of BMPs.
- SMAQMD Rule 404 (Particulate Matter). This rule restricts emissions of PM greater than 0.23 grams per cubic meter.
- SMAQMD Rule 412 (Stationary Internal Combustion Engines). This rule controls emissions of NO_X, CO, and non-methane hydrocarbons from stationary internal combustion engines greater than 50 brake horsepower.
- SMAQMD Rule 453 (Cutback and Emulsified Asphalt Paving). This rule limits the application of cutback and emulsified asphalt.
- BAAQMD Regulation 2, Rule 5 (New Source Review of Toxic Air Contaminates). This regulation outlines guidance for evaluating TAC emissions and their potential health threats.
- BAAQMD Regulation 6, Rule 1 (Particulate Matter). This regulation restricts emissions of PM darker than No. 1 on the Ringlemann Chart to less than 3 minutes in any 1 hour.
- BAAQMD Regulation 8, Rule 15 (Emulsified and Liquid Asphalts). This regulation limits emissions of VOCs caused by paving materials.
- BAAQMD Regulation 9, Rule 8 (Stationary Internal Combustion Engines). This regulation limits emissions of NO_X and CO from stationary internal combustion engines of more than 50 horsepower.

3.5.1.2 Environmental Setting

The following considerations are relevant to air quality conditions in the proposed project area.

Regional Climate and Meteorology

The project area is in Yolo County, which is located in the SVAB. The SVAB is bounded on the north by the Cascade Range, on the south by the San Joaquin Valley Air Basin, on the east by the Sierra Nevada, and on the west by the Coast Range.

The SVAB has a Mediterranean climate characterized by hot, dry summers and cool, rainy winters. During winter, the north Pacific storm track intermittently dominates Sacramento Valley weather, and fair weather alternates with periods of extensive clouds and precipitation. Periods of dense and persistent low-level fog, which is most prevalent between storms, are also characteristic of winter weather in the valley. The frequency and persistence of heavy fog in the valley diminish with the approach of spring. The average yearly temperature range for the Sacramento Valley is 20°F to 115°F, with summer high temperatures often exceeding 90°F and winter low temperatures occasionally dropping below freezing.

In general, the prevailing winds are moderate in strength and vary from moist clean breezes from the south to dry land flows from the north. The mountains surrounding the SVAB create a barrier to airflow, which can trap air pollutants under certain meteorological conditions. The highest frequency of air stagnation occurs in the autumn and early winter when large high-pressure cells collect over the Sacramento Valley. The lack of surface wind during these periods and the reduced vertical flow caused by less surface heating reduce the influx of outside air and allow air pollutants to become concentrated in a stable volume of air. The surface concentrations of pollutants are highest when these conditions are combined with temperature inversions that trap pollutants near the ground.

The ozone season (May through October) in the Sacramento Valley is characterized by stagnant morning air or light winds with the Delta sea breeze arriving in the afternoon out of the southwest. Usually the evening breeze transports the airborne pollutants to the north out of the Sacramento Valley. During about half of the days from July to September, however, a phenomenon called the Schultz eddy prevents this from occurring. Instead of allowing the prevailing wind patterns to move north carrying the pollutants out, the Schultz eddy causes the wind pattern to circle back to the south. Essentially, this phenomenon causes the air pollutants to be blown south toward the Sacramento Valley and Yolo County. This phenomenon has the effect of exacerbating the pollution levels in the area and increases the likelihood of violating Federal or state standards. The eddy normally dissipates around noon when the Delta sea breeze arrives (Yolo-Solano Air Quality Management District 2007).

Background Information on Air Pollutants

Air quality studies generally focus on five pollutants most commonly measured and regulated, and referred to as criteria air pollutants: ozone, CO, inhalable PM (PM10 and PM2.5), NO_2, and SO_2. Because ozone, a photochemical oxidant, is not emitted into the air directly from sources, emissions of ozone precursors (reactive organic gases [ROG] and oxides of nitrogen [NO_X]) are regulated with the aim of reducing ozone formation in the lowermost region of the troposphere.

Ozone and NO_2 are considered regional pollutants because they (or their precursors) affect air quality on a regional scale; NO_2 reacts photochemically with ROG to form ozone, and this reaction occurs at some distance downwind of the source of pollutants. Pollutants such as CO, PM10, and PM2.5 are considered to be local pollutants because they tend to disperse rapidly with distance from the source.

The pollutants of concern in the YSAQMD, SMAQMD, and BAAQMD are ozone, CO, and PM. The following discussion describes these criteria pollutants. Toxic air contaminants (TACs) are also discussed, although there are no established Federal or state standards for these pollutants.

Ozone

Ozone is an oxidant that attacks synthetic rubber, textiles, and other materials and causes extensive damage to plants by leaf discoloration and cell damage. It is also a severe eye, nose, and throat irritant and increases susceptibility to respiratory infections. Ozone is not emitted directly into the air: it forms from a photochemical reaction in the atmosphere. Ozone precursors, including ROG and NO_X, are emitted by mobile sources and stationary combustion equipment and react in the presence of sunlight to form ozone. Because reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summertime problem.

Carbon Monoxide

CO is essentially inert to most materials and to plants but can affect human health significantly because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches to nausea to death. Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter, when periods of light wind combine with the formation of ground-level temperature inversions—typically from evening through early morning. These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

Particulate Matter

Particulate matter refers to finely divided solids or liquids such as soot, dust, aerosols, and mists. Suspended particulates aggravate chronic heart and lung disease problems, produce respiratory problems, and often transport toxic elements. Suspended particulates also absorb sunlight, producing haze and reducing visibility. PM is caused primarily by dust from grading and excavation activities, from agricultural uses, and from motor vehicles, particularly diesel-powered vehicles. PM10 causes a greater health risk than larger particles, since these fine particles can more easily penetrate the defenses of the human respiratory system.

PM2.5, like PM10, is primarily generated by combustion in motor vehicles, particularly diesel engines, as well as by industrial sources and residential/agricultural activities such as burning. It is also formed through the reaction of other pollutants. Like PM10, these particulates can increase the chance of respiratory disease and can cause lung damage and cancer.

Toxic Air Contaminants

TACs are pollutants that may result in an increase in mortality or serious illness, or that may pose a present or potential hazard to human health. Health effects of TACs include cancer, birth defects, neurological damage, damage to the body's natural defense system, and diseases that lead to death. In 1998, following a 10-year scientific assessment process, ARB identified PM from diesel-fueled engines—commonly called diesel particulate matter (DPM)—as a TAC. Compared to other air toxics ARB has identified, DPM emissions are estimated to be responsible for about 70% of the total ambient air toxics risk (California Air Resources Board 2000).

Existing Conditions

The existing air quality conditions in the project area can be characterized by monitoring data collected in the region. Although the project is located in Yolo County, the nearest monitoring stations in both Yolo County and Sacramento County are selected to present air quality of the project vicinity. Air quality concentrations typically are expressed in terms of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The nearest monitoring stations to the project area are the West Sacramento 15th Street station, which monitors PM10; the Sacramento T Street station, which monitors ozone and PM2.5; and the Sacramento Del Paso Manor station, which monitors CO.

Table 3.5-2 summarizes air quality monitoring data from the monitoring stations for the last 3 years, 2009–2011, for which complete data are available (as of the time of publication, complete 2012 monitoring data are not available). As shown in Table 3.5-2, the monitoring stations have experienced occasional violations of the NAAQS and CAAQS for all pollutants except CO. However, in general, air quality is improving in the region, as indicated by the declining number of measured violations.

Table 3.5-2. Ambient Air Quality Monitoring Data (2009–2011)

Pollutant Standards	2009	2010	2011
1-Hour O_3 (ppm) (Sacramento T Street)			
Maximum 1-hour concentration	0.102	0.092	0.100
1-hour California designation value	0.102	0.101	0.095
1-hour expected peak day concentration	0.103	0.103	0.092
Number of days standard exceeded[a]			
CAAQS 1-hour (>0.09 ppm)	3	0	1
8-Hour O_3 (ppm) (Sacramento T Street)			
National maximum 8-hour concentration	0.088	0.074	0.087
National second-highest 8-hour concentration	0.080	0.069	0.072
State maximum 8-hour concentration	0.089	0.074	0.087
State second-highest 8-hour concentration	0.080	0.070	0.073
8-hour national designation value	0.077	0.075	0.071
8-hour California designation value	0.092	0.089	0.080
8-hour expected peak day concentration	0.092	0.090	0.084
Number of days standard exceeded[a]			
NAAQS 8-hour (>0.075 ppm)	4	0	1
CAAQS 8-hour (>0.070 ppm)	13	1	5
CO (ppm) (Sacramento Del Paso)			
National[b] maximum 8-hour concentration	2.77	1.60	2.27
National[b] second-highest 8-hour concentration	2.19	1.45	2.23
California[c] maximum 8-hour concentration	2.77	1.60	2.27
California[c] second-highest 8-hour concentration	2.19	1.45	2.23
Maximum 1-hour concentration	3.1	1.9	2.6
Second-highest 1-hour concentration	3.0	1.9	2.5
Number of days standard exceeded[a]			
NAAQS 8-hour (≥9 ppm)	0	0	0
CAAQS 8-hour (≥9.0 ppm)	0	0	0
NAAQS 1-hour (≥35 ppm)	0	0	0
CAAQS 1-hour (≥20 ppm)	0	0	0
PM10[d] ($\mu g/m^3$) (West Sacramento 15th Street)			
National[b] maximum 24-hour concentration	55.8	58.0	67.8
National[b] second-highest 24-hour concentration	49.7	48.0	52.4
State[c] maximum 24-hour concentration	59.4	58.0	72.1
State[c] second-highest 24-hour concentration	52.5	47.0	57.2
State annual average concentration[e]	21.2	18.3	20.7
National annual average concentration	20.3	17.9	20.0
Number of days standard exceeded[a]			
NAAQS 24-hour (>150 $\mu g/m^3$)[f]	0	0	0
CAAQS 24-hour (>50 $\mu g/m^3$)[f]	2	1	2
PM2.5 ($\mu g/m^3$) (Sacramento **T Street)**			
National[b] maximum 24-hour concentration	37.7	30.6	50.5
National[b] second-highest 24-hour concentration	27.3	27.6	47.8
State[c] maximum 24-hour concentration	50.1	37.0	50.5
State[c] second-highest 24-hour concentration	48.1	35.1	47.8

Pollutant Standards	2009	2010	2011
National annual designation value	10.8	9.5	9.2
National annual average concentration	9.5	8.0	10.1
State annual designation value	10	10	10
State annual average concentration[e]	9.5	8.1	10.1
Number of days standard exceeded[a]			
NAAQS 24-hour (>35 μg/m³)[f]	1	0	6

Sources: California Air Resources Board 2012; U.S. Environmental Protection Agency 2012.

– = insufficient data available to determine the value.

[a] An exceedance is not necessarily a violation.

[b] National statistics are based on standard conditions data. In addition, national statistics are based on samplers using Federal reference or equivalent methods.

[c] State statistics are based on local conditions data, except in the South Coast Air Basin, for which statistics are based on standard conditions data. In addition, State statistics are based on California approved samplers.

[d] Measurements usually are collected every 6 days.

[e] State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

[f] Mathematical estimate of how many days concentrations would have been measured as higher than the level of the standard had each day been monitored. Values have been rounded.

Sensitive Receptors

The NAAQS and CAAQS apply at publicly accessible areas, regardless of whether those areas are populated. For the purposes of air quality analysis, sensitive land uses are defined as locations where human populations, especially children, seniors, and sick persons, are located and where there is reasonable expectation of continuous human exposure according to the averaging period for the air quality standards (e.g., 24-hour, 8-hour, and 1-hour). Typical sensitive receptors include residences, hospitals, and schools.

Plates 1-5 and 2-2a through 2-6b (2-3a, 2-3b, 2-5a, 2-5b, 2-6a, and 2-6b are revised) present the project construction areas, borrow sites, and residents in the vicinity of the project area for each alternative. Adjacent to the project area, residential neighborhoods are located between approximately 600–1,600 feet east of the project area across the Sacramento River. Within the project area, residential neighborhoods located on San Marco Street and Roaring Creek Street are directly west of the Segment G; and residential neighborhoods located on Almond Street, Bastone Court, and Cedar Court are between approximately 800–2,300 feet west of the Segments E and F. Scattered residences also are found along S River Road, Davis Road, and Gregory Avenue within the project area.

Sensitive receptors also include residences located along the truck haul routes on local streets and the barge haul route on the Sacramento River. Primary truck routes in the project vicinity include Jefferson Boulevard, Enterprise Boulevard, Industrial Boulevard, Linden Road, Davis Road, Gregory Avenue, and Burrows Avenue.

3.5.2 Environmental Consequences

This section describes the environmental consequences relating to air quality for the Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with and without mitigation, and applicable mitigation measures are presented in a table under each alternative. Additional information on the project construction information and technical modeling procedures used to quantify air quality effects is provided in Appendix D.

3.5.2.1 Assessment Methods

Almost all increased air pollutant emissions associated with the project would be generated by construction-related activities. Construction emissions would result in localized, short-term effects on ambient air quality in the project area. Therefore, the focus of the air quality analysis is to evaluate whether the construction-related emissions would exceed emission thresholds as established by the YSAQMD, SMAQMD, BAAQMD, and General Conformity thresholds. After the project is constructed, O&M of the project facilities generally would be performed as needed. Maintenance work is less extensive than the construction activities and takes place over a few days per year. In addition, O&M activities are part of the existing environmental baseline and thus would not create a substantial source of new emissions. Consequently, the O&M of the project would not result in any adverse effect under NEPA, would not result in a significant impact under CEQA on air quality, and are not quantified in this analysis because they are part of the existing environmental baseline.

Construction activities associated with the project will generate short-term emissions of ROG, NO_X, CO, PM10, and PM2.5 (see Section 3.6, Climate Change, for a discussion of effects related to greenhouse gas emission [GHG]). Emissions will originate from on-road hauling trips, on-water barge hauling trips, worker commute trips, construction site fugitive dust, and off-road construction equipment. Construction-related emissions will vary substantially depending on the level of activity, specific equipment operations, and wind and precipitation conditions. Construction emissions are estimated based on the construction data provided by HDR (Appendix D), which include schedules, equipment list, equipment operation hours, haul truck trips, barge trips, and earth-moving quantities, by construction years, for each segment and each alternative.

For the air quality and GHG analysis, the project alternatives were evaluated using conservative construction scenarios referred to as “unfavorable scenarios” to estimate the maximum construction emissions generated by each alternative. The unfavorable scenarios assumed all the excavated material and demolished debris would be hauled off site and would not be reused for the project, which would result in a longer construction schedule, requiring additional equipment and longer truck hauling trips, resulting in larger fleet sizes and associated emissions when compared to the favorable scenarios. Detailed assumptions of the construction data for unfavorable scenarios are provided in Appendix D.

Models, tools, and assumptions used to calculate the emissions associated with off-road equipment, on-road vehicles, on-water hauling, site fugitive dust, and electricity consumptions are described below.

- **Off-Road Equipment:** Exhaust emissions from operation of onsite equipment are calculated using URBEMIS 2007 model (Version 9.2.4). The load factors for construction equipment are updated to reflect the values presented the 2011 Carl Moyer Guidelines, which are based on ARB’s most recently released load factor data (California Air Resources Board 2011b).

- **On-Road Vehicles:** Exhaust emissions from truck haul trips and worker commute trips are calculated using the EMFAC2011 emissions model. The numbers of haul trips and hauling distances are provided by HDR for each construction year. The numbers of workers required to complete construction activities are estimated based on a daily workforce of 20 workers plus one person per piece of construction equipment. The commute distance is based on the average work-related trip length estimated by the URBEMIS. It is assumed that 70% of the truck and commute trips would be generated in the YSAQMD and 30% of the trips would be generated in the SMAQMD.
- **On-Water Towboats:** The project would use barges powered by towboats to carry the riprap material from the San Rafael Rock Quarry through the Bay-Delta and the Sacramento River to the project sites. Exhaust emissions from towboats are quantified using emission factors and the load factor developed for EPA (2009). For a conservative estimate, the emission factors for Tier 0 Category 2 towboats are used to calculate the emissions. The average one-way hauling distance between the San Rafael Rock Quarry and the project area is approximately 90 miles, of which 22.5 miles would be in the YSAQMD, 36 miles in the SMAQMD, and 41.5 miles in the BAAQMD.
- **Land Disturbance and Earth Moving:** Fugitive dust emissions generated by building demolition, land disturbance, and earth moving are quantified using the URBEMIS with the disturbed acreages and earthwork volume provided by HDR.
- **Off-Site Material Borrow:** Sources of borrow material are described in Chapter 2, "Alternatives." For the air quality and GHG analysis, it is conservatively assumed that embankment material excavated as part of construction would not be reused as the levee fill material to analyze the maximum air emissions generated by material borrow activities. The borrow material is assumed to be imported from the dredged material previously removed from the DWSC to account for the longest truck hauling distance (6.6 round trip miles) among the potential off-site borrow pits identified for the project. The construction emissions associated with on-road hauling trucks, off-road equipment, and fugitive dust at the borrow sites would be generated entirely within the YSAQMD. For construction emissions associated with worker commute trips, it is assumed that 70% of the truck and commute trips would be generated in the YSAQMD and 30% of the trips would be generated in the SMAQMD.

Table 3.5-3 summarizes the emission sources associate with the project construction that would occur in the YSAQMD, SMAQMD, and BAAQMD.

Table 3.5-3. Emission Sources occurring in the YSAQMD, SMAQMD, BAAQMD

Emission Sources	YSAQMD	SMAQMD	BAAQMD
Off-Road Construction Equipment	X		
On-Road Vehicles	X		
On-Water Towboats	X	X	X
Dust Emissions from Land Disturbance and Earth Moving	X		
Off-Site Material Borrow, including fugitive dust, off-road construction equipment, and on-road vehicles associated with the activity.	X	X	

SMAQMD = Sacramento Metropolitan Air Quality Management District.
YSAQMD = Yolo-Solano Air Quality Management District.
BAAQMD = Bay Area Air Quality Management District.

3.5.2.2 Determination of Effects

For this analysis, an environmental effect was considered potentially significant related to air quality if it would result in any of the effects listed below. These effects are based on common NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000), local air district CEQA thresholds of significance, and standards of professional practice. Further, the analysis of effects listed below address both NEPA and CEQA (i.e., Effect AIR-1 and Effects AIR-3 through AIR-4), unless clearly stated otherwise (i.e., Effect AIR-2).

CEQA

For this analysis, an effect pertaining to air quality was analyzed under CEQA if it would result in any of the following environmental effects, which are based on State CEQA Guidelines Appendix G (14 CCR 15000 et seq.) and standards of professional practice.

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or substantial contribution to existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a nonattainment area under NAAQS and CAAQS.
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

The guidelines further state that the significance criteria established by the applicable air quality management or air pollution control district may be relied on to make the determinations above. An air quality effect is considered to be significant if the project's construction emissions would exceed districts' CEQA emission thresholds. The appropriate district-recommended emission thresholds as published in their respective CEQA guidance documents apply only to the portions of emissions generated under their jurisdiction. For construction activities that would occur in Yolo County, an air quality effect is considered significant if the air pollutant emissions would exceed the YSAQMD's thresholds of significance. For portions of the construction activities that would occur in Sacramento County (i.e., haul trucks and commute vehicles traveling on public roads in the county), an air quality effect is considered significant if the air pollutant emissions would exceed the SMAQMD's thresholds of significance. It should be noted that no earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only. For portions of the construction activities that would occur in within the BAAQMD's jurisdiction (i.e., transport of riprap using barges powered by towboats), an air quality effect is considered significant if the air pollutant emissions would exceed the BAAQMD's thresholds of significance. The CEQA emission thresholds for the YSAQMD, SMAQMD, and BAAQMD[2] are shown in Table 3.5-4.

[2] In March 2012, an Alameda County Superior Court ruled that BAAQMD needed to comply with CEQA prior to adopting their 2010 CEQA Guidelines, which included significance thresholds for criteria air pollutants and greenhouses gases. The Superior Court did not determine whether the thresholds were valid on the merits, but found that the adoption of the thresholds was a project under CEQA and ordered the BAAQMD to set aside the thresholds until BAAQMD complied with CEQA. The First District Court of Appeal reversed the lower court's ruling on August 13, 2013, holding that BAAQMD's promulgation of thresholds was not a project subject to CEQA review and were supported by substantial evidence. The Appellate Court's decision reinstates BAAQMD's threshold of significance for use in CEQA documents.

Table 3.5-4. CEQA Thresholds of Significance

Pollutant	YSAQMD	SMAQMD	BAAQMD
Construction			
ROG	10 tons/year	None	54 lb/day
NO_X	10 tons/year	85 lb/day	54 lb/day
CO	Violation of a CAAQS	Violation of a CAAQS	None
PM10	80 lb/day	Violation of a CAAQS or failure to implement emissions control practices	Exhaust: 82 lb/day; Fugitive dust: failure to implement BMPs.
PM2.5	None	Same as PM10	Exhaust: 54 lb/day; Fugitive dust: failure to implement BMPs.
TACs	None	None	Increased cancer risk of 10 in 1 million; increased non-cancer risk of greater than 1.0 (HI); PM2.5 increase of greater than 0.3 micrograms per cubic meter
Operation			
ROG	Same as construction	Not applicable to the project because no operation and maintenance activity would occur within the district.	Not applicable to the project because no operation and maintenance activity would occur within the district.
NO_X	Same as construction		
CO	Same as construction		
PM10	Same as construction		
PM2.5	Same as construction		
TACs	Increased cancer risk of 10 in 1 million or increased non-cancer risk of greater than 1.0 (HI)		

Sources: Yolo-Solano Air Quality Management District 2007; Sacramento Metropolitan Air Quality Management District 2011a; Bay Area Air Quality Management District 2010.

BAAQMD = Bay Area Air Quality Management District.
CAAQS = California Ambient Air Quality Standards.
CO = carbon monoxide.
HI = hazard index.
lb/day = pounds per day.
NO_X = oxides of nitrogen.
PM2.5 = particulate matter 2.5 microns in diameter or less.
PM10 = particulate matter 10 microns in diameter or less.
ROG = reactive organic gases.
SMAQMD = Sacramento Metropolitan Air Quality Management District.
TACs = toxic air contaminants.
YSAQMD = Yolo-Solano Air Quality Management District.

The thresholds identified in Table 3.5-4 were developed by the air quality management agencies in the project area to evaluate project-level impacts on air quality. In developing these thresholds, the agencies considered levels at which project emissions would be cumulatively considerable. For example, as noted in BAAQMD's (2012) CEQA Guidelines,

> In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions. Therefore, additional analysis to assess cumulative impacts is unnecessary.

And, as noted in SMAQMD's (2011) CEQA Guidelines,

> The District's approach to thresholds of significance is relevant to whether a project's individual emissions would result in a cumulatively considerable adverse contribution to the SVAB's existing air quality conditions. If a project's emissions would be less than these levels, the project would not be expected to result in a cumulatively considerable contribution to the significant cumulative impact…If construction-generated NO_X emissions cannot be mitigated or offset below 85 lb/day, the project would substantially contribute to this **significant** air quality impact.

And, as noted in YSAQMD's (2007) CEQA Guidelines,

> Any proposed project that would individually have a significant air quality impact (see above for project-level Thresholds of Significance) would also be considered to have a significant cumulative impact.

The emissions thresholds presented in Table 3.5-4, therefore, represent the maximum emissions a project may generate before contributing to a cumulative impact on regional air quality. Therefore, exceedances of the project-level thresholds would also be cumulatively considerable.

NEPA

An air quality effect is considered to be significant under NEPA if the project's construction emissions would exceed the General Conformity *de minimis* thresholds listed in Table 3.5-5.

Table 3.5-5. Federal General Conformity *de Minimis* Thresholds used to Determine NEPA Effects

	ROG	NO_X	CO	PM10	PM2.5
Air Basin	Annual Air Pollutant Emissions in Tons per Year				
Sacramento Valley Air Basin (include YSAQMD and SMAQMD)	25	25	100	100	100
Bay Area Air Basin (includes BAAQMD)	50	100	100	None	100

Source: 40 CFR 93.153
BAAQMD = Bay Area Air Quality Management District.
CO = carbon monoxide.
NO_X = oxides of nitrogen.
PM2.5 = particulate matter 2.5 microns in diameter or less.
PM10 = particulate matter 10 microns in diameter or less.
ROG = reactive organic gases.
SMAQMD = Sacramento Metropolitan Air Quality Management District.
YSAQMD = Yolo-Solano Air Quality Management District.

3.5.3 Effects and Mitigation Measures

3.5.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be implemented. Current levee O&M activities would continue, but there would be no construction-related emissions as a result of the project. Therefore, there would be no effect on air quality attributable to the implementation of the No

Action Alternative. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

As discussed in Chapter 2, there are three possible scenarios related to the levee vegetation policy under the No Action Alternative.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

However, there would be no effect on air quality under the implementation of any of the three vegetation management scenarios.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.5.3.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on air quality (Table 3.5-6).

Table 3.5-6. Air Quality Effects and Mitigation Measures for Alternative 1, Unfavorable Scenario

	Finding		With	
Effect	**Direct**	**Indirect**	**Mitigation**	**Mitigation Measure**
AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan	Less than significant	No effect	NA	None
AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA	Significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Non-Attainment Area under NAAQS and CAAQS	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations	No effect	Significant	Less than significant	AIR-MM-2: Implement Fugitive Dust Control Plan
AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations	No effect	Less than significant	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10
AIR-7: Create Objectionable Odors Affecting a Substantial Number of People	Less than significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents

Effect AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan

A project is deemed inconsistent with air quality plans if it would result in population and/or employment growth that exceeds growth estimates included in the applicable air quality plan, which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget.

As described in Chapter 4, "Growth-Inducing and Cumulative Effects," the implementation of the project, combined with implementation of future flood risk–reduction measures, might remove an obstacle for undeveloped lands in West Sacramento and make development easier or more attractive for these lands, which might result in population growth in these areas in the long term. The 2035 Metropolitan Transportation Plan (Sacramento Area Council of Government 2008) has included the population projection of 278,786 people for Yolo County and 87,402 people for West Sacramento, which has accounted for the land development and population growth of these areas through 2035. The air quality conformity analysis as part of the 2035 Metropolitan Transportation Plan meets the emission conformity test for the Sacramento ozone nonattainment area. Therefore, the project operation would not conflict with or obstruct the implementation of air quality plans. This direct effect would be less than significant. No mitigation is required.

Effect AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA

The construction emissions are estimated for the project site–related activities and off-site material borrow activities based on the emission rates and assumptions described in Section 3.5.2.1, Assessment Methods. Emission sources associated with the project site include the off-road construction equipment operating at project sites, on-road vehicles (except vehicles associated with the material borrow) traveling to and from the project sites, towboats traveling to and from the project sites on the Sacramento River, and fugitive dust associated with earthmoving and soil-disturbance activities at project sites. Emission sources associated with the material borrow activities include the off-road construction equipment operating at borrow sites, on-road hauling trucks traveling between borrow sites and the project sites, workers traveling to and from the borrow sites, and fugitive dust associated with earthmoving and soil-disturbance activities at borrow sites.

The estimated unmitigated construction emissions for each construction year are shown in Table 3.5-7. To evaluate emissions against YSAQMD CEQA thresholds, annual emissions are estimated for ROG and NO_X, while maximum daily emissions are estimated for ROG, NO_X, PM10, and PM2.5 to evaluate emissions against YSAQMD, SMAQMD, and BAAQMD CEQA thresholds. Construction-related emissions under the alternative would exceed the YSAQMD's emission thresholds for NO_X and PM10, exceed the SMAQMD's emission threshold for NO_X, and exceed the BAAQMD's emission threshold for NO_X. The emission estimate for the off-site material borrow activities is conservative because it assumed that embankment material excavated as part of construction would not be reused as the levee fill material to analyze the maximum air emissions generated by material borrow activities. The actual emissions may be reduced depending on the availability of the excavated embankment material and the availability of the borrow pits that are located closer to the project sites; regardless, the overall construction emissions under the alternative still would exceed the thresholds. Therefore, construction of the alternative would result in a significant effect. Mitigation measures for this effect are Mitigation Measures AIR-MM-1 through AIR-MM-5, described below.

Table 3.5-8 shows mitigated construction emissions with implementation of Mitigation Measures AIR-MM-1 through AIR-MM-3. After mitigation, construction-related emissions still would exceed the YSAQMD's emission thresholds for NO_X and PM10, exceed the SMAQMD's emission threshold for NO_X, and exceed the BAAQMD's emission threshold for NO_X. Because NO_X emissions would exceed SMAQMD's threshold after the implementation of Mitigation Measures AIR-MM-1 through AIR-MM-3, WSAFCA will be required to pay an off-site mitigation fee for NO_X emissions in the SVAB (Mitigation Measure AIR-MM-4) and SFBAAB (Mitigation Measure AIR-MM-5). With the implementation of Mitigation Measures AIR-MM-4 and AIR-MM-5, NO_X emission effects in the SVAB (both YSAQMD and SMAQMD) and SFBAAB would be reduced to a less-than-significant level. Table 3.5-9 shows the construction emissions with implementation of Mitigation Measures AIR-MM-1 through AIR-MM-5.

While AIR-MM-1 through AIR-MM-5 would reduce NO_X emissions in the YSAQMD, BAAQMD, and SMAQMD to less than significant, PM10 emissions in YSAQMD would still exceed applicable air district thresholds. This would be a direct adverse effect. Consequently, Effect AIR-2 is significant and unavoidable in YSAQMD for the following pollutant.

- Daily PM10 in YSAQMD.

Table 3.5-7. Construction Emissions: Alternative 1, Unfavorable Scenario

	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
Construction Year	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in YSAQMD										
Year 1 Onsite Construction	3.0	28.7	11.0	119.6	25.7				6,285	
Year 1 Off-site Soil Borrow	1.4	17.3	5.2	115.0	24.4				6,007	
Year 1 Total	4.4	46.0	16.2	234.6	50.2				12,292	
Year 2 Onsite Construction	1.6	14.9	5.9	58.3	12.6				1,745	
Year 2 Off-site Soil Borrow	0.8	9.5	2.9	56.3	12.0				1,738	
Year 2 Total	2.4	24.4	8.9	114.6	24.5				3,483	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	**Yes**							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.2	4.3	1.5	0.2	0.2		296			
Year 1 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.2			
Year 1 Total	0.2	4.3	1.6	0.2	0.2		296.2			
Year 2 Onsite Construction	0.1	1.8	0.6	0.1	0.1		71.4			
Year 2 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.1			
Year 2 Total	0.1	1.8	0.7	0.1	0.1		71.5			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							**Yes**			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	3.1	33.0	12.5	0.2	25.9					
Year 1 Off-site Soil Borrow	1.4	17.3	5.2	0.0	24.4					
Year 1 Total	4.5	50.2	17.7	0.2	50.3					
Year 2 Onsite Construction	1.7	16.7	6.6	0.2	12.6					
Year 2 Off-site Soil Borrow	0.8	9.5	2.9	0.0	12.0					
Year 2 Total	2.5	26.2	9.5	0.2	24.6					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	**Yes**	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.1	3.5	1.3	0.2	0.2	12.9	340	18.6		17.1
Year 2	0.1	1.4	0.5	0.1	0.1	1.8	48.6	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	**Yes**	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.
[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.
[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Table 3.5-8. Mitigated Construction Emissions with AIR-MM-1 through AIR-MM-3: Alternative 1, Unfavorable Scenario

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in YSAQMD										
Year 1 Onsite Construction	3.0	21.2	11.0	7.6	1.9				396	
Year 1 Off-site Soil Borrow	1.4	14.2	5.2	7.2	1.7				378	
Year 1 Total	4.4	35.4	16.2	14.8	3.6				774	
Year 2 Onsite Construction	1.6	11.0	5.9	3.7	0.9				110	
Year 2 Off-site Soil Borrow	0.8	7.7	2.9	3.5	0.8				109	
Year 2 Total	2.4	18.7	8.9	7.2	1.7				219	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	**Yes**							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.2	3.5	1.5	0.2	0.2		220			
Year 1 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.2			
Year 1 Total	0.2	3.5	1.6	0.2	0.2		220.2			
Year 2 Onsite Construction	0.1	1.5	0.6	0.1	0.1		47.1			
Year 2 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.1			
Year 2 Total	0.1	1.5	0.7	0.1	0.1		47.2			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							**Yes**			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	3.1	24.7	12.5	0.2	2.06					
Year 1 Off-site Soil Borrow	1.4	14.2	5.2	0.0	1.7					
Year 1 Total	4.5	38.9	17.7	0.2	3.7					
Year 2 Onsite Construction	1.7	12.5	6.6	0.2	1.0					
Year 2 Off-site Soil Borrow	0.8	7.7	2.9	0.0	0.8					
Year 2 Total	2.5	20.2	9.5	0.2	1.8					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	**Yes**	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.1	2.6	1.3	0.2	0.2	12.9	253	18.6		17.1
Year 2	0.1	1.0	0.5	0.1	0.1	1.8	36.1	2.7		2.4

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	**Yes**	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.
[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.
[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Table 3.5-9. Mitigated Construction Emissions with AIR-MM-1 through AIR-MM-5: Alternative 1, Unfavorable Scenario

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in YSAQMD										
Year 1 Onsite Construction	3.0	0	11.0	7.6	1.9				396	
Year 1 Off-site Soil Borrow	1.4	0	5.2	7.2	1.7				378	
Year 1 Total	4.4	0	16.2	14.8	3.6				774	
Year 2 Onsite Construction	1.6	0	5.9	3.7	0.9				110	
Year 2 Off-site Soil Borrow	0.8	0	2.9	3.5	0.8				109	
Year 2 Total	2.4	0	8.9	7.2	1.7				219	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	No							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.2	0	1.5	0.2	0.2		0			
Year 1 Off-site Soil Borrow	0.0	0	0.0	0.0	0.0		0			
Year 1 Total	0.2	0	1.6	0.2	0.2		0			
Year 2 Onsite Construction	0.1	0	0.6	0.1	0.1		0			
Year 2 Off-site Soil Borrow	0.0	0	0.0	0.0	0.0		0			
Year 2 Total	0.1	0	0.7	0.1	0.1		0			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							No			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	3.1	0	12.5	0.2	2.06					
Year 1 Off-site Soil Borrow	1.4	0	5.2	0.0	1.7					
Year 1 Total	4.5	0	17.7	0.2	3.7					
Year 2 Onsite Construction	1.7	0	6.6	0.2	1.0					
Year 2 Off-site Soil Borrow	0.8	0	2.9	0.0	0.8					
Year 2 Total	2.5	0	9.5	0.2	1.8					

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**PM10 Exhaust**	**PM10**	**PM2.5 Exhaust**
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	No	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.1	2.6	1.3	0.2	0.2	12.9	53	18.6		17.1
Year 2	0.1	1.0	0.5	0.1	0.1	1.8	36.1	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	No	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.
[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.
[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Mitigation Measure AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10

According to the YSAQMD CEQA guidelines (Yolo-Solano Air Quality Management District 2007), the project lead agency is encouraged to explore and incorporate mitigation measures as technology advances and less emissive products become available at lower costs. Therefore, WSAFCA will require the construction contractor to implement the feasible and reasonable measures to reduce public nuisance and tailpipe emissions from diesel-powered construction equipment. This requirement will be incorporated into the construction contracts as part of the project's specifications. Depending on the exceedance amounts of NO_X and PM10 emissions, WSAFCA will require the construction contractor to implement either or all of following mitigation options.

- Reduce use, trips, and unnecessary idling of heavy equipment. Shut down idling equipment that is not used for more than 5 consecutive minutes as required by California law.
- Maintain all construction equipment in proper tune according to manufacturer's specifications.
- Use a modern equipment fleet meeting at least Tier 2 engine standards for off-road heavy-duty diesel engines.
- The fleet average of active on-road diesel haul trucks over 14,000 GVWR shall be equipped with either an ARB verified Level 3 particulate filter or an engine that at least meets the 2007 model year ARB emission standard Off-road diesel haul trucks will comply with all state off-road regulations. As feasible, existing haul trucks within the contractor's fleet with newer engines will be prioritized.
- Locate stationary diesel-powered equipment and haul truck staging areas as far as practicable from sensitive receptors.

- Use existing power sources (e.g., power lines) or clean fuel generators rather than conventional diesel generators, when feasible.
- Substitute gasoline-powered for diesel-powered equipment when feasible.
- Use alternatively fueled construction equipment on site where feasible, such as compressed natural gas (CNG), liquefied natural gas (LNG), propane, or biodiesel.
- Use ARB and/or EPA-verified particulate traps and other appropriate controls (i.e., diesel oxidation catalyst or diesel particular filters) where feasible to reduce emissions of NO_X, DPM, and other pollutants at the construction site.
- Use towboats with newer or remanufactured engines that comply with the EPA Tier 2 or Tier 3 emission standards.
- The construction contractor will provide a plan, for approval by WSAFCA and the local air district, demonstrating that the heavy-duty off-road equipment to be used at the project sites, including owned, leased, and subcontractor equipment, will achieve a project-wide fleet-average reduction of 20% for NO_X and 45% for diesel particulate, compared to the most recent ARB fleet average at time of construction. A construction mitigation calculator may be downloaded from the SMAQMD web site to perform the fleet average evaluation (Sacramento Metropolitan Air Quality Management District 2011b).
- The project representative will submit to WSAFCA and the local air district a comprehensive inventory of all off-road construction equipment, equal to or greater than 50 horsepower, that will be used an aggregate of 40 or more hours during any portion of the construction project. The inventory will include the horsepower rating, engine production year, and projected hours of use for each piece of equipment. The inventory will be updated and submitted monthly throughout the duration of the project, except that an inventory will not be required for any 30-day period in which no construction activity occurs. At least 48 hours prior to the use of subject heavy-duty off-road equipment, the project representative will provide SMAQMD with the anticipated construction timeline, including start date, and name and phone number of the project manager and onsite foreman.
- The construction contractor will monitor and ensure that emissions from all off-road diesel-powered equipment used on the project site do not exceed 40% opacity for more than 3 minutes in any 1 hour. Any equipment found to exceed 40% opacity (or Ringelmann 2.0) will be repaired immediately, and WSAFCA and the local air district will be notified within 48 hours of identification of noncompliant equipment. A visual survey of all in-operation equipment will be made at least weekly, and a monthly summary of the visual survey results will be submitted throughout the duration of the project, except that the monthly summary will not be required for any 30-day period in which no construction activity occurs. The monthly summary will include the quantity and type of vehicles surveyed as well as the dates of each survey. The local air district and/or other officials may conduct periodic site inspections to determine compliance. Nothing in this section will supersede other local air district or state rules or regulations.

Mitigation Measure AIR-MM-2: Implement Fugitive Dust Control Plan

The construction contractor will implement all applicable and feasible fugitive dust control measures required by the YSAQMD including those listed below. This requirement will be incorporated into the construction contract.

- Post a publicly visible sign with the telephone number and person to contact regarding dust complaints. This person would respond and take corrective action within 48 hours. The phone number of the YSAQMD also will be visible to ensure compliance with the YSAQMD Rule 2.5, Nuisance.
- Water active unpaved areas at all construction sites at least twice daily in dry conditions, with the frequency of watering based on the type of operation, soil, and wind exposure.
- Prohibit all grading activities and water all areas of disturbed soil under windy conditions (winds more than 20 miles per hour).
- Limit onsite vehicles to a speed that prevents visible dust emissions to extend beyond unpaved roads.
- Cover all trucks hauling dirt, sand, or loose materials.
- Cover active and inactive storage piles where appropriate.
- Cover or hydroseed unpaved areas that will remain inactive for extended periods.
- Apply soil stabilizers to active and inactive areas where appropriate.
- Stabilize visible soil material and sediment at the entrance to construction sites.
- Sweep streets if visible soil material is carried out from the construction sites.
- Phase grading operations where appropriate.

However, with the implementation of above mitigations, daily fugitive dust emissions along with the diesel exhaust emissions would still exceed the YSAQMD's threshold for PM10. The construction contractor will implement all feasible, cost-effective mitigation measures to reduce fugitive dust emissions.

Mitigation Measure AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents

WSAFCA will provide advance written notification of the proposed construction activities to all residences and other air quality-sensitive uses within 500 feet of the construction site. Notification will include a brief overview of the proposed project and its purpose, as well as the proposed construction activities and schedule. It will also include the name and contact information of WSAFCA's project manager or a representative for ensuring that reasonable measures are implemented to address the problem.

Mitigation Measure AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds

WSAFCA will reduce NO_X emissions generated by the construction of the project through the creation of offsetting reductions of emissions occurring within the Sacramento Federal Nonattainment Area (SFNA). NO_X emissions in excess of the Federal *de minimis* threshold of 25 tons per year will be reduced to net zero (0). NO_X emissions not in excess of the *de minimis* thresholds, but above the YSAQMD's and SMAQMD's NO_X thresholds, will be reduced to quantities below the applicable numeric thresholds.

WSAFCA will undertake in good faith an effort to enter into a development mitigation contract with YSAQMD and SMAQMD to reduce NO_X emissions generated by the construction through contributions to YSAQMD's Incentive Programs and SMAQMD's Heavy-Duty Low-Emission Vehicle Incentive Programs (HDLEVIP).

YSAQMD's Incentive Programs are designed to reduce NO_X from on-road sources. SMAQMD's incentive programs are a means of funding projects and programs capable of achieving emissions reductions. The HDLEVIP is designed to reduce NO_X, PM, and ROG from on- and off-road sources. The payment fee is based on the average cost to achieve 1 ton per day (tpd) of reductions based on the average cost for reductions over the previous year. Onroad reductions averaged (nominally) $44 million ($NO_X$ only) and off-road reductions averaged $36 million ($NO_X$ only) over the previous year, thus working out to approximately $40 million per 1 tpd of reductions. This roughly correlates to the average cost effectiveness of the Carl Moyer Incentive Program.

Using YSAQMD's and SMAQMD's local mitigation contract programs, WSAFCA will enter into mitigation contracts with YSAQMD and SMAQMD to reduce NO_X emissions to the required levels. The required levels are:

- For NO_X emissions in excess of the Federal *de minimis* threshold: **net zero (0)**.
- For NO_X emissions not in excess of *de minimis* threshold but above YSAQMD's and SMAQMD's thresholds: **below the appropriate CEQA threshold levels**.

Implementation of this mitigation would require WSAFCA to adopt the following specific responsibilities.

- Consult with the YSAQMD and SMAQMD in good faith to enter into a mitigation contract for YSAQMD's Incentive Programs and SMAQMD's HDLEVIP. For NO_X emissions occurring within Yolo County, YSAQMD staff will determine whether projects exist within the YSAQMD that can be funded to fully offset these emissions. If sufficient projects cannot be identified, any remaining offsets would need to be achieved through the HDLEVIP by funding projects elsewhere in the Sacramento Region. For SIP purposes, the necessary reductions must be achieved (contracted and delivered) by the applicable year in question (i.e., emissions generated in year 2014 would need to be reduced off-site in 2014). Funding would need to be received prior to contracting with participants and should allow sufficient time to receive and process applications to ensure off-site reduction projects are funded and implemented prior to commencement of SEIP activities being reduced. This would roughly equate to the equivalent of 2 years prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emission reductions required for a specific year. In negotiating the terms of the mitigation contract, the WSAFCA, YSAQMD, and SMAQMD should seek clarification and agreement on air district responsibilities, including those following.
    - Identification of appropriate off-site mitigation and air district administrative fees required for the project.
    - Timing required for obtaining necessary off-site emission credits.
    - Processing of mitigation fees surrendered by WSAFCA.
    - Verification of emissions inventories submitted by WSAFCA.

- Verification that off-site fees are applied to appropriate mitigation programs within the SFNA.

- Quantify mitigation fees required to satisfy the appropriate reductions. As noted above, the payment fees may vary by year and are sensitive to the number of projects requiring reductions within the SFNA. The schedule in which payments are surrendered to the air district also influences overall cost. For example, a higher rate on a per ton basis will be required for project elements that need accelerated equipment turnover to achieve near-term reductions, whereas project elements that are established to contract to achieve far-term reductions will likely pay a lower rate on a per-tonnage basis.

- Develop a compliance program to calculate emissions and collect fees from the construction contractors for payment to the appropriate air district. The program will require, as a standard or specification of their contract, construction contractors to identify construction emissions and their share of required off-site fees, if applicable. Based on the emissions estimates, WSAFCA will collect fees from the individual construction contractors (as applicable) for payment to the air district. Construction contractors will have the discretion to reduce their construction emissions to the lowest possible level through onsite mitigation (Mitigation Measure AIR-MM-1), as the greater the emissions reductions that can be achieved by onsite mitigation, the lower the required off-site fee. All control strategies must be verified by YSAQMD and SMAQMD.

- Conduct daily and annual emissions monitoring to ensure onsite emissions reductions are achieved and no additional mitigation payments are required. The construction contractor will be required to ensure the requirement is met. This requirement will be incorporated into the construction contracts as part of the project's specifications. Excess off-site funds can be carried from previous to subsequent years in the event that additional reductions are achieved by onsite mitigation. At the end of the project, if it is determined that excess offset funds remain (outstanding contracts and administration over the final years of the contracts will be taken into consideration) the SMAQMD, YSAQMD, and WSAFCA Proponents will determine the disposition of final funds (e.g., additional emission reduction projects to offset underperforming contracts, return of funds to WSAFCA, etc.).

The amount of NO_X reductions that can be obtained is ultimately dependent on the number and type of projects available. The total pool of potential projects may be limited in any given year by other development projects seeking to offset their own emissions. If a sufficient number of emissions reduction projects are not identified to meet the required performance standard, the WSAFCA will coordinate with YSAQMD and SMAQMD to meet the performance standards of achieving net zero (0) for emissions in excess of General Conformity *de minimis* thresholds (where applicable) and of achieving quantities below applicable YSAQMD and SMAQMD CEQA thresholds for other pollutants not in excess of the *de minimis* thresholds, but above YSAQMD and SMAQMD CEQA thresholds.

Mitigation Measure AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds

WSAFCA will reduce NO_X emissions generated by the construction of the project by offsetting emissions occurring within the BAAQMD. NO_X emissions above the BAAQMD's NO_X thresholds will be reduced to quantities below the applicable numeric thresholds.

To accomplish this offset, WSAFCA will undertake a good faith effort to enter into a development mitigation contract with BAAQMD to reduce NO_X emissions generated by the construction within the BAAQMD. The preferred source of emissions offsetting for NO_X shall be through contributions to BAAQMD's Carl Moyer Program and/or other BAAQMD incentive programs (e.g., Transportation Fund for Clean Air [TFCA] or Carl Moyer Program[3]).

Using the BAAQMD's local mitigation contract programs (e.g., TFCA or Carl Moyer Program), WSAFCA will enter into a mitigation contract with the BAAQMD to reduce NO_X emissions to the required levels. Such reductions may occur within the SFBAAB. NO_X emissions above the BAAQMD's threshold are required to be below the CEQA threshold level.

Implementation of this mitigation would require WSAFCA to adopt the following specific responsibilities.

- Consult with the BAAQMD in good faith to enter into a mitigation contract for an emission reduction incentive program (e.g., TFCA or Carl Moyer Program). For SIP purposes, the necessary reductions must be achieved (contracted and delivered) by the applicable year in question (i.e., emissions generated in year 2014 would need to be reduced off-site in 2014). Funding would need to be received prior to contracting with participants and should allow sufficient time to receive and process applications to ensure off-site reduction projects are funded and implemented prior to commencement of SEIP activities being reduced. This would roughly equate to the equivalent of 2 years prior to the required mitigation; additional lead time may be necessary depending on the level of off-site emission reductions required for a specific year. In negotiating the terms of the mitigation contract, the WSAFCA and BAAQMD should seek clarification and agreement on air district responsibilities, including those following.
  - Identification of appropriate off-site mitigation fees required for the project.
  - Timing required for obtaining necessary off-site emission credits.
  - Processing of mitigation fees surrendered by WSAFCA.
  - Verification of emissions inventories submitted by WSAFCA.
  - Verification that off-site fees are applied to appropriate mitigation programs within the SFNA.
- Quantify mitigation fees required to satisfy the appropriate reductions. Funding for the emission reduction projects will be provided in an amount up to the emission reduction project cost-effectiveness limit set by for the Carl Moyer Program during the year that the emissions from construction are emitted. (The current emissions limit is $17,080/weighted ton of criteria pollutants [NO_X + ROG + (20*PM)]). An administrative fee of 5% would be paid by WSAFCA to the BAAQMD to implement the program. The funding would be used to fund projects eligible for funding under the Carl Moyer Program guidelines or other BAAQMD emission reduction incentive program meeting the same cost-effectiveness threshold that are real, surplus, quantifiable, and enforceable.

[3] The BAAQMD also supports incentive programs to reduce criteria pollutant emissions within the district. Similar to SMAQMD, the BAAQMD's Carl Moyer Program funds control projects for off-road and on-road emission sources. The Transportation Fund for Clean Air Program likewise provides financial incentives for on-road vehicle retrofits

- Develop a compliance program to calculate emissions and collect fees from the construction contractors for payment to the BAAQMD. The program will require, as a standard or specification of their contract, construction contractors to identify construction emissions and their share of required off-site fees, if applicable. Based on the emissions estimates, WSAFCA will collect fees from the individual construction contractors (as applicable) for payment to the air district. Construction contractors will have the discretion to reduce their construction emissions to the lowest possible level through onsite mitigation (Mitigation Measure AIR-MM-1), as the greater the emissions reductions that can be achieved by onsite mitigation, the lower the required off-site fee. All control strategies must be verified by the BAAQMD.

- Conduct daily and annual emissions monitoring to ensure onsite emissions reductions are achieved and no additional mitigation payments are required. The construction contractor will be required to ensure the requirement is met. This requirement will be incorporated into the construction contracts as part of the project's specifications. Excess off-site funds can be carried from previous to subsequent years in the event that additional reductions are achieved by onsite mitigation. At the end of the project, if it is determined that excess offset funds remain (outstanding contracts and administration over the final years of the contracts will be taken into consideration), the BAAQMD and WSAFCA proponents will determine the disposition of final funds (e.g., additional emission reduction projects to offset underperforming contracts, return of funds to WSAFCA, etc.).

If a sufficient number of emissions reduction projects are not identified to meet the required performance standard, the WSAFCA will coordinate with the BAAQMD to meet the performance standards of achieving quantities below applicable BAAQMD CEQA thresholds.

Effect AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA

As shown in Table 3.5-7 above, annual construction emissions under the alternative would exceed the General Conformity threshold for NO_X in the SVAB, resulting in a significant adverse effect. With the implementation of Mitigation Measures AIR-MM-1 and AIR-MM-3, described above, annual construction emissions, as shown in Table 3.5-8, would still would exceed the General Conformity *de minimis* threshold for NO_X within the SVAB. Since project emissions exceed the Federal *de minimis* threshold for NO_X, a general conformity determination must be made if Alternative 1 is selected as the APA to demonstrate that total direct and indirect emissions of NO_X would conform to the appropriate SVAB ozone SIP for each year of construction.

WSAFCA must demonstrate that project emissions would not result in a net increase in regional NO_X emissions, which could be achieved by fully offsetting construction-related NO_X emissions to zero through implementation of Mitigation Measure AIR-MM-4. Mitigation Measure AIR-MM-4 will ensure the requirements of the mitigation and offset program are implemented and conformity requirements are met. Therefore, this direct effect would be reduced to a less-than–significant level.

Effect AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Nonattainment Area under NAAQS and CAAQS

The project-level analysis performed in Effect AIR-3 evaluates the significance of construction-related emissions that would be generated in the BAAQMD, SMAQMD, and YSAQMD. As shown in

Table 3.5-7, construction of Alternative 1 would exceed SMAQMD's and BAAQMD's NO_X thresholds, as well as YSAQMD's NO_X and PM10 thresholds.

As noted in Section 3.5.2.2, the air quality management agencies in the project area consider emissions in excess of their project-level thresholds to have the potential to contribute to a cumulative impact on regional air quality. Accordingly, based on the emissions presented in Table 3.5-7, construction of Alternative 1 would result in a significant cumulative effect on regional air quality.

Implementation of AIR-MM-1 through AIR-MM-5 would reduce NO_X emissions in the YSAQMD, BAAQMD, and SMAQMD to less than significant. However, PM10 emissions in YSAQMD would still exceed applicable air district thresholds even after implementation of AIR-MM-1 through AIR-MM-5 (Table 3.5-9). This would be a direct adverse effect. Consequently, construction of Alternative 1 would result in a significant and unavoidable cumulative impact in YSAQMD for PM10.

Effect AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations

Construction of the proposed project would result in short-term dust emissions from grading and earth moving activities at the project construction sites and the soil borrow sites. The amount of dust generated would be highly variable and is dependent on the size of the disturbed area at any given time, amount of activity, soil conditions, and meteorological conditions. Nearby land uses, especially those residences located downwind of the project sites, could be exposed to dust generated during construction activities, indirectly resulting in potential adverse health effects. This indirect effect would be significant, but implementation of Mitigation Measure AIR-MM-2 would reduce dust emissions during construction to a less-than-significant level.

Effect AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations

Construction of the proposed project would result in short-term diesel particulate emissions from onsite heavy duty equipment and on-road haul trucks. DPM, which is classified as a carcinogenic TAC by ARB, is the primary pollutant of concern with regard to indirect health risks to sensitive receptors. Nearby land uses, especially those residences located downwind of the project sites, could be exposed to DPM generated during construction activities, indirectly resulting in potential adverse health effects.

The assessment of health risks associated with exposure to diesel exhaust typically is associated with chronic exposure, in which a 70-year exposure period is often assumed. However, while cancer can result from exposure periods of less than 70 years, acute exposure periods (i.e., exposure periods of 2 to 3 years) to diesel exhaust are not anticipated to result in an increased health risk, as health risks associated with exposure to diesel exhaust are typically seen in exposures periods that are chronic. Because construction activities along each segment are not expected to take place for more than 80 days per year over the of 2-year construction period, construction activities would occur linearly along the segment alignment and would not occur over a prolonged period in any one general location, there would a limited number of pieces of heavy equipment used at a construction site, and sensitive receptors are not located within close proximity to the construction area. Furthermore, as required by ARB regulation[4], no in-use off-road diesel vehicles may idle for more

[4] On June 15, 2008, ARB adopted a regulation for off-road diesel vehicles to reduce TACs from diesel-powered construction and mining vehicles operating in California. The regulation requires an operator of applicable off-road

than 5 consecutive minutes. Indirect health effects would be less than significant based on guidance provided by the YSAQMD (Jones pers. comm. 2012). In addition, implementation of Mitigation Measure AIR-MM-1, which is required under other air quality effects, would further reduce exhaust emissions and associated health risks during construction.

Effect AIR-7: Create Objectionable Odors Affecting a Substantial Number of People

The proposed project would not result in any major sources of odor, and the project would not involve operation of any of the common types of facilities that are known to produce odors (e.g., landfill, wastewater treatment facility). Odors associated with diesel exhaust emissions from the use of onsite construction equipment may be noticeable from time to time by adjacent receptors. However, the odors would be intermittent and temporary and would dissipate rapidly from the source with an increase in distance. Furthermore, as required by ARB regulation, no in-use off-road diesel vehicles may idle for more than 5 consecutive minutes. Therefore, this direct effect would be less than significant. In addition, implementation of Mitigation Measures AIR-MM-1 and AIR-MM-3, which are required under other air quality effects, would further reduce exhaust emissions and provide advanced notification of construction activity.

3.5.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on air quality (Table 3.5-10).

Table 3.5-10. Air Quality Effects and Mitigation Measures for Alternative 2, Unfavorable Scenario

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan	Less than significant	No effect	NA	None
AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds

vehicles (self-propelled diesel-fueled vehicles of 25 horsepower and greater that were not designed for on-road driving) to limit idling to no more than 5 minutes. These requirements are specified in 13 CCR 2449(d)(3).

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA	Significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds
AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Non-Attainment Area under NAAQS and CAAQS	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations	No effect	Significant	Less than significant	AIR-MM-2: Implement Fugitive Dust Control Plan
AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations	No effect	Less than significant	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10
AIR-7: Create Objectionable Odors Affecting a Substantial Number of People	Less than significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents

Effect AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan

Effect AIR-1 under Alternative 2 would be similar to Alternative 1. The 2035 Metropolitan Transportation Plan (Sacramento Area Council of Government 2008) accounts for future land development and population growth in Yolo and Sacramento Counties. The air quality conformity analysis as part of the 2035 Metropolitan Transportation Plan meets the emission conformity test for the Sacramento ozone nonattainment area. Therefore, operation of Alternative 2 would not conflict with or obstruct the implementation of air quality plans. This direct effect would be less than significant. No mitigation is required.

Effect AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA

The estimated construction emissions for Alternative 2 are shown in Table 3.5-11. Alternative 2 results in slightly higher construction-related emissions in the SVAB relative to Alternative 1. As shown in Table 3.5-11, construction of Alternative 2 would exceed SMAQMD's and BAAQMD's NO_X thresholds, as well as YSAQMD's NO_X and PM10 thresholds. Therefore, construction of Alternative 2 would result in a significant effect. Mitigation Measures AIR-MM-1 through AIR-MM-3 are available to address this effect.

Table 3.5-12 shows the mitigated construction emissions with implementation of mitigation measures AIR-MM-1 through AIR-MM-3. After mitigation, construction-related emissions still would exceed the YSAQMD's emission thresholds for NO_X and PM10, exceed the SMAQMD's emission threshold for NO_X, and exceed the BAAQMD's emission threshold for NO_X. Because NO_X emissions would exceed SMAQMD's threshold after the implementation of Mitigation Measures AIR-MM-1 through AIR-MM-3, WSAFCA will be required to pay an off-site mitigation fee for NO_X emissions within the SVAB (Mitigation Measure AIR-MM-4) and SFBAAB (Mitigation Measure AIR-MM-5). With the implementation of Mitigation Measures AIR-MM-4 and AIR-MM-5, NO_X emission effects in the SVAB (both YSAQMD and SMAQMD) and SFBAAB would be reduced to a less-than-significant level. Table 3.5-13 shows the construction emissions with implementation of Mitigation Measures AIR-MM-1 through AIR-MM-5.

While AIR-MM-1 through AIR-MM-5 would reduce NO_X emissions in the YSAQMD, BAAQMD, and SMAQMD to less than significant, PM10 emissions in YSAQMD would still exceed applicable air district thresholds. This would be a direct adverse effect. Consequently, Effect AIR-2 is significant and unavoidable within YSAQMD for daily PM10.

Table 3.5-11. Construction Emissions: Alternative 2, Unfavorable Scenario

	Annual Emissions in Tons					**Maximum Daily Emissions in Pounds**				
Construction Year	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**PM10 Exhaust**	**PM10**	**PM2.5 Exhaust**
Emissions generated in YSAQMD										
Year 1 Onsite Construction	4.3	42.0	16.0	172.5	37.1				5,228	
Year 1 Off-site Soil Borrow	1.6	16.5	5.8	90.0	19.2				7,718	
Year 1 Total	5.8	58.6	21.8	262.6	56.3				12,946	
Year 2 Onsite Construction	2.9	27.9	10.5	102.3	22.1				3,440	
Year 2 Off-site Soil Borrow	1.0	10.4	3.7	63.2	13.4				5,267	
Year 2 Total	3.9	38.3	14.2	165.5	35.5				8,707	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	**Yes**							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.2	5.4	1.7	0.3	0.2		370			
Year 1 Off-site Soil Borrow	0.0	0.0	0.1	0.0	0.0		0.3			
Year 1 Total	0.2	5.4	1.8	0.3	0.2		370.3			

Construction Year	Annual Emissions in Tons ROG	NO_X	CO	PM10	PM2.5	Maximum Daily Emissions in Pounds ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Year 2 Onsite Construction	0.1	3.2	0.9	0.1	0.1		47.1			
Year 2 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.2			
Year 2 Total	0.1	3.2	0.9	0.1	0.1		47.3			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							**Yes**			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	4.5	47.4	17.7	0.3	37.3					
Year 1 Off-site Soil Borrow	1.6	16.6	5.9	0.0	19.2					
Year 1 Total	6.0	63.9	23.6	0.3	56.5					
Year 2 Onsite Construction	3.0	31.1	11.4	0.3	22.1					
Year 2 Off-site Soil Borrow	1.0	10.4	3.7	0.0	13.4					
Year 2 Total	4.0	41.5	15.1	0.3	35.6					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	**Yes**	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.1	3.5	1.3	0.2	0.2	12.9	340	18.6		17.9
Year 2	0.1	1.4	0.5	0.1	0.1	1.8	48.6	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	**Yes**	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.

[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.

[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Table 3.5-12. Mitigated Construction Emissions with AIR-MM-1 through AIR-MM-3: Alternative 2, Unfavorable Scenario

Construction Year	Annual Emissions in Tons ROG	NO_X	CO	PM10	PM2.5	Maximum Daily Emissions in Pounds ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in YSAQMD										
Year 1 Onsite Construction	4.3	31.3	16.0	10.9	2.7				328	
Year 1 Off-site Soil Borrow	1.6	12.7	5.8	5.6	1.3				484	
Year 1 Total	5.8	44.1	21.8	16.6	4.0				812	
Year 2 Onsite Construction	2.9	21.2	10.5	6.6	1.6				212	
Year 2 Off-site Soil Borrow	1.0	8.1	3.7	3.9	0.9				328	
Year 2 Total	3.9	29.3	14.2	10.5	2.5				539	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	**Yes**							**Yes**	

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**PM10 Exhaust**	**PM10**	**PM2.5 Exhaust**
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.2	4.6	1.7	0.2	0.2		294			
Year 1 Off-site Soil Borrow	0.0	0.0	0.1	0.0	0.0		0.3			
Year 1 Total	0.2	4.6	1.8	0.2	0.2		294.3			
Year 2 Onsite Construction	0.1	2.9	0.9	0.1	0.1		47.1			
Year 2 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.2			
Year 2 Total	0.1	2.9	0.9	0.1	0.1		47.3			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							**Yes**			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	4.5	35.9	17.7	0.2	2.9					
Year 1 Off-site Soil Borrow	1.6	12.7	5.9	0.0	1.3					
Year 1 Total	6.0	48.7	23.6	0.2	4.2					
Year 2 Onsite Construction	3.0	24.1	11.4	0.1	1.7					
Year 2 Off-site Soil Borrow	1.0	8.1	3.7	0.0	0.9					
Year 2 Total	4.0	32.2	15.1	0.1	2.6					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	**Yes**	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.1	2.6	1.3	0.2	0.2	12.9	253	18.6		17.1
Year 2	0.1	1.1	0.5	0.1	0.1	1.8	36.1	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	**Yes**	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.
[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.
[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Table 3.5-13. Mitigated Construction Emissions with AIR-MM-1 through AIR-MM-5: Alternative 2, Unfavorable Scenario

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**PM10 Exhaust**	**PM10**	**PM2.5 Exhaust**
Emissions generated in YSAQMD										
Year 1 Onsite Construction	4.3	0	16.0	10.9	2.7				328	
Year 1 Off-site Soil Borrow	1.6	0	5.8	5.6	1.3				484	
Year 1 Total	5.8	0	21.8	16.6	4.0				812	

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Year 2 Onsite Construction	2.9	0	10.5	6.6	1.6				212	
Year 2 Off-site Soil Borrow	1.0	0	3.7	3.9	0.9				328	
Year 2 Total	3.9	0	14.2	10.5	2.5				539	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	No							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.2	0	1.7	0.2	0.2		0			
Year 1 Off-site Soil Borrow	0.0	0	0.1	0.0	0.0		0			
Year 1 Total	0.2	0	1.8	0.2	0.2		0			
Year 2 Onsite Construction	0.1	0	0.9	0.1	0.1		0			
Year 2 Off-site Soil Borrow	0.0	0	0.0	0.0	0.0		0			
Year 2 Total	0.1	0	0.9	0.1	0.1		0			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							No			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	4.5	0	17.7	0.2	2.9					
Year 1 Off-site Soil Borrow	1.6	0	5.9	0.0	1.3					
Year 1 Total	6.0	0	23.6	0.2	4.2					
Year 2 Onsite Construction	3.0	0	11.4	0.1	1.7					
Year 2 Off-site Soil Borrow	1.0	0	3.7	0.0	0.9					
Year 2 Total	4.0	0	15.1	0.1	2.6					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	No	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.1	2.6	1.3	0.2	0.2	12.9	53	18.6		17.1
Year 2	0.1	1.1	0.5	0.1	0.1	1.8	36.1	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	No	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.
[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.
[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Effect AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA

As shown in Table 3.5-11, annual construction emissions in the SVAB under Alternative 2, which are slightly higher than Alternative 1, would exceed the General Conformity threshold for NO_X in the SVAB, resulting in a significant adverse effect. Implementation of Mitigation Measures AIR-MM-1 and AIR-MM-3, described above, would reduce annual NO_X emissions, but not to a level below the General Conformity *de minimis* threshold. If Alternative 2 is selected as the APA, a general conformity determination must be made to demonstrate that total direct and indirect emissions of NO_X would conform to the appropriate SVAB ozone SIP for each year of construction. Mitigation Measure AIR-MM-4 would ensure the conformity requirements are met by fully offsetting construction-related NO_X emissions in the SVAB to zero. Therefore, this direct effect would be reduced to a less-than-significant level.

Effect AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Nonattainment Area under NAAQS and CAAQS

Long-term cumulative air quality effects under Alternative 2 would be similar to Alternative 1. As shown in Table 3.5-11, construction of Alternative 2 would exceed SMAQMD's and BAAQMD's NO_X thresholds, as well as YSAQMD's NO_X and PM10 thresholds. Emissions in excess of applicable air district thresholds have the potential to result in a significant cumulative impact on regional air quality. Implementation of AIR-MM-1 through AIR-MM-5 would reduce NO_X emissions in the YSAQMD, BAAQMD, and SMAQMD to less than significant. However, PM10 emissions in YSAQMD would still exceed applicable air district thresholds even after implementation of Mitigation Measures AIR-MM-1 through AIR-MM-5 (Table 3.5-13). This would be a direct adverse effect. Consequently, construction of Alternative 2 would result in a significant and unavoidable cumulative impact in YSAQMD for PM10.

Effect AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations

Construction of Alternative 2 would result in slightly higher short-term dust emissions from grading and earthmoving activities in the SVAB relative to Alternative 1. Nearby land uses, especially those residences located downwind of the project sites, could be exposed to dust generated during construction activities, indirectly resulting in potential adverse health effects. This indirect effect would be significant. Implementation of Mitigation Measure AIR-MM-2 would reduce dust emissions during construction to a less-than-significant level.

Effect AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations

Construction of Alternative 2 would result in slightly higher short-term DPM emissions in the SVAB relative to Alternative 1. Nearby land uses, especially those residences located downwind of the project sites, could be exposed to DPM generated during construction activities, indirectly resulting in potential adverse health effects. However, construction activities along each segment are not expected to take place for more than 2 years, which is well below the 70-year exposure period often assumed in chronic health risk assessment. Moreover, sensitive receptors are not located in proximity to the construction area, construction activities would occur linearly along the segment alignment and would not occur over a prolonged period in any one general location, and all off-road diesel equipment would comply with ARB regulations regarding consecutive idling. Indirect health effects would be less than significant (Jones pers. comm. 2012). In addition, implementation of Mitigation Measure AIR-MM-1, which is required under other air quality effects, would further reduce exhaust emissions during construction.

Effect AIR-7: Create Objectionable Odors Affecting a Substantial Number of People

Odors associated with diesel exhaust emissions from onsite construction equipment in the SVAB may be slightly higher than Alternative 1. These odors may be noticeable from time to time by adjacent receptors. However, the odors would be intermittent and temporary and would dissipate rapidly from the source with an increase in distance. Furthermore, as required by ARB regulation, no in-use off-road diesel vehicles may idle for more than 5 consecutive minutes. Therefore, this direct effect would be less than significant. In addition, implementation of Mitigation Measures AIR-MM-1 and AIR-MM-3, which are required under other air quality effects, would further reduce exhaust emissions and provide advance notification of construction activities.

3.5.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on air quality (Table 3.5-14).

Table 3.5-14. Air Quality Effects and Mitigation Measures for Alternative 3, Unfavorable Scenario

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan	Less than significant	No effect	NA	None
AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA	Significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds

Effect	Finding Direct	Indirect	With Mitigation	Mitigation Measure
AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Non-Attainment Area under NAAQS and CAAQS	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations	No effect	Significant	Less than significant	AIR-MM-2: Implement Fugitive Dust Control Plan
AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations	No effect	Less than significant	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10
AIR-7: Create Objectionable Odors Affecting a Substantial Number of People	Less than significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents

Effect AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan

Effect AIR-1 under Alternative 3 would be similar to Alternative 1. The 2035 Metropolitan Transportation Plan (Sacramento Area Council of Government 2008) accounts for future land development and population growth in Yolo and Sacramento Counties. The air quality conformity analysis as part of the 2035 Metropolitan Transportation Plan meets the emission conformity test for the Sacramento ozone nonattainment area. Therefore, operation of Alternative 3 would not conflict with or obstruct the implementation of air quality plans. This direct effect would be less than significant. No mitigation is required.

Effect AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA

The estimated construction emissions for Alternative 3, which are slightly higher than emissions predicted for Alternative 1, are shown in Table 3.5-15. As shown in Table 3.5-15, construction of Alternative 3 would exceed SMAQMD's and BAAQMD's NO_X thresholds, as well as YSAQMD's NO_X and

PM10 thresholds. Therefore, construction of Alternative 3 would result in a significant effect. Mitigation Measures AIR-MM-1 through AIR-MM-3 are available to address this effect.

Table 3.5-16 shows mitigated construction emissions with implementation of Mitigation Measures AIR-MM-1 through AIR-MM-3. After mitigation, construction-related emissions still would exceed YSAQMD's emission thresholds for NO_X and PM10, SMAQMD's emission threshold for NO_X, and BAAQMD's emission threshold for NO_X. Because NO_X emissions would exceed SMAQMD's threshold after the implementation of Mitigation Measures AIR-MM-1 through AIR-MM-3, WSAFCA will be required to pay an off-site mitigation fee for NO_X emissions in the SVAB (Mitigation Measure AIR-MM-4) and SFBAAB (Mitigation Measure AIR-MM-5). With the implementation of Mitigation Measures AIR-MM-4 and AIR-MM-5, NO_X emission effects in the SVAB (both YSAQMD and SMAQMD) and SFBAAB would be reduced to a less-than-significant level. Table 3.5-17 shows the construction emissions with implementation of Mitigation Measures AIR-MM-1 through AIR-MM-5.

While AIR-MM-1 through AIR-MM-5 would reduce NO_X emissions in YSAQMD, BAAQMD, and SMAQMD to less than significant, PM10 emissions in YSAQMD would still exceed applicable air district thresholds. This would be a direct adverse effect. Consequently, Effect AIR-2 is significant and unavoidable in YSAQMD for daily PM10.

Table 3.5-15. Construction Emissions: Alternative 3, Unfavorable Scenario

	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
Construction Year	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**PM10 Exhaust**	**PM10**	**PM2.5 Exhaust**
Emissions generated in YSAQMD										
Year 1 Onsite Construction	3.4	34.5	12.9	114.6	24.9				7,382	
Year 1 Off-site Soil Borrow	1.5	17.1	5.3	93.2	19.9				6,906	
Year 1 Total	4.9	51.5	18.2	207.8	44.7				14,288	
Year 2 Onsite Construction	1.8	17.8	6.9	56.5	12.3				3,385	
Year 2 Off-site Soil Borrow	0.7	7.8	2.4	45.9	9.8				3,384	
Year 2 Total	2.5	25.6	9.2	102.4	22.0				6,69	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	**Yes**							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.3	7.8	2.8	0.4	0.3		381			
Year 1 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.3			
Year 1 Total	0.3	7.8	2.8	0.4	0.3		381.3			
Year 2 Onsite Construction	0.1	3.6	1.3	0.2	0.2		84.6			
Year 2 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.1			
Year 2 Total	0.1	3.6	1.3	0.2	0.2		84.7			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							**Yes**			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	3.7	42.2	15.6	0.4	25.2					
Year 1 Off-site Soil Borrow	1.5	17.1	5.4	0.0	19.9					
Year 1 Total	5.2	59.3	21.0	0.4	45.1					

Construction Year	Annual Emissions in Tons ROG	NOx	CO	PM10	PM2.5	Maximum Daily Emissions in Pounds ROG	NOx	PM10 Exhaust	PM10	PM2.5 Exhaust
Year 2 Onsite Construction	2.0	21.3	8.1	0.2	12.4					
Year 2 Off-site Soil Borrow	0.7	7.8	2.4	0.0	9.8					
Year 2 Total	2.6	29.1	10.5	0.2	22.2					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	**Yes**	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.3	7.0	2.6	0.4	0.3	16.6	438	23.9		22.0
Year 2	0.1	3.1	1.2	0.2	0.2	3.7	97.3	5.3		4.9
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	**Yes**	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.
[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.
[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Table 3.5-16. Mitigated Construction Emissions with AIR-MM-1 through AIR-MM-3: Alternative 3, Unfavorable Scenario

Construction Year	Annual Emissions in Tons ROG	NOx	CO	PM10	PM2.5	Maximum Daily Emissions in Pounds ROG	NOx	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in YSAQMD										
Year 1 Onsite Construction	3.4	25.7	12.9	7.4	1.9				463	
Year 1 Off-site Soil Borrow	1.5	13.8	5.3	5.9	1.4				436	
Year 1 Total	4.9	39.4	18.2	13.3	3.3				899	
Year 2 Onsite Construction	1.8	13.2	6.9	3.7	0.9				208	
Year 2 Off-site Soil Borrow	0.7	6.3	2.4	2.9	0.7				212	
Year 2 Total	2.5	19.6	9.2	6.5	1.6				420	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	**Yes**							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.3	6.2	2.8	0.4	0.3		283			
Year 1 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.3			
Year 1 Total	0.3	6.2	2.8	0.4	0.3		283.3			
Year 2 Onsite Construction	0.1	2.9	1.3	0.2	0.2		73.7			
Year 2 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.1			
Year 2 Total	0.1	2.9	1.3	0.2	0.2		73.8			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							**Yes**			

Construction Year	Annual Emissions in Tons ROG	NOx	CO	PM10	PM2.5	Maximum Daily Emissions in Pounds ROG	NOx	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	3.7	31.9	15.6	0.4	2.3					
Year 1 Off-site Soil Borrow	1.5	13.8	5.4	0.0	1.4					
Year 1 Total	5.2	45.6	21.0	0.4	3.7					
Year 2 Onsite Construction	2.0	16.1	8.1	0.2	1.1					
Year 2 Off-site Soil Borrow	0.7	6.3	2.4	0.0	0.7					
Year 2 Total	2.6	22.4	10.5	0.2	1.8					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	**Yes**	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.3	5.2	2.6	0.4	0.3	16.6	325	23.9		22.0
Year 2	0.1	2.3	1.2	0.2	0.1	3.7	72.2	5.3		4.9
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	**Yes**	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.
[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.
[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Table 3.5-17. Mitigated Construction Emissions with AIR-MM-1 through AIR-MM-5: Alternative 3, Unfavorable Scenario

Construction Year	Annual Emissions in Tons ROG	NOx	CO	PM10	PM2.5	Maximum Daily Emissions in Pounds ROG	NOx	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in YSAQMD										
Year 1 Onsite Construction	3.4	0	12.9	7.4	1.9				463	
Year 1 Off-site Soil Borrow	1.5	0	5.3	5.9	1.4				436	
Year 1 Total	4.9	0	18.2	13.3	3.3				899	
Year 2 Onsite Construction	1.8	0	6.9	3.7	0.9				208	
Year 2 Off-site Soil Borrow	0.7	0	2.4	2.9	0.7				212	
Year 2 Total	2.5	0	9.2	6.5	1.6				420	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	No							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.3	0	2.8	0.4	0.3		0			
Year 1 Off-site Soil Borrow	0.0	0	0.0	0.0	0.0		0			
Year 1 Total	0.3	0	2.8	0.4	0.3		0			

	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
Construction Year	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Year 2 Onsite Construction	0.1	0	1.3	0.2	0.2		0			
Year 2 Off-site Soil Borrow	0.0	0	0.0	0.0	0.0		0			
Year 2 Total	0.1	0	1.3	0.2	0.2		0			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							No			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	3.7	0	15.6	0.4	2.3					
Year 1 Off-site Soil Borrow	1.5	0	5.4	0.0	1.4					
Year 1 Total	5.2	0	21.0	0.4	3.7					
Year 2 Onsite Construction	2.0	0	8.1	0.2	1.1					
Year 2 Off-site Soil Borrow	0.7	0	2.4	0.0	0.7					
Year 2 Total	2.6	0	10.5	0.2	1.8					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	No	No	No	No					
Emissions generated in BAAQMD/SFBAAB[b]										
Year 1	0.3	5.2	2.6	0.4	0.3	16.6	53	23.9		22.0
Year 2	0.1	2.3	1.2	0.2	0.1	3.7	53	5.3		4.9
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	No	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.

[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.

[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Effect AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA

As shown in Table 3.5-15, annual construction emissions under Alternative 3, which are slightly higher than Alternative 1, would exceed the General Conformity threshold for NO_X in the SVAB, resulting a significant adverse effect. Implementation of Mitigation Measures AIR-MM-1 and AIR-MM-3, described above, would reduce annual NO_X emissions, but not to a level below the General Conformity *de minimis* threshold. If Alternative 3 is selected as the APA, a general conformity determination must be made to demonstrate that total direct and indirect emissions of NO_X would conform to the appropriate SVAB ozone SIP for each year of construction. Mitigation Measure AIR-MM-4 would ensure the conformity requirements are met by fully offsetting construction-related NO_X emissions in the SVAB to zero. Therefore, this direct effect would be reduced to a less-than-significant level.

Effect AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Nonattainment Area under NAAQS and CAAQS

Long-term cumulative air quality effects under Alternative 3 would be similar to Alternative 1. As shown in Table 3.5-15, construction of Alternative 3 would exceed SMAQMD's and BAAQMD's NO_X thresholds, as well as YSAQMD's NO_X and PM10 thresholds. Emissions in excess of applicable air district thresholds have the potential to result in a significant cumulative impact on regional air quality. Implementation of AIR-MM-1 through AIR-MM-5 would reduce NO_X emissions in the YSAQMD, BAAQMD, and SMAQMD to less than significant. However, PM10 emissions in YSAQMD would still exceed applicable air district thresholds even after implementation of AIR-MM-1 through AIR-MM-5 (Table 3.5-17). This would be a direct adverse effect. Consequently, construction of Alternative 3 would result in a significant and unavoidable cumulative impact in YSAQMD PM10.

Effect AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations

Construction of Alternative 3 would result in slightly higher short-term dust emissions from grading and earthmoving activities than Alternative 1. Nearby land uses, especially those residences located downwind of the project sites, could be exposed to dust generated during construction activities, indirectly resulting in potential adverse health effects. This indirect effect would be significant. Implementation of Mitigation Measure AIR-MM-2 would reduce dust emissions during construction to a less-than-significant level.

Effect AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations

Construction of Alternative 3 would result in slightly higher short-term DPM emissions than Alternative 1. Nearby land uses, especially those residences located downwind to the project sites could be exposed to DPM generated during construction activities, indirectly resulting in potential adverse health effects. However, construction activities along each segment are not expected to take place for more than 2 years, which is well below the 70-year exposure period often assumed in chronic health risk assessment. Moreover, sensitive receptors are not located in proximity to the construction area, construction activities would occur linearly along the segment alignment and would not occur over a prolonged period in any one general location, and all off-road diesel equipment would comply with ARB regulations regarding consecutive idling. Indirect health effects would be less than significant (Jones pers. comm. 2012). In addition, implementation of Mitigation Measure AIR-MM-1, which is required under other air quality effects, would further reduce exhaust emissions during construction.

Effect AIR-7: Create Objectionable Odors Affecting a Substantial Number of People

Odors associated with diesel exhaust emissions from onsite construction equipment may be slightly higher than Alternative 1. These odors may be noticeable from time to time by adjacent receptors. However, the odors would be intermittent and temporary and would dissipate rapidly from the source with an increase in distance. Furthermore, as required by ARB regulation, no in-use off-road diesel vehicles may idle for more than 5 consecutive minutes. Therefore, this direct effect would be less than significant. In addition, implementation of Mitigation Measures AIR-MM-1 and AIR-MM-3, which are required under other air quality effects, would further reduce exhaust emissions and provide advance notification of construction activities.

3.5.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on air quality (Table 3.5-18).

Table 3.5-18. Air Quality Effects and Mitigation Measures for Alternative 4, Unfavorable Scenario

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan	Less than significant	No effect	NA	None
AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA	Significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds

Effect	Finding Direct	Finding Indirect	With Mitigation	Mitigation Measure
AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Non-Attainment Area under NAAQS and CAAQS	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations	No effect	Significant	Less than significant	AIR-MM-2: Implement Fugitive Dust Control Plan
AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations	No effect	Less than significant	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10
AIR-7: Create Objectionable Odors Affecting a Substantial Number of People	Less than significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents

Effect AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan

Effect AIR-1 under Alternative 4 would be similar to Alternative 1. The 2035 Metropolitan Transportation Plan (Sacramento Area Council of Government 2008) accounts for future land development and population growth in Yolo and Sacramento Counties. The air quality conformity analysis as part of the 2035 Metropolitan Transportation Plan meets the emission conformity test for the Sacramento ozone nonattainment area. Therefore, operation of Alternative 4 would not conflict with or obstruct the implementation of air quality plans. This direct effect would be less than significant. No mitigation is required.

Effect AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA

The estimated construction emissions for Alternative 4 are shown in Table 3.5-19. Alternative 4 results in slightly higher construction-related emissions in the SVAB relative to Alternative 1 but slightly lower emissions in the BAAQMD. As shown in Table 3.5-19, construction of Alternative 4 would exceed SMAQMD's NO_X threshold and the YSAQMD's NO_X and PM10 thresholds. Therefore, construction of Alternative 4 would result in a significant effect. Mitigation Measures AIR-MM-1 through AIR-MM-3 are available to address this effect.

Table 3.5-20 shows mitigated construction emissions with implementation of Mitigation Measures AIR-MM-1 through AIR-MM-3. After mitigation, construction-related emissions still would exceed the YSAQMD's emission thresholds for NO_X and PM10 and exceed the SMAQMD's emission threshold for NO_X. Because NO_X emissions would exceed SMAQMD's threshold after the implementation of Mitigation Measures AIR-MM-1 through AIR-MM-3, WSAFCA will be required to pay an off-site mitigation fee for NO_X emissions in the SVAB (Mitigation Measure AIR-MM-4) and SFBAAB (Mitigation Measure AIR-MM-5). With the implementation of Mitigation Measures AIR-MM-4 and AIR-MM-5, NO_X emission effects in the SVAB (both YSAQMD and SMAQMD) and SFBAAB would be reduced to a less-than-significant level. Table 3.5-21 shows the construction emissions with implementation of Mitigation Measures AIR-MM-1 through AIR-MM-5.

While AIR-MM-1 through AIR-MM-5 would reduce NO_X emissions in the YSAQMD and SMAQMD to less than significant, PM10 emissions in YSAQMD would still exceed applicable air district thresholds. This would be a direct adverse effect. Consequently, Effect AIR-2 is significant and unavoidable in YSAQMD for daily PM10.

Table 3.5-19. Construction Emissions: Alternative 4, Unfavorable Scenario

	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
Construction Year	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**PM10 Exhaust**	**PM10**	**PM2.5 Exhaust**
Emissions generated in YSAQMD										
Year 1 Onsite Construction	3.7	38.1	13.8	147.7	31.8				5,246	
Year 1 Off-site Soil Borrow	3.1	38.0	11.8	130.0	28.0				5,233	
Year 1 Total	6.8	76.0	25.6	277.6	59.8				10,479	
Year 2 Onsite Construction	2.6	26.2	9.8	102.2	22.0				3,440	
Year 2 Off-site Soil Borrow	1.2	14.1	4.3	43.5	9.4				3,346	
Year 2 Total	3.8	40.3	14.2	145.7	31.4				6,786	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	**Yes**							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.1	3.8	1.2	0.2	0.1		288			
Year 1 Off-site Soil Borrow	0.0	0.0	0.1	0.0	0.0		0.3			
Year 1 Total	0.1	3.8	1.3	0.2	0.1		288.3			
Year 2 Onsite Construction	0.1	3.0	0.8	0.1	0.1		47.1			
Year 2 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.2			
Year 2 Total	0.1	3.0	0.8	0.1	0.1		47.3			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							**Yes**			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	3.8	41.9	15.1	0.2	31.9					
Year 1 Off-site Soil Borrow	3.1	38.0	11.8	0.0	28.0					
Year 1 Total	6.9	79.8	26.9	0.2	60.0					

	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
Construction Year	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Year 2 Onsite Construction	2.7	29.1	10.6	0.2	22.1					
Year 2 Off-site Soil Borrow	1.2	14.1	4.4	0.0	9.4					
Year 2 Total	3.9	43.3	15.0	0.2	31.5					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	**Yes**	No	No	No					
Emissions generated in BAAQMD/SFBAAB[b]										
Year 1	0.1	2.3	0.9	0.1	0.1	9.2	243	13.2		12.2
Year 2	0.0	1.2	0.5	0.1	0.1	1.8	48.6	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	**Yes**	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.
[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.
[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Table 3.5-20. Mitigated Construction Emissions with AIR-MM-1 through AIR-MM-3: Alternative 4, Unfavorable Scenario

	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
Construction Year	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in YSAQMD										
Year 1 Onsite Construction	3.7	29.2	13.8	9.4	2.3				347	
Year 1 Off-site Soil Borrow	3.1	31.2	11.8	8.5	2.2				339	
Year 1 Total	6.8	60.3	25.6	17.9	4.5				686	
Year 2 Onsite Construction	2.6	19.9	9.8	6.5	1.6				212	
Year 2 Off-site Soil Borrow	1.2	11.5	4.3	2.8	0.7				217	
Year 2 Total	3.8	31.4	14.2	9.3	2.3				428	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	**Yes**							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.1	3.3	1.2	0.2	0.1		233			
Year 1 Off-site Soil Borrow	0.0	0.0	0.1	0.0	0.0		0.3			
Year 1 Total	0.1	3.3	1.3	0.2	0.1		233.3			
Year 2 Onsite Construction	0.1	2.7	0.8	0.1	0.1		47.1			
Year 2 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.2			
Year 2 Total	0.1	2.7	0.8	0.1	0.1		47.3			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							**Yes**			

Construction Year	Annual Emissions in Tons: ROG	NO_X	CO	PM10	PM2.5	Maximum Daily Emissions in Pounds: ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	3.8	32.4	15.1	0.2	2.5					
Year 1 Off-site Soil Borrow	3.1	31.2	11.8	0.0	2.2					
Year 1 Total	6.9	63.6	26.9	0.2	4.7					
Year 2 Onsite Construction	2.7	22.6	10.6	01	1.7					
Year 2 Off-site Soil Borrow	1.2	11.5	4.4	0.0	0.7					
Year 2 Total	3.9	34.1	15.0	0.1	2.4					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	**Yes**	No	No	No					
Emissions generated in BAAQMD/SFBAAB[b]										
Year 1	0.1	1.7	0.9	0.1	0.1	9.2	181	13.2		12.2
Year 2	0.0	0.9	0.5	0.1	0.1	1.8	36.1	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	**Yes**	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.

[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.

[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Table 3.5-21. Mitigated Construction Emissions with AIR-MM-1 through AIR-MM-5: Alternative 4, Unfavorable Scenario

Construction Year	Annual Emissions in Tons: ROG	NO_X	CO	PM10	PM2.5	Maximum Daily Emissions in Pounds: ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in YSAQMD										
Year 1 Onsite Construction	3.7	0	13.8	9.4	2.3				347	
Year 1 Off-site Soil Borrow	3.1	0	11.8	8.5	2.2				339	
Year 1 Total	6.8	0	25.6	17.9	4.5				686	
Year 2 Onsite Construction	2.6	0	9.8	6.5	1.6				212	
Year 2 Off-site Soil Borrow	1.2	0	4.3	2.8	0.7				214	
Year 2 Total	3.8	0	14.2	9.3	2.3				425	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	No							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.1	0	1.2	0.2	0.1		0			
Year 1 Off-site Soil Borrow	0.0	0	0.1	0.0	0.0		0			
Year 1 Total	0.1	0	1.3	0.2	0.1		0			

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Year 2 Onsite Construction	0.1	0	0.8	0.1	0.1		0			
Year 2 Off-site Soil Borrow	0.0	0	0.0	0.0	0.0		0			
Year 2 Total	0.1	0	0.8	0.1	0.1		0			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							No			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	3.8	0	15.1	0.2	2.5					
Year 1 Off-site Soil Borrow	3.1	0	11.8	0.0	2.2					
Year 1 Total	6.9	0	26.9	0.2	4.7					
Year 2 Onsite Construction	2.7	0	10.6	01	1.7					
Year 2 Off-site Soil Borrow	1.2	0	4.4	0.0	0.7					
Year 2 Total	3.9	0	15.0	0.1	2.4					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	No	No	No	No					
Emissions generated in BAAQMD/SFBAAB[b]										
Year 1	0.1	1.7	0.9	0.1	0.1	9.2	53	13.2		12.2
Year 2	0.0	0.9	0.5	0.1	0.1	1.8	53	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	No	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.

[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.

[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Effect AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA

As shown in Table 3.5-19, annual construction emissions in the SVAB under Alternative 4, which are slightly higher than Alternative 1, would exceed the General Conformity threshold for NO_X in the SVAB, resulting in a significant adverse effect. Implementation of Mitigation Measures AIR-MM-1 and AIR-MM-3, described above, would reduce annual NO_X emissions, but not to a level below the General Conformity *de minimis* threshold. If Alternative 4 is selected as the APA, a general conformity determination must be made to demonstrate that total direct and indirect emissions of NO_X would conform to the appropriate SVAB ozone SIP for each year of construction. Mitigation Measure AIR-MM-4 would ensure the conformity requirements are met by fully offset construction related NO_X emissions in the SVAB to zero. Therefore, the direct effect would be reduced to a less-than-significant level.

Effect AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Nonattainment Area under NAAQS and CAAQS

Long-term cumulative air quality effects under Alternative 4 would be similar to Alternative 1. As shown in Table 3.5-19, construction of Alternative 4 would exceed SMAQMD’s NO_X threshold and the YSAQMD’s NO_X and PM10 thresholds. Emissions in excess of applicable air district thresholds have the potential to result in a significant cumulative impact on regional air quality. Implementation of AIR-MM-1 through AIR-MM-5 would reduce NO_X emissions in the YSAQMD, BAAQMD, and SMAQMD to less than significant. However, PM10 emissions in YSAQMD would still exceed applicable air district thresholds even after implementation of AIR-MM-1 through AIR-MM-5 (Table 3.5-21). This would be a direct adverse effect. Consequently, construction of Alternative 4 would result in a significant and unavoidable cumulative impact in YSAQMD for PM10.

Effect AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations

Construction of Alternative 4 would result in slightly higher short-term dust emissions from grading and earthmoving activities in the SVAB, relative to Alternative 1. Nearby land uses, especially those residences located downwind of the project sites, could be exposed to dust generated during construction activities, indirectly resulting in potential adverse health effects. This indirect effect would be significant. Implementation of Mitigation Measure AIR-MM-2 would reduce dust emissions during construction to a less-than-significant level.

Effect AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations

Construction of Alternative 4 would result in slightly higher short-term DPM emissions in the SVAB, relative to Alternative 1. Nearby land uses, especially those residences located downwind of the project sites, could be exposed to DPM generated during construction activities, indirectly resulting in potential adverse health effects. However, construction activities along each segment are not expected to take place for more than 2 years, which is well below the 70-year exposure period often assumed in chronic health risk assessment. Moreover, sensitive receptors are not located in proximity to the construction area, construction activities would occur linearly along the segment alignment and would not occur over a prolonged period in any one general location, and all off-road diesel equipment would comply with ARB regulations regarding consecutive idling. Indirect health effects would be less than significant (Jones pers. comm. 2012). In addition, implementation of Mitigation Measure AIR-MM-1, which is required under other air quality effects, would further reduce exhaust emissions during construction.

Effect AIR-7: Create Objectionable Odors Affecting a Substantial Number of People

Odors associated with diesel exhaust emissions from onsite construction equipment in the SVAB may be slightly higher than Alternative 1. These odors may be noticeable from time to time by adjacent receptors. However, the odors would be intermittent and temporary and would dissipate rapidly from the source with an increase in distance. Furthermore, as required by ARB regulation, no in-use off-road diesel vehicles may idle for more than 5 consecutive minutes. Therefore, this direct effect would be less than significant. In addition, implementation of Mitigation Measures AIR-MM-1 and AIR-MM-3, which are required under other air quality effects, would further reduce exhaust emissions during construction and provide advance notification of construction activities.

3.5.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on air quality (Table 3.5-22).

Table 3.5-22. Air Quality Effects and Mitigation Measures for Alternative 5, Unfavorable Scenario

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan	Less than significant	No effect	NA	None
AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA	Significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds

Effect	Finding Direct	Finding Indirect	With Mitigation	Mitigation Measure
AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Non-Attainment Area under NAAQS and CAAQS	Significant	No effect	Significant and unavoidable	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-2: Implement Fugitive Dust Control Plan AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents AIR-MM-4: Mitigate and Offset Construction-Generated NO_X Emissions to Net Zero (0) for Emissions in Excess of General Conformity *de Minimis* Threshold (Where Applicable) and to Quantities below Applicable YSAQMD and SMAQMD CEQA Thresholds AIR-MM-5: Mitigate and Offset Construction-Generated NO_X Emissions to Quantities below Applicable BAAQMD CEQA Thresholds
AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations	No effect	Significant	Less than significant	AIR-MM-2: Implement Fugitive Dust Control Plan
AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations	No effect	Less than significant	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10
AIR-7: Create Objectionable Odors Affecting a Substantial Number of People	Less than significant	No effect	Less than significant	AIR-MM-1: Implement Measures to Reduce Exhaust Emissions of NO_X and PM10 AIR-MM-3: Provide Advance Notification of Construction Schedule and 24-Hour Hotline to Residents

Effect AIR-1: Conflict with or Obstruct Implementation of an Applicable Air Quality Plan

Effect AIR-1 under Alternative 5 would be similar to Alternative 1. The 2035 Metropolitan Transportation Plan (Sacramento Area Council of Government 2008) accounts for future land development and population growth in Yolo and Sacramento Counties. The air quality conformity analysis as part of the 2035 Metropolitan Transportation Plan meets the emission conformity test for the Sacramento ozone nonattainment area. Therefore, operation of Alternative 5 would not conflict with or obstruct the implementation of air quality plans. This direct effect would be less than significant. No mitigation is required.

Effect AIR-2: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—CEQA

The estimated construction emissions for Alternative 5 are shown in Table 3.5-23. Alternative 5 results in slightly higher construction-related emissions in the SVAB, relative to Alternative 1. As shown in Table 3.5-23, construction of Alternative 5 would exceed SMAQMD's and BAAQMD's NO_X thresholds, as well as YSAQMD's NO_X and PM10 thresholds. Therefore, construction of Alternative 5 would result in a significant effect. Mitigation Measures AIR-MM-1 through AIR-MM-3 are available to address this effect.

Table 3.5-24shows the mitigated construction emissions with implementation of Mitigation Measures AIR-MM-1 through AIR-MM-3. After mitigation, construction-related emissions still would exceed the YSAQMD's emission thresholds for NO_X and PM10, exceed the SMAQMD's emission threshold for NO_X, and exceed the BAAQMD's emission threshold for NO_X. Because NO_X emissions would exceed SMAQMD's threshold after the implementation of Mitigation Measures AIR-MM-1 through AIR-MM-3, WSAFCA will be required to pay an offsite mitigation fee for NO_X emissions within the SVAB (Mitigation Measure AIR-MM-4) and SFBAAB (Mitigation Measure AIR-MM-5). With the implementation of Mitigation Measures AIR-MM-4 and AIR-MM-5, NO_X emission effects in the SVAB (both YSAQMD and SMAQMD) and SFBAAB would be reduced to a less-than-significant level. Table 3.5-25 shows the construction emissions with implementation of Mitigation Measures AIR-MM-1 through AIR-MM-5.

While AIR-MM-1 through AIR-MM-5 would reduce NO_X emissions in the YSAQMD, BAAQMD, and SMAQMD to less than significant, PM10 emissions in YSAQMD would still exceed applicable air district thresholds. This would be a direct adverse effect. Consequently, Effect AIR-2 is significant and unavoidable within YSAQMD for daily PM10.

Table 3.5-23. Construction Emissions: Alternative 5, Unfavorable Scenario

	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
Construction Year	**ROG**	**NO_X**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_X**	**PM10 Exhaust**	**PM10**	**PM2.5 Exhaust**
Emissions generated in YSAQMD										
Year 1 Onsite Construction	4.1	40.2	15.4	172.5	37.1				5,230	
Year 1 Off-site Soil Borrow	1.6	16.5	5.8	90.0	19.2				7,718	
Year 1 Total	5.7	56.7	21.2	262.5	56.3				12,948	
Year 2 Onsite Construction	3.2	31.4	11.8	113.4	24.5				3,434	
Year 2 Off-site Soil Borrow	1.0	10.4	3.7	63.2	13.4				5,267	
Year 2 Total	4.2	41.8	15.5	176.6	37.9				8,701	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	**Yes**							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.2	5.1	1.7	0.2	0.2		361			
Year 1 Off-site Soil Borrow	0.0	0.0	0.1	0.0	0.0		0.3			
Year 1 Total	0.2	5.1	1.7	0.2	0.2		361.3			
Year 2 Onsite Construction	0.1	3.5	0.9	0.1	0.1		94.8			
Year 2 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.2			
Year 2 Total	0.1	3.5	0.9	0.1	0.1		95.0			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							**Yes**			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	4.3	45.3	17.1	0.2	37.3					
Year 1 Off-site Soil Borrow	1.6	16.6	5.9	0.0	19.2					
Year 1 Total	5.9	61.8	22.9	0.2	56.5					

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Year 2 Onsite Construction	3.3	34.9	12.7	0.1	24.6					
Year 2 Off-site Soil Borrow	1.0	10.4	3.7	0.0	13.4					
Year 2 Total	4.3	45.3	16.4	0.1	38.0					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	**Yes**	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.1	3.5	1.3	0.2	0.2	11.1	292	16.0		14.7
Year 2	0.1	1.4	0.5	0.1	0.1	1.8	48.6	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	**Yes**	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.
[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.
[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Table 3.5-24. Mitigated Construction Emissions with AIR-MM-1 through AIR-MM-3: Alternative 5, Unfavorable Scenario

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in YSAQMD										
Year 1 Onsite Construction	4.1	29.9	15.4	10.9	2.7				328	
Year 1 Off-site Soil Borrow	1.6	12.7	5.8	5.6	1.3				484	
Year 1 Total	5.7	42.6	21.2	16.5	4.0				812	
Year 2 Onsite Construction	3.2	23.8	11.8	7.3	1.8				214	
Year 2 Off-site Soil Borrow	1.0	8.1	3.7	3.9	0.9				328	
Year 2 Total	4.2	31.9	15.5	11.2	2.7				541	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	**Yes**							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.2	4.3	1.7	0.2	0.2		296			
Year 1 Off-site Soil Borrow	0.0	0.0	0.1	0.0	0.0		0.3			
Year 1 Total	0.2	4.3	1.7	0.2	0.2		296.3			
Year 2 Onsite Construction	0.1	3.1	0.9	0.1	0.1		94.8			
Year 2 Off-site Soil Borrow	0.0	0.0	0.0	0.0	0.0		0.2			
Year 2 Total	0.1	3.1	0.9	0.1	0.1		95.0			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							**Yes**			

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	4.3	34.2	17.1	0.2	2.9					
Year 1 Off-site Soil Borrow	1.6	12.7	5.9	0.0	1.3					
Year 1 Total	5.9	46.9	22.9	0.2	4.2					
Year 2 Onsite Construction	3.3	27.0	12.7	0.1	1.9					
Year 2 Off-site Soil Borrow	1.0	8.1	3.7	0.0	0.9					
Year 2 Total	4.3	35.0	16.4	0.1	2.8					
General Conformity *de Minimis* Threshold	25	25	100	100	100					
Exceed Threshold?	No	**Yes**	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.1	2.6	1.3	0.2	0.2	11.1	217	16.0		14.7
Year 2	0.1	1.1	0.5	0.1	0.1	1.8	36.1	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	**Yes**	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.

[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.

[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Table 3.5-25. Mitigated Construction Emissions with AIR-MM-1 through AIR-MM-5: Alternative 5, Unfavorable Scenario

Construction Year	Annual Emissions in Tons					Maximum Daily Emissions in Pounds				
	ROG	NO_X	CO	PM10	PM2.5	ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Emissions generated in YSAQMD										
Year 1 Onsite Construction	4.1	0	15.4	10.9	2.7				328	
Year 1 Off-site Soil Borrow	1.6	0	5.8	5.6	1.3				484	
Year 1 Total	5.7	0	21.2	16.5	4.0				812	
Year 2 Onsite Construction	3.2	0	11.8	7.3	1.8				214	
Year 2 Off-site Soil Borrow	1.0	0	3.7	3.9	0.9				328	
Year 2 Total	4.2	0	15.5	11.2	2.7				541	
CEQA Threshold	10	10	NA	NA	NA				80	
Exceed Threshold?	No	No							**Yes**	
Emissions generated in SMAQMD[a]										
Year 1 Onsite Construction	0.2	0	1.7	0.2	0.2		0			
Year 1 Off-site Soil Borrow	0.0	0	0.1	0.0	0.0		0			
Year 1 Total	0.2	0	1.7	0.2	0.2		0			

Construction Year	Annual Emissions in Tons: ROG	NO_X	CO	PM10	PM2.5	Maximum Daily Emissions in Pounds: ROG	NO_X	PM10 Exhaust	PM10	PM2.5 Exhaust
Year 2 Onsite Construction	0.1	0	0.9	0.1	0.1		0			
Year 2 Off-site Soil Borrow	0.0	0	0.0	0.0	0.0		0			
Year 2 Total	0.1	0	0.9	0.1	0.1		0			
CEQA Threshold	NA	NA	NA	NA	NA		85			
Exceed Threshold?							No			
Emissions generated in SVAB (YSAQMD and SMAQMD[b]) subject to conformity										
Year 1 Onsite Construction	4.3	0	17.1	0.2	2.9					
Year 1 Off-site Soil Borrow	1.6	0	5.9	0.0	1.3					
Year 1 Total	5.9	0	22.9	0.2	4.2					
Year 2 Onsite Construction	3.3	0	12.7	0.1	1.9					
Year 2 Off-site Soil Borrow	1.0	0	3.7	0.0	0.9					
Year 2 Total	4.3	0	16.4	0.1	2.8					
General Conformity *de Minimis* Threshold	25	10	100	100	100					
Exceed Threshold?	No	No	No	No	No					
Emissions generated in BAAQMD/SFBAAB[c]										
Year 1	0.1	2.6	1.3	0.2	0.2	11.1	53	16.0		14.7
Year 2	0.1	1.1	0.5	0.1	0.1	1.8	53	2.7		2.4
CEQA Threshold						54	54	82		54
Exceed Threshold?						No	No	No		No
General Conformity *de Minimis* Threshold	50	100	100	NA	100					
Exceed Threshold?	No	No	No		No					

[a] No earthmoving activities are expected to occur within the SMAQMD. Therefore, the analysis of effects within the SMAQMD does not evaluate fugitive dust emissions and evaluates exhaust-related NO_X emissions only.

[b] PM10 emissions are for those within Sacramento County (SMAQMD), as Yolo County (YSAQMD) is an attainment area for PM10 and is not subject to general conformity requirements for PM10.

[c] Only on-water exhaust emissions generated from towboats are expected to occur within the BAAQMD.

Effect AIR-3: Violate Any Air Quality Standard or Substantial Contribution to Existing or Projected Air Quality Violation—NEPA

As shown in Table 3.5-23, annual construction emissions under Alternative 5 would exceed the General Conformity thresholds for NO_X in the SVAB, resulting in a significant adverse effect. With the implementation of Mitigation Measures AIR-MM-1 and AIR-MM-3, described above, annual construction emissions would still exceed the General Conformity *de minimis* threshold for NO_X within the SVAB, as shown in Table 3.5-24. Since project emissions exceed the Federal *de minimis* threshold for NO_X, a general conformity determination must be made to demonstrate that total direct and indirect emissions of NO_X would conform to the appropriate SVAB ozone SIP for each year of construction.

As shown in Appendix D, WSAFCA demonstrated that project emissions generated by Alternative 5, would not result in a net increase in regional NO_X emissions, as construction-related NO_X emissions would be fully offset to zero through implementation of Mitigation Measure AIR-MM-4 after the implementation of feasible onsite mitigation as described in Mitigation Measure AIR-MM-1. Mitigation Measure AIR-MM-4 will ensure the requirements of the mitigation and offset program are implemented and conformity requirements are met. Therefore, this direct effect would be reduced to a less-than-significant level.

Effect AIR-4: Result in a Cumulatively Considerable Net Increase of Any Criteria Pollutant for Which the Project Region is a Nonattainment Area under NAAQS and CAAQS

Cumulative air quality effects under Alternative 5 would be similar to Alternative 1. Construction of Alternative 5 would result in a significant cumulative impact for NO_X in the SMAQMD and BAAQMD, and NO_X and PM10 in the YSAQMD. Implementation of AIR-MM-1 through AIR-MM-5 would reduce NO_X emissions in the YSAQMD, BAAQMD, and SMAQMD to less than significant. However, PM10 emissions in YSAQMD would still exceed applicable air district thresholds even after implementation of AIR-MM-1 through AIR-MM-5 (Table 3.5-25). This would be a direct adverse effect. Consequently, construction of Alternative 5 would result in a significant and unavoidable cumulative impact in YSAQMD for daily PM10.

Effect AIR-5: Expose Sensitive Receptors to Substantial Fugitive Dust Concentrations

Construction of Alternative 5 would result in slightly higher short-term dust emissions from grading and earth moving activities in the SVAB, relative to Alternative 1. Nearby land uses, especially those residences located downwind of the project sites, could be exposed to dust generated during construction activities, indirectly resulting in potential adverse health effects. This indirect effect would be significant. Implementation of Mitigation Measure AIR-MM-2 would reduce dust emissions during construction to a less than significant level.

Effect AIR-6: Expose Sensitive Receptors to Substantial Diesel Particulate Matter Concentrations

Construction of Alternative 5 would result in slightly higher short-term DPM emissions in the SVAB, relative to Alternative 1. Nearby land uses, especially those residences located downwind of the project sites, could be exposed to DPM generated during construction activities, indirectly resulting in potential adverse health effects. However, construction activities along each segment are not expected to take place for more than 2 years, which is well below the 70-year exposure period often assumed in chronic health risk assessment. Moreover, sensitive receptors are not located in proximity to the construction area, construction activities would occur linearly along the segment alignment and would not occur over a prolonged period in any one general location, and all off-road diesel equipment would comply with ARB regulations regarding consecutive idling. Indirect health effects would be less than significant (Jones pers. comm. 2012). In addition, implementation of Mitigation Measure AIR-MM-1, which is required under other air quality effects, would further reduce exhaust emissions during construction.

Effect AIR-7: Create Objectionable Odors Affecting a Substantial Number of People

Odors associated with diesel exhaust emissions from onsite construction equipment in the SVAB may be slightly higher than Alternative 1. These odors may be noticeable from time to time by adjacent receptors. However, the odors would be intermittent and temporary and would dissipate rapidly from the source with an increase in distance. Furthermore, as required by ARB regulation, no in-use off-road diesel vehicles may idle for more than 5 consecutive minutes. Therefore, this direct effect would be less than significant. In addition, implementation of Mitigation Measures AIR-

MM-1 and AIR-MM-3, which are required under other air quality effects, would further reduce exhaust emissions and provide advance notification of construction activities.

3.6 Climate Change

3.6.1 Affected Environment

This section describes the affected environment for climate change in the Southport project area.

3.6.1.1 Regulatory Framework

Federal and State

Although climate change and GHG reduction are a concern at the Federal level, at this time, no legislation or regulations have been enacted specifically addressing GHG emissions reductions and climate change. At the state level, a variety of legislation has been enacted in California related to climate change, much of which sets aggressive goals for GHG reduction within the state. Key legislation includes Executive Order S-3-05, Assembly Bill (AB) 32, also known as the Global Warming Solutions Act, and SB 97.

Local

There are no local regulations pertaining to climate change and GHGs.

3.6.1.2 Environmental Setting

The following considerations are relevant to climate change in the proposed Southport project area.

Overview of Greenhouse Gas

Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse does. The accumulation of GHGs has been implicated as the driving force for global climate change. Examples of GHGs that are produced both by natural processes and industry include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Examples of GHGs created and emitted primarily through human activities include fluorinated gases and sulfur hexafluoride (SF_6). The primary GHGs generated by construction activities are CO_2, CH_4, and N_2O.

The Intergovernmental Panel on Climate Change (IPCC) estimates that CO_2 accounts for more than 75% of all anthropogenic (human-made) GHG emissions. Three quarters of anthropogenic CO_2 emissions are the result of fossil-fuel burning, and approximately one quarter results from land use change (Intergovernmental Panel on Climate Change 2007). CH_4 is the second-largest contributor of anthropogenic GHG emissions. It results from growing rice, raising cattle, combustion, and mining coal (National Oceanic and Atmospheric Administration 2005). N_2O, although not as abundant as CO_2 or CH_4, is a powerful GHG. Sources of N_2O include agricultural processes, nylon production, fuel-fired power plants, nitric acid production, and vehicle emissions.

GHG emissions other than CO_2 are commonly converted into carbon dioxide equivalents (CO_2e), which take into account the differing global warming potential (GWP) of different gases. For example, the IPCC finds that N_2O has a GWP of 310 and CH_4 has a GWP of 21. Thus, emissions of 1 metric ton of N_2O and 1 metric ton of CH_4 are represented as the emissions of 310 metric tons and

21 metric tons of CO_2e (MT CO_2e), respectively. This method allows the summation of different GHG emissions into a single total.

Greenhouse Gas Emissions Inventories

A GHG inventory is a quantification of GHG emissions and sinks within a selected physical and/or economic boundary over a specified time. GHG inventories can be performed on a large scale (i.e., for global and national entities) or on a small scale (i.e., for a particular building or person).

Many GHG emission and sink specifications are complicated to evaluate because natural processes may dominate the carbon cycle. Although some emission sources and processes are easily characterized and well understood, some components of the GHG budget (i.e., the balance of GHG sources and sinks) are not known with accuracy. Because protocols for quantifying GHG emissions from many sources are currently under development by international, national, state, and local agencies, ad-hoc tools must be developed to quantify emissions from certain sources and sinks in the interim.

Table 3.6-1 outlines the most recent global, national, statewide, and local GHG inventories to help contextualize the magnitude of potential project-related emissions.

Table 3.6-1. Global, National, State, and Local GHG Emissions Inventories

Emissions Inventory	CO_2e (metric tons)
2004 IPCC Global GHG Emissions Inventory	49,000,000,000
2009 EPA National GHG Emissions Inventory	6,633,200,000
2008 ARB State GHG Emissions Inventory	477,740,000
2008 Yolo County GHG Emissions Inventory[a]	651,740
2005 Sacramento County GHG Emissions Inventory	13,925,537

Sources: Intergovernmental Panel on Climate Change 2007; U.S. Environmental Protection Agency 2011a; California Air Resources Board 2010; Yolo County 2011; ICF Jones & Stokes 2009.

[a] Only includes emissions associated with the unincorporated county.

Climate Change Effects on the Sacramento Area

Climate change is a complex phenomenon that has the potential to alter local climatic patterns and meteorology. Although modeling indicates that climate change will result in sea level rise, changes in regional climate and rainfall, and other things, a high degree of scientific uncertainty still exists with regard to characterizing future climate characteristics and predicting how various ecological and social systems will react to any changes in the existing climate at the local level. Regardless of this uncertainty, it is widely understood that some form of climate change is expected to occur in the future.

Several recent studies have attempted to characterize future climatic scenarios for the state. While specific estimates and statistics on the severity of changes vary, sources agree that the Sacramento Valley will witness warmer temperatures, increased heat waves, and changes in rainfall patterns. Specifically, the CEC estimates that average annual temperatures in the valley will increase by approximately 1°C to 3°C between 2010 and mid-century. Climatic models also predict that between 2035 and 2064, the number of heat wave days will increase by more than 100, relative to the previous 30-year period between 2005 and 2034. Annual precipitation is expected to witness a declining trend, but remain highly variable, suggesting that the Sacramento Valley will be vulnerable to increased drought. Warmer temperatures and increased precipitation in the form of rain are expected to result in decreased snowpack in the Sierra Nevada. Such effects will translate into earlier snowmelt and increased potential for flooding as a result of insufficient reservoir capacity to retain earlier snowmelt (Intergovernmental Panel on Climate Change 2007; California Natural Resources Agency 2009; California Energy Commission 2009).

Sea level rise during the next 50 years is expected to increase dramatically over historical rates. The CEC predicts that by 2050, sea level rise, relative to the 2000 level, will range from 30 centimeters (cm) to 45 cm. Coastal sea level rise could result in saltwater intrusion to the Delta and associated biological impacts in the Sacramento Valley. Changes in soil moisture and increased risk of wildfires also may dominate future climatic conditions in the project area (Intergovernmental Panel on Climate Change 2007; California Natural Resources Agency 2009; California Energy Commission 2009).

3.6.2 Environmental Consequences

This section describes the environmental consequences relating to climate change for the Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative. Additional information on the project construction information and technical modeling procedures used to quantify climate change effects is provided in Appendix D.

3.6.2.1 Assessment Methods

As discussed in Section 3.5, Air Quality, almost all air pollutant emissions associated with the project would be generated by construction-related activities. After the project is constructed, operation and maintenance of the project facilities would generally be performed as needed. Maintenance work is less extensive than the construction activities and takes place over a few days per year. In addition, operation and maintenance activities are part of the existing environmental baseline and thus would not create a substantial source of new emissions. Consequently, operation of the project would not result in any adverse effects under NEPA or significant impacts under CEQA related to GHG emissions and are not quantified in this analysis because they are part of the existing environmental baseline. The assessment, therefore, focuses on evaluating GHG impacts from construction activities.

GHG emissions from project construction would result from fuel usage by off-road equipment, on-road vehicles, and on-water towboats and from electricity consumption by office trailers. For the GHG analysis, the project alternatives were evaluated using conservative construction scenarios referred to as “unfavorable scenarios” to estimate the maximum construction emissions generated by each alternative. The unfavorable scenarios assumed all excavated material and demolished debris would be hauled off site and would not be reused for the project, which would result in longer construction schedule requiring additional equipment, and longer truck hauling trips, resulting in larger fleet sizes and associated emissions when compared to the favorable scenarios. Detailed assumptions of the construction data for unfavorable scenarios are provided in Appendix D. The primary GHG emissions generated from these sources would be CO_2, CH_4, and N_2O. Models, tools, and assumptions used to calculate the GHG emissions are described below.

- **Off-Road Equipment:** CO_2 emissions generated from onsite construction equipment were estimated using the URBEMIS 2007 (Version 9.2.4) emissions model, following the same assumptions described in Section 3.5. URBEMIS does not quantify CH_4 and N_2O emissions from off-road equipment. Emissions of CH_4 and N_2O from off-road diesel-powered equipment were determined by scaling the estimated CO_2 emissions by the CH_4/CO_2 ratio and N_2O/CO_2 ratio. The ratios are calculated from CO_2, CH4, and N_2O emissions expected per gallon of diesel fuel according to the Climate Action Registry (2009).
- **On-Road Vehicles:** CO_2 emissions generated from the on-road vehicle trips were estimated using the EMFAC 2011 emissions model, following the same assumptions described in Section 3.5. EMFAC does not quantify CH_4 and N_2O emissions from vehicle trips. Emissions of CH4 and N2O from on-road diesel-powered sources (e.g., haul trucks) were determined using the emission factors published in the General Reporting Protocol Version 3.1 (California Climate Action Registry 2009). GHG emissions from gasoline-powered employee commutes were determined by dividing the CO_2 emissions by 0.95. This statistic is based on EPA's recommendation that CH_4, N_2O, and other GHG emissions account for 5% of on-road emissions (U.S. Environmental Protection Agency 2011b).
- **On-Water Towboats:** CO_2, CH_4, and N_2O emissions generated from towboats were estimated using emission factors and the load factor developed for EPA (2009), following the same assumptions described in Section 3.5.
- **Office Trailers:** There would be three office trailers operating 9 hours per day from April 15 to November 1 for the entire project. CO_2, CH_4, and N_2O emissions generated from electricity usage of the office trailers estimated using the emission factors published by the EPA (2012).

3.6.2.2 Determination of Effects

For this analysis, an environmental effect was considered potentially significant related to climate change if it would result in any of the effects listed below. These effects are based on common NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

- Generate GHG emissions that may have a significant effect on the environment.
- Conflict with an applicable plan adopted for the purpose of reducing GHG emissions.

The YSAQMD, SMAQMD, and BAAQMD have local jurisdiction over the project area. All three air districts do not recommend a GHG emission threshold for construction-related emissions. However, based on the CEQA guidelines established by each district, the districts recommend that GHG emissions from construction activities be quantified and disclosed, a determination regarding the significance of these GHG emissions be made based on a threshold determined by lead agency, and BMPs be incorporated to reduce GHG emissions during construction, as feasible and applicable. (Yolo-Solano Air Quality Management District 2007; Sacramento Metropolitan Air Quality Management District 2011; Bay Area Air Quality Management District 2010.)

Based on consultation with the YSAQMD, the district recommended that the BAAQMD's GHG threshold for stationary sources (10,000 MT CO_2e) is an appropriate threshold for evaluating the GHG effect of the project because the GHG emissions associated with the project would be generated mostly from the on-site equipment operation that have similar characteristics as stationary sources (Jones pers. comm. 2012).

The State CEQA Guidelines are currently silent on whether CEQA evaluations should address the potential impacts of climate change on a project. However, Section 15126.2 (a) does note that the lead agency should "evaluate any potentially significant impacts of locating development in other areas susceptible to hazardous conditions." Accordingly, a lead agency should consider whether construction and operation of a project would be affected by climate change. In conducting such an evaluation, the agency should focus on the long-term impacts of the project that are more likely to experience the effects of climate change in the future. Foreseeable shifts in regional climate will likely spur changes in local patterns of flooding, wildfire potential, water availability, energy demand, environmental health, and heat-wave events (California Energy Commission 2009). Draft climate change guidance issued by the Council on Environmental Quality (CEQ) also recognizes the importance of considering climate change effects on NEPA projects (Sutley 2010).

The Court of Appeals recently found that while an EIR must analyze environmental effects that may result from a project, it is not required to examine the effects of the environment on the project (see *Ballona Wetland Foundation v. City of Los Angeles*, 201 Cal. App. 4th 455). The *Ballona* decision potentially eliminates the need for lead agencies in the fourth district to consider impacts of climate change on proposed projects. Unless binding legislation that overturns the *Ballona* decision is adopted, courts throughout the state will be presented with the case as precedent. Nonetheless, courts outside the fourth district will have the discretion to differ in their interpretation of the State CEQA Guidelines and may find that an analysis of climate change effects on proposed projects is required. Accordingly, a discussion of the issue has been included in this EIR/EIS for informational purposes in Section 3.6.3.7.

3.6.3 Effects and Mitigation Measures

3.6.3.1 No Action Alternative

The No Action Alternative is the same as that described in "Air Quality," Section 3.5.3.1. No flood risk–reduction measures would be implemented. Likewise, no construction-related effects on vegetation or wetlands would occur. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

The No Action Alternative is characterized by three possible future scenarios.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

Under modified application of the ETL as proposed in the ULDC, no vegetation would be added to the levee prism or within 15 feet of the landside and waterside levee toes. Understory vegetation that is less than 4 inches in diameter at breast height or over 12 inches high would be removed, and new volunteer vegetation would not be allowed to grow on the levee. In addition, existing vegetation would be allowed to die out within its natural lifecycle so that, over time, the levee would become covered with only grasses. Understory vegetation maintenance would be similar to current vegetation management activities, such as mowing levee grasses and thinning restoration plantings. Trees and larger shrubs would die out over a course of time, which could take 30 years or more.

Implementation of the No Action Alternative would result in the following effects on climate change (Table 3.6-2).

Table 3.6-2. Climate Change Effects and Mitigation Measures for the No Action Alternative

	Finding		
Effect	**Scenario**	**Direct**	**Indirect**
CC-NA-1: Generate GHG Emissions That May Have a Significant Effect on the Environment or Conflict with Applicable GHG Reduction Plans	No ETL	No effect	No effect
	Modified ETL	No effect	Less than significant
	Full ETL	No effect	Less than significant

Effect CC-NA-1: Generate GHG Emissions That May Have a Significant Effect on the Environment or Conflict with Applicable GHG Reduction Plans

USACE's levee vegetation policy would have an effect on long-term vegetation within the levee prism, which could influence potential sequestration of carbon. Anticipated effects on GHG emissions resulting from implementation of the three vegetation scenarios are described below.

- Full compliance with USACE's levee vegetation policy would result in the removal of a substantial amount of vegetation from the bank of the Sacramento River. Under this scenario, the greatest effects related to GHG emissions and sequestration would occur, as prohibition of woody vegetation within the levee prism would lessen the amount of carbon that would otherwise be sequestered within the woody plant mass if this scenario would not otherwise occur. In addition, GHG exhaust emissions would result from equipment used to remove woody vegetation along the levee prism. Full compliance with USACE's levee vegetation policy will therefore result in increased GHG emissions, relative to existing conditions. However, based on the level of activity required for vegetation management, as well as the anticipated effects on sequestration, net GHG emissions are not expected to exceed the BAAQMD's 10,000 metric ton significance criteria. This indirect effect is less than significant.

- If the USACE levee vegetation policy is not applied, it is assumed that the vegetation conditions at the time of this analysis would continue into the future. Under this scenario, no changes in GHG sequestration would occur. In addition, no GHG exhaust emissions from heavy equipment are anticipated to result as no vegetation removal would occur. Accordingly, there would be no effect on GHG emissions.

- Modified application of the ETL through application of the ULDC would result in a slow loss of woody vegetation along the Sacramento River South Levee. Effects related to GHG emissions and sequestration would be less than the full application scenario and less than the no application scenario, as existing vegetation would continue to exist and allowed to die out, creating a levee covered only with grasses, while understory vegetation meeting certain criteria would be removed. Under this scenario, GHG exhaust emissions would result from equipment used to remove woody vegetation along the levee prism, but to less of an extent than under the full application scenario, as less vegetation would be removed under the ULDC. Net GHG emissions are, therefore, not expected to exceed the BAAQMD's 10,000 metric ton significance criteria. This indirect effect is less than significant.

Further, the No Action Alternative does not pose any apparent conflict with the goals of AB 32, the key elements and GHG reduction measures in the Climate Change Scoping Plan, or any other plans for reduction or mitigation of GHGs. To date, no federal, state, or local agency with jurisdiction over the proposed project has adopted plans or regulations that set specific goals for emission limits or emission reductions applicable to the proposed flood risk–reduction project. Because the estimated GHG emissions from the implementation of the No Action Alternative are well below BAAQMD's significance threshold, it would not conflict with or obstruct the implementation of GHG emission reduction plans. This indirect effect is less than significant.

The City of West Sacramento's tree preservation ordinance and systemwide levee vegetation plan would facilitate the replacement of vegetation removed from the levee prism. In the event that the ordinance and plan replaces lost vegetation on a 1:1 ratio, lost GHG sequestration potential will be minimized. However, exhaust emissions associated with the three scenarios described above would still occur, as well as new exhaust emissions associated with replanting activities.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.6.3.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on climate change (Table 3.6-3).

Table 3.6-3. Climate Change Effects and Mitigation Measures for Alternative 1, Unfavorable Scenario

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment	No effect	Less than significant	Less than significant	CC-MM-1: Implement Measures to Minimize GHG Emissions during Construction
CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions	No effect	Less than significant	NA	None

Effect CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment

The YSAQMD, SMAQMD, and BAAQMD have not formally adopted GHG thresholds for construction construction-related emissions. As recommended by the YSAQMD (Jones pers. comm. 2012), the BAAQMD's threshold of 10,000 MT per year of CO_2e for stationary sources is compared against the GHG emissions generated from the entire project construction to determine Alternative 1's indirect cumulative contribution to climate change.

The construction emissions are estimated for Alternative 1 site–related activities and off-site material borrow activities based on the emission rates and assumptions described in Section 3.6.2.1, Assessment Methods. Emission sources associated with site–related activities include the off-road construction equipment operating at project sites, on-road vehicles (except vehicles associated with the material borrow) traveling to and from the project sites, towboats traveling to and from the project sites on the Sacramento River, and office trailers operating at project sites. Emission sources associated with borrow material activities include the off-road construction equipment operating at borrow sites, on-road hauling trucks traveling between borrow sites and the project sites, and workers traveling to and from the borrow sites.

The estimated construction GHG emissions, which include CO_2, CH_4, N_2O, and other GHG emissions, are shown in Table 3.6-4. As shown in Table 3.6-4, project-wide GHG emissions would be well below the BAAQMD's GHG threshold of 10,000 MT CO_2e, indicating that project-generated GHG emissions would not indirectly contribute to climate change. This indirect effect is less than significant. Implementation of Mitigation Measure CC-MM-1 would further reduce GHG emissions during construction.

Table 3.6-4. Construction GHG Emissions for All Alternatives

Construction Year	Total GHG Emissions (MT/year of CO_2e)			
	YSAQMD	**SMAQMD**	**BAAQMD**	**Project-Wide**
Alternative 1, Unfavorable Scenario				
Year 1 On-site Construction	3,195	335	169	3,699
Year 1 Off-site Soil Borrow	2,064	5	0	2,069
Year 1 Total	5,259	340	169	5,768
Year 2 On-site Construction	1,820	163	69	2,050
Year 2 Off-site Soil Borrow	1,217	3	0	1,221
Year 2 Total	3,037	166	68	3,271
Alternative 2, Unfavorable Scenario				
Year 1 On-site Construction	4,723	498	167	5,338
Year 1 Off-site Soil Borrow	1,895	5	0	1,899
Year 1 Total	6,618	503	167	7,287
Year 2 On-site Construction	3,525	377	69	3,971
Year 2 Off-site Soil Borrow	1,301	3	0	1,304
Year 2 Total	4,826	380	69	5,275
Alternative 3, Unfavorable Scenario				
Year 1 On-site Construction	3,770	554	334	4,657
Year 1 Off-site Soil Borrow	2,008	5	0	2,013
Year 1 Total	5,777	559	334	6,671
Year 2 On-site Construction	2,131	279	148	2,559
Year 2 Off-site Soil Borrow	996	3	0	998
Year 2 Total	3,127	282	148	3,557
Alternative 4, Unfavorable Scenario				
Year 1 On-site Construction	4,395	367	111	4,873
Year 1 Off-site Soil Borrow	4,551	8	0	4,559
Year 1 Total	8,946	375	111	9,432

Construction Year	Total GHG Emissions (MT/year of CO_2e)			
	YSAQMD	**SMAQMD**	**BAAQMD**	**Project-Wide**
Year 2 On-site Construction	3,274	364	57	3,695
Year 2 Off-site Soil Borrow	1,833	3	0	1,836
Year 2 Total	5,106	368	57	5,531
Alternative 5, Unfavorable Scenario				
Year 1 On-site Construction	4,512	460	167	5,138
Year 1 Off-site Soil Borrow	1,895	5	0	1,899
Year 1 Total	6,406	464	167	7,037
Year 2 On-site Construction	3,957	419	69	4,444
Year 2 Off-site Soil Borrow	1,301	3	0	1,304
Year 2 Total	5,257	422	69	5,748
BAAQMD Threshold	**–**	**–**	**–**	**10,000**
Exceed Threshold?				No

Mitigation Measure CC-MM-1: Implement Measures to Minimize GHG Emissions during Construction

The following measures could be considered to lower GHG emissions during the construction. These mitigation measures combine the currently proposed mitigation measures recommended and published by SMAQMD (2011) and BAAQMD (2010).

- Improve fuel efficiency of construction equipment.
- Perform onsite material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).
- Use electricity from utility power lines rather than fossil fuel, where appropriate.
- Encourage construction workers to carpool.
- Reduce electricity use in the construction office by using compact fluorescent bulbs, powering off computers every day, and replacing heating and cooling units with more efficient ones.
- Recycle at least 75% of construction waste and demolition debris.
- Use at least 20% of locally sourced or recycled materials for construction materials.
- Develop a plan to efficiently use water for adequate dust control.
- Comply with all applicable future GHG regulations at the time of project-level permitting and construction.

Effect CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions

Alternative 1 does not pose any apparent conflict with the goals of AB 32, the key elements and GHG reduction measures in the Climate Change Scoping Plan, or any other plans for reduction or mitigation of GHGs. To date, no federal, state, or local agency with jurisdiction over the proposed project has adopted plans or regulations that set specific goals for emission limits or emission reductions applicable to the proposed flood risk–reduction project. As described in Effect CC-1, the estimated GHG emissions from the implementation of the project were compared to BAAQMD's significance threshold. The estimated emission rates are well below the significance threshold. Therefore, the proposed project would not conflict with or obstruct the implementation of GHG emission reduction plans. This indirect effect is less than significant.

3.6.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on climate change (Table 3.6-5).

Table 3.6-5. Climate Change Effects and Mitigation Measures for Alternative 2, Unfavorable Scenario

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment	No effect	Less than significant	Less than significant	CC-MM-1: Implement Measures to Minimize GHG Emissions during Construction
CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions	No effect	Less than significant	NA	None

Effect CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment

The estimated construction emissions for Alternative 2 are shown in Table 3.6-4. While Alternative 2 would generate slightly more GHG emissions relative to Alternative 1, emissions would be well below the BAAQMD's GHG threshold. Construction-related GHG emissions are not anticipated to indirectly contribute to climate change; this indirect effect is considered less than significant. Implementation of Mitigation Measure CC-MM-1 would further reduce this effect.

Effect CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions

Effect AIR-1 under Alternative 2 would be the same as Alternative 1. Alternative 2 would not directly conflict with or obstruct the implementation of applicable GHG emission reduction plans. This indirect effect is less than significant.

3.6.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on climate change (Table 3.6-6).

Table 3.6-6. Climate Change Effects and Mitigation Measures for Alternative 3, Unfavorable Scenario

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment	No effect	Less than significant	Less than significant	CC-MM-1: Implement Measures to Minimize GHG Emissions during Construction
CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions	No effect	Less than significant	NA	None

Effect CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment

The estimated construction emissions for Alternative 3 are shown in Table 3.6-4. While Alternative 3 would generate slightly more GHG emissions relative to Alternative 1, emissions would be well below the BAAQMD's GHG threshold. Construction-related GHG emissions are not anticipated to indirectly contribute to climate change; this indirect effect is considered less than significant Implementation of Mitigation Measure CC-MM-1 would further reduce this effect.

Effect CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions

Effect AIR-1 under Alternative 3 would be the same as Alternative 1. Alternative 3 would not directly conflict with or obstruct the implementation of applicable GHG emission reduction plans. This indirect effect is less than significant.

3.6.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on climate change (Table 3.6-7).

Table 3.6-7. Climate Change Effects and Mitigation Measures for Alternative 4, Unfavorable Scenario

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment	No effect	Less than significant	Less than significant	CC-MM-1: Implement Measures to Minimize GHG Emissions during Construction
CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions	No effect	Less than significant	NA	None

Effect CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment

The estimated construction emissions for Alternative 4 are shown in Table 3.6-4. While Alternative 4 would generate slightly more GHG emissions, relative to Alternative 1, emissions would be below the BAAQMD's GHG threshold. Construction-related GHG emissions are not anticipated to indirectly contribute to climate change; this indirect effect is considered less than significant. Implementation of Mitigation Measure CC-MM-1 would further reduce this effect.

Effect CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions

Effect AIR-1 under Alternative 4 would be the same as Alternative 1. Alternative 4 would not directly conflict with or obstruct the implementation of applicable GHG emission reduction plans. This indirect effect is less than significant.

3.6.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on climate change (Table 3.6-8).

Table 3.6-8. Climate Change Effects and Mitigation Measures for Alternative 5, Unfavorable Scenario

	Finding		With	
Effect	**Direct**	**Indirect**	**Mitigation**	**Mitigation Measure**
CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment	No effect	Less than significant	Less than significant	CC-MM-1: Implement Measures to Minimize GHG Emissions during Construction
CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions	No effect	Less than significant	NA	None

Effect CC-1: Generate GHG Emissions That May Have a Significant Effect on the Environment

The estimated construction emissions for Alternative 5 are shown in Table 3.6-4. While Alternative 5 would generate slightly more GHG emissions, relative to Alternative 1, emissions would be well below the BAAQMD's GHG threshold. Construction-related GHG emissions are not anticipated to indirectly contribute to climate change; this effect is considered less than significant. Implementation of Mitigation Measure CC-MM-1 would further reduce this effect.

Effect CC-2: Conflict with an Applicable Plan, Adopted for the Purpose of Reducing GHG Emissions

Effect AIR-1 under Alternative 5 would be the same as Alternative 1. Alternative 5 would not directly conflict with or obstruct the implementation of applicable GHG emission reduction plans. This indirect effect is less than significant.

3.6.3.7 Climate Change Effects on the Project Alternatives

As discussed in Section 3.6.1.2, Environmental Setting, several indirect effects on the environment are expected throughout California as a result of global climate change. The extent of these effects is still being defined as climate modeling tools become more refined. Regardless of the uncertainty in precise predictions, it is widely understood that substantial climate change is expected to occur in the future. Potential climate change effects in California and the Sacramento area include, but are not limited to, Delta salt water intrusion, extreme heat events, increased energy consumption, increase in infectious diseases and respiratory illnesses, reduced snowpack and water supplies, increased water consumption, and potential increase in wildfires.

Global climate change could expose the No Action Alternative and project alternatives to increased rainfall runoff and flood flows in the Sacramento River or changes in rainfall and flood flow patterns. The effects of increased flood flows would be most severe for the No Action Alternative, which does not include any flood risk–reduction measures. Further, when the No Action Alternative is considered to include full or modified application of USACE levee vegetation policy, as detailed in the ETL, the removal of woody vegetation diminishes existing levels of onsite carbon sequestration that can help to offset the effects of climate change. The loss of this sequestration function under the No Action Alternative is detailed in Effect CC-NA-1: Generate GHG Emissions That May Have a Significant Effect on the Environment or Conflict with Applicable GHG Reduction Plans.

Alternatives 1 through 5, however, would be built to accommodate future flood events as a result of climate change. Consequently, the project alternatives would improve the resiliency of the levee system with respect to changing climatic conditions, potentially reducing exposure of property or persons to the effects of climate change. Because each alternative is engineered to meet a 200-year level of performance for the Southport area levees, each alternative represents an equivalent level of climate change resiliency. However, Alternatives 2, 4, and 5, the setback alternatives, include the additional benefit of increasing onsite carbon sequestration through the introduction of a substantial, long-term increase in woody vegetation in the offset habitat restoration area. Alternatives 2 and 5, which include the greatest increase in riparian woodland, would thus be expected to exhibit the highest levels of climate change resiliency.

3.7 Noise

3.7.1 Affected Environment

This section describes the affected environment for noise in the Southport project area.

3.7.1.1 Fundamentals of Noise and Vibration

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient sound level. The decibel (dB) scale is used to quantify sound intensity. Because sound pressure can vary enormously within the range of human hearing, the logarithmic decibel scale is used to keep sound intensity numbers at a convenient and manageable level.

The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called A-weighting. Because humans are less sensitive to low frequency sound than to high frequency sound, A-weighted decibel (dBA) levels deemphasize low frequency sound energy to better represent how humans hear. Table 3.7-1 summarizes typical A-weighted sound levels.

Table 3.7-1. Typical A-Weighted Sound Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower, 100 feet	70	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	
		Large business office
Quiet urban daytime	50	Dishwasher in next room
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime		
	30	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

Source: California Department of Transportation 2009.
dBA = A-weighted decibel; mph = miles per hour.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (L_{eq}), the minimum and maximum sound levels (L_{min} and L_{max}), percentile-exceeded sound levels (L_{xx}), the day-night sound level (L_{dn}), and the community noise equivalent level (CNEL). Below are brief definitions of these measurements and other terminology used in this section.

- **Sound.** A vibratory disturbance created by a vibrating object that, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Ambient noise.** The composite of noise from all sources near and far in a given environment exclusive of particular noise sources to be measured.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale that indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.

- **A-weighted decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent sound level (L_{eq}).** The average of sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period.
- **Exceedance sound level (L_{xx}).** The sound level exceeded XX% of the time during a sound level measurement period. For example, L_{90} is the sound level exceeded 90% of the time, and L_{10} is the sound level exceeded 10% of the time. L_{90} is typically considered to represent the ambient noise level.
- **Maximum and minimum sound levels (L_{max} and L_{min}).** The maximum and minimum sound levels measured during a measurement period.
- **Day-night level (L_{dn}).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.
- **Community noise equivalent level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period with 5 dB added to the A-weighted sound levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

L_{dn} and CNEL values rarely differ by more than 1 dB. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such in this assessment. In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving sound level.

For a point source such as a stationary compressor, sound attenuates based on geometry at rate of 6 dB per doubling of distance. For a line source such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance. Atmospheric conditions including wind, temperature gradients, and humidity can change how sound propagates over distance and can affect the level of sound received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface such as grass attenuates at a greater rate than sound that travels over a hard surface such as pavement. The increased attenuation is typically in the range of 1 to 2 dB per doubling of distance. Barriers such as buildings and topography that block the line of site between a source and receiver also increase the attenuation of sound over distance.

Auditory and non-auditory effects can result from excessive or chronic exposure to elevated noise levels. Auditory effects of noise on people can include temporary or permanent hearing loss. Non-auditory effects of exposure to elevated noise levels include sleep disturbance, speech interference, and psychological effects such as annoyance. Land use compatibility standards for noise typically are based on research related to these non-auditory effects.

3.7.1.2 Vibration

Operation of heavy construction equipment, particularly pile driving and other impulsive devices such as pavement breakers, creates seismic waves that radiate along the surface of the earth and downward into the earth. These surface waves can be felt as ground vibration. Vibration from operation of this equipment can result in effects ranging from annoyance of people to damage of structures. Varying geology and distance will result in different vibration levels containing different frequencies and displacements. In all cases, vibration amplitudes will decrease with increasing distance.

As seismic waves travel outward from a vibration source, they excite the particles of rock and soil through which they pass and cause them to oscillate. The actual distance that these particles move is usually only a few ten-thousandths to a few thousandths of an inch. The rate or velocity (in inches per second [in/sec]) at which these particles move is the commonly accepted descriptor of the vibration amplitude, referred to as the peak particle velocity (ppv). Table 3.7-2 summarizes typical vibration levels generated by construction equipment (Federal Transit Administration 2006).

Table 3.7-2. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 feet
Pile driver (impact)	0.644 to 1.518
Pile drive (sonic)	0.170 to 0.734
Vibratory roller	0.210
Hoe ram	0.089
Large bulldozer	0.089
Caisson drilling	0.089
Loaded trucks	0.076
Jackhammer	0.035
Small bulldozer	0.003

Source: Federal Transit Administration 2006.

Vibration amplitude attenuates over distance and is a complex function of how energy is imparted into the ground and the soil conditions through which the vibration is traveling. The following equation can be used to estimate the vibration level at a given distance for typical soil conditions. PPV_{ref} is the reference ppv at 25 feet (from Table 3.7-2):

$$PPV = PPV_{ref}\left(\frac{25}{distance}\right)^{1.5}$$

Table 3.7-3 summarizes guidelines vibration annoyance potential criteria suggested by the California Department of Transportation (Caltrans) (California Department of Transportation 2004).

Table 3.7-3. Guideline Vibration Annoyance Potential Criteria

	Maximum PPV (in/sec)	
Human Response	**Transient Sources**	**Continuous/Frequent Intermittent Sources**
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: California Department of Transportation 2004.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 3.7-4 summarizes guideline vibration damage potential criteria suggested by Caltrans (California Department of Transportation 2004).

Table 3.7-4. Guideline Vibration Damage Potential Criteria

	Maximum PPV (in/sec)	
Structure and Condition	**Transient Sources**	**Continuous/Frequent Intermittent Sources**
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: California Department of Transportation 2004.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

3.7.1.3 Regulatory Framework

Federal

There are no Federal noise or vibration regulations that apply to implementation of the Southport project.

State

There are no state policies related to noise or vibration that would apply to the implementation of the Southport project.

Local

Implementation of the proposed project may affect noise-sensitive uses in West Sacramento and in Sacramento across the Sacramento River. The following local policies related to noise may apply to implementation of the Southport project.

City of West Sacramento Noise Ordinance

The City noise ordinance is the primary enforcement tool for the operation of locally regulated noise sources, such as construction activity or outdoor recreation facilities, and is set forth in Chapter 17.32 of the City Code. The City noise ordinance sets noise level performance standards for non-transportation noise sources, which are summarized in Table 3.7-5. Examples of non-transportation noise sources are construction equipment, industrial operations, outdoor recreation facilities, HVAC units, and loading docks. The City of West Sacramento's noise ordinance does not specify an exemption for temporary daytime construction activity, so the daytime and nighttime limits specified in the noise ordinance are considered to apply to all construction associated with the proposed project. City of West Sacramento transportation noise level standards are listed in Table 3.7-6.

Table 3.7-5. City of West Sacramento Non-Transportation Noise Level Standards

		Exterior Noise Levels		Interior Noise Levels	
Land Use	**Noise Level Descriptor**	**Daytime (7:00 a.m. to 10:00 p.m.)**	**Nighttime (10:00 p.m. to 7:00 a.m.)**	**Daytime (7:00 a.m. to 10:00 p.m.)**	**Nighttime (10:00 p.m. to 7:00 a.m.)**
Residential	Hourly L_{eq}, dBA	50	45	45	35
	Max. Level, dBA	70	65	–	–
Transient lodging	Hourly L_{eq}, dBA	–	–	45	35
Hospital, nursing homes	Hourly L_{eq}, dBA	–	–	45	35
Theatres, auditoriums, music halls	Hourly L_{eq}, dBA	–	–	35	35
Churches, meeting halls	Hourly L_{eq}, dBA	–	–	40	40
Office buildings	Hourly L_{eq}, dBA	–	–	45	45
Schools, libraries, museum	Hourly L_{eq}, dBA	–	–	45	45

Note: Each noise level specified above will be lowered by 5 dB for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises. These noise level standards do not apply to residential units established in conjunction with industrial or commercials uses (e.g., caretaker dwellings).

dBA = A-weighted decibel.

L_{eq} = equivalent sound level.

Table 3.7-6. City of West Sacramento Maximum Transportation Noise Level Standards

Land Use	Outdoor Activity Areas[1] L_{dn}/CNEL, dB	Interior Spaces L_{dn}/CNEL, dB	Interior Spaces L_{eq}, dB[2]
Residential	60[3]	45	–
Transient lodging	60[3]	45	–
Hospitals, nursing homes	60[3]	45	–
Theatres, auditoriums, music halls	–	–	35
Churches, meeting halls	60[3]	–	40
Office buildings	–	–	45
Schools, libraries, museum	–	–	45
Playgrounds, neighborhood parks	70	–	–

Notes:

[1] Where the location of outdoor activity is unknown, the exterior noise level standard must be applied to the property line of the receiving land use.

[2] As determined for a typical worst-case hour during period of use.

[3] Where it is not possible to reduce noise in outdoor activity areas to 60 dB L_{dn}/CNEL or less using a practical application of the best-available noise reduction measures, an exterior noise level of up to 65 dB L_{dn}/CNEL may be allowed, provided that practical exterior noise level reduction measures have been implemented and that interior noise levels are in compliance with this table. An exterior noise level of 70 dB L_{dn}/CNEL will be allowed in the triangle specific plan area and the Washington specific plan area.

dB = decibels.

L_{dn} = day-night level.

L_{eq} = equivalent sound level.

CNEL = community noise equivalent level.

In addition, the City code stipulates that no operation may be installed that by its construction or nature habitually or consistently produces noticeable vibration beyond the property line. As discussed below, vibration from non-impact construction equipment (which typically produces steady state vibration) is not anticipated to result in a significant effect. As indicated in Table 3.7-4, human response to transient vibration sources (such as impact pile driving) typically becomes "distinctly perceptible" at or above 0.25 in/sec ppv (California Department of Transportation 2004).

West Sacramento General Plan

The primary purpose of the Noise Element of the West Sacramento General Plan is to protect city residents from the harmful effects of excessive noise (City of West Sacramento 1990). To this end, the Noise Element serves to set acceptable limits for the land use compatibility of new developments or land uses as it relates to noise exposure. The City's general plan noise element applies the noise standards in Table 3.7-5 and Table 3.7-6 as land use compatibility standards for new development.

City of Sacramento Noise Ordinance

The City of Sacramento's noise ordinance limits described below have been used in this EIS as a noise effect criterion for homes inside the city.

The City of Sacramento noise ordinance is the primary enforcement tool for the operation of locally regulated noise sources, such as construction activity, and is set forth in Chapter 8.68 of the City Code. The noise ordinance sets exterior noise level standards for noise sources that affect residential or agricultural property. These exterior noise level performance standards are summarized in Table 3.7-7. Noise associated with the erection (including excavation), demolition, alteration, or repair of any structure occurring between 7:00 a.m. and 6:00 p.m., Monday through Saturday, and between 9:00 a.m. and 6:00 p.m. on Sunday is exempted from the provisions of the City noise ordinance.

Table 3.7-7. City of Sacramento Exterior Noise Level Standards

Cumulative Duration of the Intrusive Sound in Any One Hour	Daytime[1] (7:00 a.m. to 10:00 p.m.)	Nighttime[1] (10:00 p.m. to 7:00 a.m.)
30 minutes	55	50
15 minutes	60	55
5 minutes	65	60
1 minute	70	65
Level not to be exceeded	75	70

Notes:

Each of the noise limits specified shall be reduced by 5 dBA for impulsive or simple tone noise, or for noises consisting of speech or music;

If the ambient noise level exceeds that permitted by any of the first four noise level categories, the allowable noise limit shall be increased in 5 dB increments in each category to encompass the ambient noise level. If the ambient noise level exceeds the fifth noise level category, the maximum ambient noise level shall be the noise limit for that category.

dBA = A-weighted decibel.

dB = decibel.

L_{eq} = equivalent sound level.

City of Sacramento General Plan

The Noise Element of the City of Sacramento General Plan (City of Sacramento 1988) establishes interior and exterior noise level standards for planning purposes to ensure land use compatibility for new zoned developments as it relates to noise exposure. The City of Sacramento General plan identifies 60 L_{dn} as the land use compatibility standard for single family, duplex, and mobile home residential uses. The standard for multi-family uses is 65 L_{dn}.

Yolo County Noise Ordinance

Yolo County does not have a noise ordinance or county code sections that address construction noise.

Yolo County General Plan

The noise section of the Health and Safety Element of the Yolo County General Plan (Yolo County 2009) establishes interior and exterior noise level standards for planning purposes to ensure land use compatibility for new developments as it relates to noise exposure. Sound levels in the range of 60 to 65 L_{dn} are identified as being “normally acceptable” for residential uses.

3.7.1.4 Environmental Setting

The project area is generally rural undeveloped land but includes some residential subdivisions and scattered isolated residences. Adjacent to the project area, residential neighborhoods are located directly east of the project area across the Sacramento River. Within the project area, residential neighborhoods are located directly west of Segment G and within a quarter mile west of Segments E and F. Scattered residences are also found along CMA A through CMA E. In addition, proposed borrow sites are located immediately adjacent to residential neighborhoods and scattered residences. Plate 3.7-1 shows the locations of sensitive receptors in the vicinity of the project area.

Vehicle traffic on roadways in the project area, aircraft overhead, and boating activity on the Sacramento River are the predominant sources of noise in the project area. Primary roadways in the area include Jefferson Boulevard, Lake Washington Boulevard, and Linden Road. Ambient noise measurements were conducted at several locations in the project area as part of the West Sacramento General Plan update (City of West Sacramento 2009). The measurement locations are identified in Plate 3.7-1. Table 3.7-8 summarizes the measurement results.

Table 3.7-8. Ambient Noise Measurements in the Project Area

Noise Measurement Location/Time		Noise Sources	Sound Levels (dBA)		
			L_{eq}	L_{min}	L_{max}
3	Bridgeway Lakes Drive south of Marshall Road Start: 3:35 pm.	Very light vehicular traffic on Bridgeway Lakes Drive, distant commercial and private aircraft fly-overs.	56.0	34.0	81.0
4	Jefferson Boulevard north of Davis Road Start: 4:05 pm.	Primary: Vehicular traffic on Jefferson Boulevard. Secondary: Distant private aircraft operations, fire truck pulled into station across street (no siren/horns).	66.7	37.9	83.1
5	Lassen Street south of Donner Road Start: 4:35 pm.	Distant aircraft operations (no vehicular traffic on Lassen Street during measurement period).	48.4	33.9	76.8
6	Roaring Creek Street near Sacramento River Start: 5:10 pm.	Distant aircraft operations, vehicular traffic on I-5 across Sacramento River.	51.4	38.2	78.1

Source: City of West Sacramento 2009.

3.7.2 Environmental Consequences

This section describes the environmental consequences relating to noise for the proposed Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.7.2.1 Assessment Methods

This analysis focuses on the potential construction-related noise effects associated with implementation of the Southport project. There are no operational noise or vibration effects associated with the proposed project. Construction equipment and activity data provided by the applicant and methods recommended by the Federal Highway Administration (2006) have been used to assess construction noise. Temporary groundborne vibration from construction activity has also been assessed using methods recommended by the Federal Transit Administration (2006).

3.7.2.2 Determination of Effects

For this analysis, an environmental effect was considered potentially significant related to noise and vibration if it would result in any of the effects listed below. These effects are based on NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

A noise effect is normally considered significant if it would:

- Expose persons to or generate noise levels in excess of applicable standards.
- 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.
- Expose persons to vibration or generation of excessive groundborne noise levels.

For the purposes of this analysis, a noise or vibration effect is considered to be significant if:

- Construction noise levels are predicted exceed noise standards specified by the City of West Sacramento or the City of Sacramento, for receivers in those jurisdictions.
- Trucks traveling on public roads or on on-site haul routes would result in noise exceeding 60 L_{dn} at residences.
- Construction vibration is predicted to exceed a peak particle velocity of 0.2 in/sec at any structure or occupied building based on Caltrans guidance for annoyance and potential damage to older buildings (Table 3.7-3 and Table 3.7-4, respectively).
- Roadway realignment would expose existing or planned noise sensitive uses to noise in excess of 60 L_{dn}.

3.7.3 Effects and Mitigation Measures

3.7.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be implemented. No construction-related effects relating to noise would occur. Therefore, there would be no noise effects attributable to the implementation of the No Action Alternative. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

As discussed in Chapter 2, “Alternatives,” there are three possible scenarios related to the levee vegetation policy under the No Action Alternative.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.

- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

However, there would be no effects related to noise by the implementation of any of the three vegetation management scenarios.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.7.3.2 Alternative 1

Implementation of the Southport project Alternative 1 would result in the following noise effects (Table 3.7-9).

Table 3.7-9. Noise Effects and Mitigation Measures for Alternative 1

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise	Significant	No effect	Significant and unavoidable	NOI-MM-1: Employ Noise-Reducing Construction Practices
NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration	Significant	No effect	Significant and unavoidable	NOI-MM-2: Employ Vibration-Reducing Construction Practices

Effect NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise

Under each alternative, construction would occur in more than one annual construction season (typically April 15 to October 31, subject to conditions), with construction of Segments C, D, E, F, and G preceding construction of Segments A and B. Construction of the first segments would take place during the first construction season (Year 1). Construction of Segments A and B would take place during the second construction season (Year 2). Work would occur on any day of the week and would be limited to the hours between 7:00 a.m. and 10:00 p.m.

Appendix D lists equipment expected to be used during Year 1 and Year 2 along each segment. Equipment is separated by the construction activity within each segment. Table 3.7-10 summarizes noise emission levels assumed for each piece of equipment based on levels reported in Federal Highway Administration (FHWA) 2006 and Caltrans 1978.

Table 3.7-10. Summary of Noise Emission Assumptions for Construction Equipment

Equipment Listed for Southport Project	Comparable Equipment from FHWA 2006	Acoustical use Factor (%)	L_{max} at 50 Feet (dBA)	L_{eq} at 50 Feet (dBA)
Asphalt Compactor, Sheepsfoot Compactor	Compactor (ground)	20	83	76
Bulldozer	Dozer	40	82	78
Haul Truck, Dump Truck	Dump Truck	40	76	72
Excavator, Long Reach Excavator, Hydraulic Excavator, Trencher	Excavator	40	81	77
Water Truck, Utility/Pole Truck, Off-road Truck, Pipe Layer	Flat Bed Truck	40	74	70
Front End Loader	Front End Loader	40	79	75
Motor Grader	Grader	40	85	81
Asphalt Paver	Paver	50	77	74
Rough Terrain/Telehandler Forklift, Worker Commute, Pickup Truck	Pickup Truck	40	75	71
Scraper, Water Wheel Scraper, Tractor Scraper	Scraper	40	84	80
Colder Planer	Colder Planer[1]	50	86	83
Crane	Crane	16	81	73
Drill Rig Truck	Drill Rig Truck	20	79	72
Tow Boat	Boat with exhaust above water line[2]	40	90	86

All data from FHWA 2006 except where noted.

[1] Cold planer from Caltrans 1978. Acoustical use factor for cold planer is based on the factor for a paver.

[2] Boat from Personal Watercraft Industry Association 2007. Acoustical use factor for boat is based on the factor for dump truck.

Table 3.7-11, Table 3.7-12, Table 3.7-13, and Table 3.7-14 show construction noise levels associated with each construction activity along each segment during Alternative 1 Year 1 and Year 2. This is based on construction data dated March 6, 2013. To develop a reasonable worst-case assessment of construction noise, all equipment identified within each construction activity is assumed to operate concurrently. Accordingly, sound levels for all equipment within each activity have been added to provide a cumulative construction noise level for each activity.

Relief wells may be used in combination with slurry cutoff walls and seepage berms and installed in select locations at any stage of construction where berms cannot be wide enough or slurry cutoff walls deep enough to meet the required design standards for seepage control remediation. Relief wells are constructed using soil-boring equipment to drill a hole vertically through the surface sand and deeper gravel beneath. Operation of the wells is passive and does not generate noise. As indicated in Table 3.7-10, noise associated with drill rig operation is similar to the noise associated with operation of a dump truck (72 dBA, L_{eq}). The effect of relief well construction is, therefore, represented by the effect of truck operation that is included in the analysis described above.

With the exception of slurry wall construction, all noise generating construction work will occur during daytime hours between 7:00 a.m. and 10:00 p.m. Slurry wall construction may need to occur at night. Construction noise levels for all activities except slurry wall construction are compared to daytime noise standards only. Noise from slurry wall construction is compared to both daytime and nighttime noise standards. Table 3.7-11, Table 3.7-12, Table 3.7-13, and Table 3.7-14 show the calculated distance to the 50 dBA-L_{eq} and 55 dBA-L_{eq} contour to show the distances within which West Sacramento and Sacramento daytime noise ordinance standards are predicted to be exceeded. Distance for nighttime standards (45 dBA-L_{eq} for West Sacramento, 50 dBA-L_{eq} for Sacramento) are shown as footnotes for slurry wall construction. This calculation is based on point source attenuation of 6 dB per doubling of distance assuming no shielding between the source and the receiver. In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

Table 3.7-11. Summary of Predicted On-Site Construction Noise Levels under Alternative 1 Year 1

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C	Roadway Replace	87	3,533	1,987
	Stripping	87	3,393	1,908
	Soil Borrow Extraction/Levee Placement	96	10,240	5,758
	Rip Rap Installation	92	6,480	3,644
	Utility Relocation	83	2,126	1,195
	Drainage	84	2,524	1,420
D	Building Demo	83	2,227	1,253
	Roadway Removal	87	3,460	1,946
	Roadway Replace	88	3,751	2,109
	Stripping	88	3,983	2,240
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	88	3,918	2,204
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
E	Roadway Replace	89	4,335	2,438
	Stripping	88	3,983	2,240
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Wet Well Installation	82	2,104	1,183
	Rip Rap Installation	94	7,843	4,410
	Trench Excavation	82	2,092	1,176
	Utility Relocation	81	1,841	1,035
	Drainage	84	2,524	1,420

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
F	Building Demo	86	3,086	1,736
	Roadway Removal	87	3,460	1,946
	Roadway Replace	89	4,341	2,441
	Stripping	88	3,983	2,240
	Soil Borrow Extraction/Levee Placement	96	10,240	5,758
	Rip Rap Installation	90	5,053	2,841
	Existing Pump Station	83	2,227	1,253
	Utility Relocation	81	1,841	1,035
	Drainage	84	2,632	1,480
G	Building Demo	83	2,227	1,253
	Roadway Replace	86	3,136	1,763
	Roadway Replace	86	3,136	1,763
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
	Rip Rap Installation	89	4,521	2,542

Note: In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

[a] Distance for exceedance of West Sacramento 45 dBA-L_{eq} nighttime noise standard: 4,653 feet.

[b] Distance for exceedance of Sacramento 50 dBA-L_{eq} nighttime noise standard: 2,616 feet.

Table 3.7-12. Summary of Predicted Off-Site Construction Noise Levels under Alternative 1 Year 1

Segment	Off-Site Material Borrow Activities	Cumulative Noise Level at 50 Feet from Activity (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C	Off-Site Material Borrow	95	9,227	5,189
D	Off-Site Material Borrow	95	8,489	4,774
E	Off-Site Material Borrow	95	8,489	4,774
F	Off-Site Material Borrow	95	9,227	5,189
G	Off-Site Material Borrow	95	8,489	4,774

Table 3.7-13. Summary of Predicted On-Site Construction Noise Levels under Alternative 1 Year 2

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
A	Building Demo	83	2,227	1,253
	Roadway Removal	88	4,046	2,275
	Roadway Replace	89	4,597	2,585
	Stripping	88	3,944	2,218
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	90	5,053	2,841
	Utility Relocation	83	2,126	1,195
	Drainage	86	3,021	1,699
B	Building Demo	90	5,271	2,964
	Roadway Removal	87	3,517	1,978
	Roadway Replace	89	4,553	2,560
	Stripping	88	3,983	2,240
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Utility Relocation	83	2,126	1,195
	Drainage	86	3,021	1,699
	Rip Rap Installation	90	5,053	2,841

Note: In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

[a] Distance for exceedance of West Sacramento 45 dBA-L_{eq} nighttime noise standard: 4,653 feet.

[b] Distance for exceedance of Sacramento 50 dBA-L_{eq} nighttime noise standard: 2,616 feet.

Table 3.7-14. Summary of Predicted Off-Site Construction Noise Levels under Alternative 1 Year 2

Segment	Off-Site Material Borrow Activities	Cumulative Noise Level at 50 Feet from Activity (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
A	Off-Site Material Borrow	95	8,489	4,774
B	Off-Site Material Borrow	95	8,489	4,774

Alternative 1—Year 1

Segment C Levee Work

Levee work along Segment C would occur within about 250 feet of residences located along the east end of Davis Road and within about 700 feet of residences located in Sacramento. Borrow site work to supply material to Segment C could occur at any of the possible borrow site locations in the project area. Some borrow sites are located directly adjacent to existing residential areas.

Segment D Levee Work

Levee work along Segments D would occur within about 100 feet of residences located along the east end of Davis Road within about 700 feet of residences located in Sacramento. Borrow site work to supply material to Segment D could occur at any of the possible borrow site locations in the project area. Some borrow sites are located directly adjacent to existing residential areas.

Segment E Levee Work

Levee work along Segment E would occur within about 350 feet of residences located along the east end of Tamarack Road and within about 700 feet of residences located in Sacramento. Borrow site work to supply material to Segment E could occur at any of the possible borrow site locations in the project area. Some borrow sites are located directly adjacent to existing residential areas.

Segment F Levee Work

Levee work along Segment F would occur within about 650 feet of residences located along the east end of Tamarack Road, with 100 feet for residences located at the end of Linden Road, and within about 700 feet of residences located in Sacramento. Borrow site work to supply material to Segment F could occur at any of the possible borrow site locations in the project area. Some borrow sites are located directly adjacent to existing residential areas.

Segment G Levee Work

Levee work along Segment G would occur adjacent to residences located along San Marco Street and Roaring Creek Street and within about 700 feet of residences located in Sacramento.

Onsite Haul Truck Activity

Material for levee work could come from any of the borrow sites in the project area. As such, specific on-site haul routes have not been defined. The maximum number of haul trips per day under any alternative or construction year is predicted to be 1,912 trips per day, 25% of which are estimated to be on unpaved on-site routes. A reasonable worst case assumption is that 478 trips (25% × 1,912) per day occur on a single route with trucks traveling at 25 miles per hour (mph). Under these conditions, the predicted sound level at 50 feet is 58 L_{dn}.

Offsite Haul Truck Activity on Public Roads

Table 3.7-15 summarizes predicted traffic noise levels based on the maximum projected project daily traffic volumes on public roads in the project area under Alternative 1.

Table 3.7-15. Project Traffic Noise Levels on Public Streets under Alternative 1

Roadway	Segment	Maximum Daily Project Truck Trips	Speed (mph)	L_{dn} at 50 Feet	Distance to 60 L_{dn} Contour (feet)
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	1,160	45	64	81
Jefferson Blvd	Lake Washington to Linden Rd (S)	3,510	45	68	157
Jefferson Blvd	Linden Rd (S) to city limits (S)	3,510	45	68	157
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	2,340	45	67	122
Industrial Blvd	Parkway Blvd to Stone Blvd	2,340	45	67	122
Industrial Blvd	Enterprise Blvd to Parkway Blvd	2,340	45	67	122
Enterprise Blvd	Seaport Blvd to Industrial Blvd	2,340	45	67	122
Linden Rd	Jefferson Blvd to Stonegate Dr	1,745	35	64	84
Linden Rd	Stonegate Dr to S River Rd	1,745	35	64	84
Davis Rd	Jefferson Blvd to S River Rd	1,752	35	64	85
Gregory Ave	Jefferson Blvd to S River Rd	1,392	35	63	74
Burrows Ave	Jefferson Blvd to S River Rd	1,395	35	63	74

Alternative 1—Year 2

Segment A Levee Work

Levee work along Segment A would occur within about 100 feet of residences located along South River Road and within about 700 feet of residences located in Sacramento.

Segment B Levee Work

Levee work along Segment B would occur within about 100 feet of residences located near the east end of Gregory Road and within about 700 feet of residences located in Sacramento.

On-Site Haul Truck Activity

Material for levee work could come from any of the borrow sites in the project area. As such, specific on-site haul routes have not been defined. The maximum number of haul trips per day under any alternative or construction year is predicted to be 1,912 trips per day, 25% of which are estimated to be on unpaved on-site routes. A reasonable worst case assumption is that 478 trips (25% × 1,912) per day occur on a single route with trucks traveling at 25 mph. Under these conditions, the predicted sound level at 50 feet is 58 L_{dn}.

Off-Site Haul Truck Activity on Public Roads

Table 3.7-15 above summarizes predicted traffic noise levels from the maximum projected project daily traffic volumes on public roads in the project area under Alternative 1.

Alternative 1—Effect Conclusions

Effect NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise

Construction work could directly expose nearby residential dwellings and sensitive land uses to elevated noise levels. The summary of distances discussed above and the results in Table 3.7-11, Table 3.7-12, Table 3.7-13, and Table 3.7-14 indicate that noise from construction work at the borrow sites and levee sites could exceed both West Sacramento and Sacramento daytime noise ordinance standards at nearby residences in West Sacramento and Sacramento. The results also indicate that slurry wall construction could exceed both West Sacramento and Sacramento nighttime noise ordinance standards. This direct effect is, therefore, considered significant.

As indicated in Table 3.7-15, noise from haul trucks traveling on public roads is predicted to exceed 60 L_{dn} and, therefore, is considered to be significant. Noise from haul trucks traveling on the onsite haul routes is not predicted to exceed 60 L_{dn} at adjacent residences and, therefore, is considered to be less than significant.

Implementation of Mitigation Measure NOI-MM-1 would reduce the effect, but it is not anticipated that feasible measures would be available in all situations to reduce noise to below the applicable noise ordinance limits. This direct effect, therefore, would be significant and unavoidable.

Mitigation Measure NOI-MM-1: Employ Noise-Reducing Construction Practices

To the extent feasible, construction contractors will control noise from construction activity such that noise does not exceed applicable noise ordinance standards specified by the Cities of West Sacramento and Sacramento. Measures that can be implemented to control noise include:

- Locate noise-generating equipment as far away as practical from residences and other noise-sensitive uses.
- Equip all construction equipment with standard noise attenuation devices such as mufflers to reduce noise and equip all internal combustion engines with intake and exhaust silencers in accordance with manufacturer’s standard specifications.
- Establish equipment and material haul routes that avoid residential uses to the extent practical, limit hauling to the hours between 7:00 a.m. and 10:00 p.m., and specify maximum acceptable speeds for each route.
- Employ electrically powered equipment in place of equipment with internal combustion engines where practical, where electric equipment is readily available, and where this equipment accomplishes project work as effectively and efficiently as equipment powered with internal combustion engines.
- Restrict the use of audible warning devices such as bells, whistles, and horns to those situations that are required by law for safety purposes.
- Provide noise-reducing enclosure around stationary noise-generating equipment.
- Provide temporary construction noise barriers between active construction sites that are in close proximity to residential and other noise-sensitive uses. Temporary barriers can be constructed or created with parked truck trailers, soil piles, or material stock piles.
- Route haul trucks away from residential areas where practical.

The construction contractor will develop a construction noise control plan which identifies specific feasible noise control measures that will be employed and the extent to which the measure will be able to control noise to specific noise ordinance limits. The plan will identify areas where it not considered feasible to comply with applicable noise ordinance limits. The noise control plan will be submitted to and approved by WSAFCA before any noise-generating activity begins.

Effect NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration

Vibration from construction equipment is the primary concern when pile driving or other similar highly dynamic activity would occur. Highly dynamic equipment such as this will not be employed on this project. Table 3.7-16 summarizes typical construction vibration levels for the types of equipment that would be used on this project. Using methods specified in Federal Transit Administration (FTA) 2006, the distance within which vibration is estimated to exceed the 0.2 in/sec threshold is also indicated. It is anticipated that construction equipment would not typically operate within approximately 30 feet of residences and structures. However, there may be situations where this would be required, directly exposing residences and other structures to ground vibration in excess of 0.2 in/sec. This direct effect, therefore, is considered to be significant.

Implementation of mitigation measure NOI-MM-2 would reduce this effect; however, it is not anticipated that feasible measures would be available in all situations to reduce vibration to below the applicable levels. This direct effect, therefore, would be significant and unavoidable.

Table 3.7-16. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 feet	Distance Within Which Vibration Is Predicted to Exceed 0.2 in/sec
Vibratory roller	0.210	26 feet
Large bulldozer	0.089	15 feet
Loaded trucks	0.076	14 feet
Jackhammer	0.035	<10 feet
Small bulldozer	0.003	< 10 feet

Source: Federal Transit Administration 2006.

Mitigation Measure NOI-MM-2: Employ Vibration-Reducing Construction Practices

The construction contractor will, to the extent feasible, maintain a minimum distance of 50 feet between construction equipment and occupied or vibration-sensitive buildings or structures. For cases where this is not feasible, the resident or property owner will be notified in writing prior to construction activity that construction may occur within 50 feet of their building. WSAFCA will inspect the potentially affected buildings prior to construction to inventory existing cracks in paint, plaster, concrete, and other building elements. WSAFCA will retain a qualified acoustical consultant or engineering firm to conduct vibration monitoring at potentially affected buildings to measure the actual vibration levels during construction. Following completion of construction, WSAFCA will conduct a second inspection to inventory changes in existing cracks and new cracks or damage, if any, that occurred as a result of construction-induced vibration. If new damage is found, then WSAFCA will promptly arrange to have the damaged repaired, or will reimburse the property owner for appropriate repairs.

In addition, if construction activity is required within 100 feet of residences or other vibration-sensitive buildings, a designated complaint coordinator will be responsible for handling and responding to any complaints received during such periods of construction. A reporting program will be required that documents complaints received, actions taken, and the effectiveness of these actions in resolving disputes.

3.7.3.3 Alternative 2

Implementation of the Southport project Alternative 2 would result in the following noise effects (Table 3.7-17).

Table 3.7-17. Noise Effects and Mitigation Measures under Alternative 2

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise	Significant	No effect	Significant and unavoidable	NOI-MM-1: Employ Noise-Reducing Construction Practices
NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration	Significant	No effect	Significant and unavoidable	NOI-MM-2: Employ Vibration-Reducing Construction Practices
NOI-3: Exposure of Sensitive Receptors to Traffic Noise from the Extension of Village Parkway	Significant	No effect	Less than significant	M.M. 4-8-1 from the Southport Framework Plan draft EIR

Effect NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise

Direct effects under Alternative 2 associated with exposure of sensitive receptors to construction-related noise are similar to those under Alternative 1.

Table 3.7-18, Table 3.7-19, Table 3.7-20, and Table 3.7-21 show construction noise levels associated with each construction activity along each segment under Alternative 2 Year 1 and Year 2.

Table 3.7-18. Summary of Predicted On-Site Construction Noise Levels under Alternative 2 Year 1

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C	Building Demo	83	2,227	1,253
	Roadway Removal	88	4,143	2,330
	Roadway Replace	87	3,698	2,079
	Stripping	88	3,983	2,240
	Levee Degrade	90	4,931	2,773
	Soil Borrow Extraction/Levee Placement	94	7,794	4,383
	Rip Rap Installation	89	4,521	2,542
	Planting	82	1,990	1,119
	Irrigation	82	1,881	1,058
	Utility Relocation	83	2,126	1,195
	Drainage	84	2,524	1,420
D	Building Demo	83	2,227	1,253
	Roadway Removal	87	3,573	2,009
	Roadway Replace	87	3,644	2,049
	Stripping	88	3,983	2,240
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	89	4,521	2,542
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
E	Roadway Replace	89	4,597	2,585
	Stripping	88	3,983	2,240
	Soil Borrow Extraction/Levee Placement	94	8,327	4,683
	Rip Rap Installation	94	7,843	4,410
	Utility Relocation	81	1,841	1,035
	Drainage	84	2,524	1,420
F	Building Demo	86	3,086	1,736
	Roadway Removal	88	3,989	2,243
	Roadway Replace	89	4,682	2,633
	Stripping	88	3,983	2,240
	Levee Degrade	90	4,931	2,773
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	89	4,521	2,542
	Existing Pump Station Removal	83	2,227	1,253
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
G	Building Demo	83	2,227	1,253
	Roadway Replace	86	3,034	1,706
	Stripping	88	3,983	2,240
	SB Cutoff Wall Installation	83	2,296[a]	1,291[b]
	Soil Borrow Extraction/Levee Placement	96	9,465	5,322
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
	Rip Rap Installation	89	4,521	2,542

Note: In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

[a] Distance for exceedance of West Sacramento 45 dBA-L_{eq} nighttime noise standard: 4,653 feet.

[b] Distance for exceedance of Sacramento 50 dBA-L_{eq} nighttime noise standard: 2,616 feet.

Table 3.7-19. Summary of Predicted Off-Site Construction Noise Levels under Alternative 2 Year 1

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet from Activity (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C	Off-Site Material Borrow	95	8,942	5,028
D	Off-Site Material Borrow	96	9,580	5,387
E	Off-Site Material Borrow	96	9,805	5,514
F	Off-Site Material Borrow	96	9,580	5,387
G	Off-Site Material Borrow	96	9,805	5,514

Table 3.7-20. Summary of Predicted On-Site Construction Noise Levels under Alternative 2 Year 2

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
A	Building Demo	86	3,086	1,736
	Roadway Removal	88	4,046	2,275
	Roadway Replace	87	3,533	1,987
	Stripping	88	3,983	2,240
	Levee Degrade	90	4,931	2,773
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	91	5,533	3,111
	Utility Relocation	86	3,011	1,693
	Drainage	86	3,021	1,699

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
B	Building Demo	88	3,754	2,111
	Roadway Removal	88	4,095	2,303
	Roadway Replace	87	3,632	2,043
	Stripping	88	3,823	2,150
	Levee Degrade	90	4,931	2,773
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	96	9,465	5,322
	Rip Rap Installation	90	5,053	2,841
	On-Site Material Borrow Restoration	NA	NA	NA
	Off-Site Material Borrow Restoration	NA	NA	NA
	Utility Relocation	86	3,011	1,693
	Drainage	86	3,021	1,699
	Planting	84	2,606	1,465
	Irrigation	81	1,772	997

Note: In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

[a] Distance for exceedance of West Sacramento 45 dBA-L_{eq} nighttime noise standard: 4,653 feet.

[b] Distance for exceedance of Sacramento 50 dBA-L_{eq} nighttime noise standard: 2,616 feet.

Table 3.7-21. Summary of Predicted Off-Site Construction Noise Levels under Alternative 2 Year 2

Segment	Off-Site Material Borrow Activities	Cumulative Noise Level at 50 Feet from Activity (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
A	On-Site Material Borrow Restoration	96	9,580	5,387
B	Off-Site Material Borrow Restoration	96	9,805	5,514

Alternative 2—Year 1

Segment C Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment D Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment E Levee Work

The distance between levee work and sensitive receptors in this segment would be similar to Alternative 1 except that construction would occur within about 200 feet of residences located along the east end of Tamarack Road.

Segment F Levee Work

The distance between levee work and sensitive receptors in this segment would be similar to Alternative 1 except that construction would occur within about 500 feet of residences located along the east end of Tamarack Road.

Segment G Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Onsite Haul Truck Activity

Onsite haul truck activity would be the same as under Alternative 1.

Offsite Haul Truck Activity on Public Roads

Table 3.7-22 summarizes predicted traffic noise levels based on the maximum projected project daily traffic volumes on public roads in the project area under Alternative 2.

Table 3.7-22. Project Traffic Noise Levels on Public Streets under Alternative 2

Roadway	Segment	Maximum Daily Project Truck Trips	Speed (mph)	L_{dn} at 50 Feet	Distance to 60 L_{dn} Contour (Feet)
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	995	45	63	74
Jefferson Blvd	Lake Washington to Linden Rd (S)	3,120	45	68	146
Jefferson Blvd	Linden Rd (S) to city limits (S)	3,120	45	68	146
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	2,080	45	66	113
Industrial Blvd	Parkway Blvd to Stone Blvd	2,080	45	66	113
Industrial Blvd	Enterprise Blvd to Parkway Blvd	2,080	45	66	113
Enterprise Blvd	Seaport Blvd to Industrial Blvd	2,080	45	66	113
Linden Rd	Jefferson Blvd to Stonegate Dr	1,442	35	63	75
Linden Rd	Stonegate Dr to S River Rd	1,442	35	63	75
Davis Rd	Jefferson Blvd to S River Rd	1,442	35	63	75
Gregory Ave	Jefferson Blvd to S River Rd	1,460	35	63	76
Burrows Ave	Jefferson Blvd to S River Rd	1,322	35	63	71

Alternative 2—Year 2

Segment A Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment B Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

On-Site Haul Truck Activity

On-site haul truck activity would be the same as under Alternative 1.

Off-Site Haul Truck Activity on Public Roads

Table 3.7-22 above summarizes predicted traffic noise levels from the maximum projected project daily traffic volumes on public roads in the project area under Alternative 2.

Alternative 2—Effect Conclusions

Effect NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise

The summary of distances discussed above and the results in Table 3.7-18, Table 3.7-19, Table 3.7-20, and Table 3.7-21 indicate that noise from construction work at the borrow sites and levee sites could exceed both West Sacramento and Sacramento daytime noise ordinance standards are nearby residences in West Sacramento and Sacramento. The results also indicate that slurry wall construction could exceed both West Sacramento and Sacramento nighttime noise ordinance standards. Noise from construction work at the borrow sites and levee sites therefore is considered to be significant.

As indicated in Table 3.7-22, noise from haul trucks traveling on public roads is predicted to exceed 60 L_{dn} and therefore is considered to be significant. Similar to Alternative 1, noise from haul trucks on on-site haul routes is not predicted to exceed 60 L_{dn} at adjacent residences and therefore is considered to be less than significant.

As with Alternative 1, Implementation of Mitigation Measure NOI-MM-1 would reduce the effect, but it is not anticipated that feasible measures would be available in all situations to reduce noise to below the applicable noise ordinance limits. This direct effect therefore is considered to be significant and unavoidable.

Effect NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration

Direct effects under Alternative 2 associated with exposure of sensitive receptors to construction-related vibration are the same as those under Alternative 1.

Effect NOI-3: Exposure of Sensitive Receptors to Traffic Noise from the Extension of Village Parkway

Implementation of Alternative 2 will require the extension of Village Parkway to accommodate the closure of South River Road. The extension of Village Parkway is a planned feature identified in the

Southport Framework Plan. The noise analysis presented in the Southport Framework Plan draft EIR (Willdan Associates 1994) determined that land uses located within about 100 feet of this roadway would be directly exposed to traffic noise that exceeds 60 L_{dn}. Residences located within this distance would be therefore exposed to a significant noise impact. The draft EIR states that Mitigation Measure M.M. 4-8.1 in the draft EIR would reduce this effect to a less-than-significant level. This mitigation measure requires that adequate sound attenuation measures be applied to reduce the effect of increased noise levels at existing land uses and identifies potential mitigation measures. These measures include the construction of berms or barriers and the installation of sound-rated windows or wall insulation.

3.7.3.4 Alternative 3

Implementation of the Southport project Alternative 3 would result in the following noise effects (Table 3.7-23).

Table 3.7-23. Noise Effects and Mitigation Measures under Alternative 3

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise	Significant	No effect	Significant and unavoidable	NOI-MM-1: Employ Noise-Reducing Construction Practices
NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration	Significant	No effect	Significant and unavoidable	NOI-MM-2: Employ Vibration-Reducing Construction Practices

Effect NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise

Direct effects under Alternative 2 associated with exposure of sensitive receptors to construction-related noise are similar to those under Alternative 1. Table 3.7-24, Table 3.7-25, Table 3.7-26, and Table 3.7-27 show construction noise levels associated with each construction year along each segment under Alternative 3 Year 1 and Year 2.

Table 3.7-24. Summary of Predicted On-Site Construction Noise Levels under Alternative 3 Year 1

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C	Roadway Removal	88	4,095	2,303
	Roadway Replace	88	4,004	2,252
	Stripping	88	3,874	2,179
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	90	5,053	2,841
	Utility location	83	2,126	1,195
	Drainage	84	2,524	1,420

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
D	Building Demo	83	2,227	1,253
	Roadway Removal	87	3,573	2,009
	Roadway Replace	88	3,906	2,196
	Stripping	88	3,874	2,179
	Levee Degrade	93	7,377	4,148
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	88	3,918	2,204
	Utility location	81	1,841	1,035
	Drainage	86	3,021	1,699
E	Roadway Replace	90	4,724	2,657
	Stripping	88	3,983	2,240
	Levee Degrade	93	7,435	4,181
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	88	4,196	2,360
	Existing Pump Station Removal	83	2,227	1,253
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
F	Building Demo	86	3,086	1,736
	Roadway Removal	88	4,095	2,303
	Roadway Replace	88	3,947	2,220
	Stripping	88	3,983	2,240
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	90	5,053	2,841
	Existing Pump Station Removal	83	2,227	1,253
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
G	Building Demo	83	2,227	1,253
	Roadway Replace	87	3,698	2,079
	Stripping	88	3,983	2,240
	Levee Degrade	93	7,435	4,181
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
	Rip Rap Installation	89	4,521	2,542

Note: In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

[a] Distance for exceedance of West Sacramento 45 dBA-L_{eq} nighttime noise standard: 4,653 feet.

[b] Distance for exceedance of Sacramento 50 dBA-L_{eq} nighttime noise standard: 2,616 feet.

Table 3.7-25. Summary of Predicted Off-Site Construction Noise Levels under Alternative 3 Year 1

Segment	Off-Site Material Borrow Activities	Cumulative Noise Level at 50 Feet from Activity (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C	Off-Site Material Borrow	95	8,489	4,774
D	Off-Site Material Borrow	95	8,489	4,774
E	Off-Site Material Borrow	95	8,489	4,774
F	Off-Site Material Borrow	95	8,489	4,774
G	Off-Site Material Borrow	95	8,489	4,774

Table 3.7-26. Summary of Predicted On-Site Construction Noise Levels under Alternative 3 Year 2

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
A	Roadway Removal	88	4,046	2,275
	Roadway Replace	90	4,766	2,680
	Stripping	88	3,983	2,240
	Levee Degrade	93	7,435	4,181
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	90	5,053	2,841
	Utility Relocation	83	2,126	1,195
	Drainage	86	3,021	1,699

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
B	Building Demo	90	5,271	2,964
	Roadway Removal	88	4,095	2,303
	Roadway Replace	89	4,639	2,609
	Stripping	88	3,983	2,240
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Utility Relocation	83	2,126	1,195
	Drainage	86	3,021	1,699
	Rip Rap Installation	90	5,053	2,841

Note: In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

[a] Distance for exceedance of West Sacramento 45 dBA-L_{eq} nighttime noise standard: 4,653 feet.

[b] Distance for exceedance of Sacramento 50 dBA-L_{eq} nighttime noise standard: 2,616 feet.

Table 3.7-27. Summary of Predicted Off-Site Construction Noise Levels under Alternative 3 Year 2

Segment	Off-Site Material Borrow Activities	Cumulative Noise Level at 50 Feet from Activity (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
A	Off-Site Material Borrow	95	8,489	4,774
B	Off-Site Material Borrow	95	8,489	4,774

Alternative 3—Year 1

Segment C Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment D Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment E Levee Work

The distance between levee work and sensitive receptors in this segment would be similar to Alternative 1 except that construction would occur within about 200 feet of residences located along the east end of Tamarack Road.

Segment F Levee Work

The distance between levee work and sensitive receptors in this segment would be similar to Alternative 1 except that construction would occur within about 500 feet of residences located along the east end of Tamarack Road.

Segment G Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Onsite Haul Truck Activity

On-site haul truck activity would be the same as under Alternative 1.

Offsite Haul Truck Activity on Public Roads

Table 3.7-28 summarizes predicted traffic noise levels based on the maximum projected project daily traffic volumes on public roads in the project area under Alternative 3.

Table 3.7-28. Project Traffic Noise Levels on Public Streets under Alternative 3

Roadway	Segment	Maximum Daily Project Trucks	Speed (mph)	L_{dn} at 50 Feet	Distance to 60 L_{dn} Contour (Feet)
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	1,973	45	66	109
Jefferson Blvd	Lake Washington to Linden Rd (S)	4,152	45	69	175
Jefferson Blvd	Linden Rd (S) to city limits (S)	4,152	45	69	175
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	2,768	45	67	135
Industrial Blvd	Parkway Blvd to Stone Blvd	2,768	45	67	135
Industrial Blvd	Enterprise Blvd to Parkway Blvd	2,768	45	67	135
Enterprise Blvd	Seaport Blvd to Industrial Blvd	2,768	45	67	135
Linden Rd	Jefferson Blvd to Stonegate Dr	1,590	35	63	80
Linden Rd	Stonegate Dr to S River Rd	1,590	35	63	80
Davis Rd	Jefferson Blvd to S River Rd	1,592	35	63	80
Gregory Ave	Jefferson Blvd to S River Rd	1,407	35	63	74
Burrows Ave	Jefferson Blvd to S River Rd	1,584	35	63	80

Alternative 3—Year 2

Segment A Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment B Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Onsite Haul Truck Activity

Onsite haul truck activity would be the same as under Alternative 1.

Offsite Haul Truck Activity on Public Roads

Table 3.7-28 above summarizes predicted traffic noise levels from the maximum projected project daily traffic volumes on public roads in the project area under Alternative 3.

Alternative 3—Effect Conclusions

Effect NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise

The summary of distances discussed above and the results in Table 3.7-24, Table 3.7-25, Table 3.7-26, and Table 3.7-27 indicate that noise from construction work at the borrow sites and levee sites could exceed both West Sacramento and Sacramento daytime noise ordinance standards are nearby residences in West Sacramento and Sacramento. The results also indicate that slurry wall construction could exceed both West Sacramento and Sacramento nighttime noise ordinance standards. Noise from construction work at the borrow sites and levee sites therefore is considered to be significant.

As indicated in Table 3.7-28, noise from haul trucks traveling on public roads is predicted to exceed 60 L_{dn} and therefore is considered to be significant. Similar to Alternative 1, noise from haul trucks on the designated on-site haul routes is not predicted to exceed 60 L_{dn} at adjacent residences and therefore is considered to be less than significant.

As with Alternative 1, Implementation of Mitigation Measure NOI-MM-1 would reduce the effect, but it is not anticipated that feasible measures would be available in all situations to reduce noise to below the applicable noise ordinance limits. This direct effect, therefore, is considered to be significant and unavoidable.

Effect NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration

Direct effects under Alternative 3 associated with exposure of sensitive receptors to construction-related vibration are the same as those under Alternative 1.

3.7.3.5 Alternative 4

Implementation of the Southport project Alternative 4 would result in the following noise effects (Table 3.7-29).

Table 3.7-29. Noise Effects and Mitigation Measures under Alternative 4

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise	Significant	No effect	Significant and unavoidable	NOI-MM-1: Employ Noise-Reducing Construction Practices
NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration	Significant	No effect	Significant and unavoidable	NOI-MM-2: Employ Vibration-Reducing Construction Practices
NOI-3: Exposure of Sensitive Receptors to Traffic Noise from the Extension of Village Parkway	Significant	No effect	Less than significant	M.M. 4-8-1 from the Southport Framework Plan draft EIR

Effect NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise

Effects under Alternative 4 associated with exposure of sensitive receptors to construction-related noise are similar to those under Alternative 1. Table 3.7-30, Table 3.7-31, Table 3.7-32, and Table 3.7-33 show construction noise levels associated with each construction activity along each segment under Alternative 4 Year 1 and Year 2.

Table 3.7-30. Summary of Predicted On-Site Construction Noise Levels under Alternative 4 Year 1

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C	Building Demo	83	2,227	1,253
	Roadway Removal	88	4,143	2,330
	Roadway Replace	87	3,698	2,079
	Stripping	88	3,781	2,126
	Levee Degrade	90	4,931	2,773
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	89	4,521	2,542
	Planting	82	1,990	1,119
	Irrigation	82	1,881	1,058
	Utility Relocation	83	2,126	1,195
	Drainage	84	2,524	1,420

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
D	Building Demo	83	2,227	1,253
	Roadway Removal	87	3,573	2,009
	Roadway Replace	87	3,644	2,049
	Stripping	88	3,983	2,240
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	89	4,521	2,542
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
E	Roadway Replace	89	4,639	2,609
	Stripping	88	3,983	2,240
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	96	9,465	5,322
	Rip Rap Installation	94	7,578	4,261
	Wet Well Excavation/Installation	NA	NA	NA
	Pump Station Installation	NA	NA	NA
	Trench Excavation & Forcemain Installation	NA	NA	NA
	Utility Relocation	81	1,841	1,035
	Drainage	84	2,524	1,420
F	Building Demo	86	3,086	1,736
	Roadway Removal	88	4,143	2,330
	Roadway Replace	89	4,682	2,633
	Stripping	88	3,983	2,240
	Soil Borrow Extraction/Levee Placement	96	10,240	5,758
	Rip Rap Installation	92	5,975	3,360
	Existing Pump Station Removal	83	2,227	1,253
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
G	Building Demo	83	2,227	1,253
	Roadway Replace	86	3,136	1,763
	Stripping	88	3,983	2,240
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	96	9,465	5,322
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
	Rip Rap Installation	90	5,026	2,827

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C-G	On-Site Material Borrow Restoration	94	7,683	4,321
	Off-Site Material Borrow Restoration	96	9,832	5,529

Note: In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

[a] Distance for exceedance of West Sacramento 45 dBA-L_{eq} nighttime noise standard: 4,653 feet.

[b] Distance for exceedance of Sacramento 50 dBA-L_{eq} nighttime noise standard: 2,616 feet.

Table 3.7-31. Summary of Predicted Off-Site Construction Noise Levels under Alternative 4 Year 1

Segment	Off-Site Material Borrow Activities	Cumulative Noise Level at 50 Feet from Activity (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C	Off-Site Material Borrow	96	9,580	5,387
D	Off-Site Material Borrow	96	9,580	5,387
E	Off-Site Material Borrow	96	9,805	5,514
F	Off-Site Material Borrow	96	10,240	5,758
G	Off-Site Material Borrow	96	9,805	5,514

Table 3.7-32. Summary of Predicted On-Site Construction Noise Levels under Alternative 4 Year 2

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
A	Building Demo	86	3,086	1,736
	Roadway Removal	88	4,046	2,275
	Roadway Replace	87	3,533	1,987
	Stripping	88	3,983	2,240
	Levee Degrade	90	4,931	2,773
	SB Cutoff Wall Installation	85	2,847[a]	1,601[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	91	5,533	3,111
	Utility Relocation	81	1,876	1,055
	Drainage	86	3,021	1,699

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
B	Building Demo	88	3,754	2,111
	Roadway Removal	88	4,095	2,303
	Roadway Replace	88	4,166	2,343
	Stripping	88	3,983	2,240
	Levee Degrade	90	4,931	2,773
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	96	9,465	5,322
	Utility Relocation	83	2,126	1,195
	Drainage	86	3,021	1,699
	Rip Rap Installation	90	5,053	2,841

Note: In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

[a] Distance for exceedance of West Sacramento 45 dBA-L_{eq} nighttime noise standard: 4,653 feet.

[b] Distance for exceedance of Sacramento 50 dBA-L_{eq} nighttime noise standard: 2,616 feet.

Table 3.7-33. Summary of Predicted Off-Site Construction Noise Levels under Alternative 4 Year 2

Segment	Off-Site Material Borrow Activities	Cumulative Noise Level at 50 Feet from Activity (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
A	Off-Site Material Borrow	96	9,580	5,387
B	Off-Site Material Borrow	96	9,805	5,514

Alternative 4—Year 1

Segment C Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment D Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment E Levee Work

The distance between levee work and sensitive receptors in this segment would be similar to Alternative 1 except that construction would occur within about 200 feet of residences located along the east end of Tamarack Road.

Segment F Levee Work

The distance between levee work and sensitive receptors in this segment would be similar to Alternative 1 except that construction would occur within about 500 feet of residences located along the east end of Tamarack Road.

Segment G Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

On-Site Haul Truck Activity

On-site haul truck activity would be the same under Alternative 2 as under Alternative 1.

Off-Site Haul Truck Activity on Public Roads

Table 3.7-34 summarizes predicted traffic noise levels based on the maximum projected project daily traffic volumes on public roads in the project area under Alternative 4.

Table 3.7-34. Project Traffic Noise Levels on Public Streets under Alternative 4

Roadway	Segment	Maximum Daily Project Trucks	Speed (mph)	L_{dn} at 50 Feet	Distance to 60 L_{dn} Contour (Feet)
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	2,625	45	67	130
Jefferson Blvd	Lake Washington to Linden Rd (S)	6,249	45	71	226
Jefferson Blvd	Linden Rd (S) to city limits (S)	6,249	45	71	226
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	4,166	45	69	176
Industrial Blvd	Parkway Blvd to Stone Blvd	4,166	45	69	176
Industrial Blvd	Enterprise Blvd to Parkway Blvd	4,166	45	69	176
Enterprise Blvd	Seaport Blvd to Industrial Blvd	4,166	45	69	176
Linden Rd	Jefferson Blvd to Stonegate Dr	5,253	35	69	170
Linden Rd	Stonegate Dr to S River Rd	5,253	35	69	170
Davis Rd	Jefferson Blvd to S River Rd	2,711	35	66	110
Gregory Ave	Jefferson Blvd to S River Rd	2,309	35	65	98
Burrows Ave	Jefferson Blvd to S River Rd	2,456	35	65	102

Alternative 4—Year 2

Segment A Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment B Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

On-Site Haul Truck Activity

On-site haul truck activity would be the same under Alternative 4 as under Alternative 1.

Off-Site Haul Truck Activity on Public Roads

Table 3.7-34 above summarizes predicted traffic noise levels based on the maximum projected project daily traffic volumes on public roads in the project area under Alternative 4.

Alternative 4—Effect Conclusions

Effect NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise

The summary of distances discussed above and the results in Table 3.7-30, Table 3.7-31, Table 3.7-32, and Table 3.7-33 indicate that noise from construction work at the borrow sites and levee sites could exceed both West Sacramento and Sacramento daytime noise ordinance standards are nearby residences in West Sacramento and Sacramento. The results also indicate that slurry wall construction could exceed both West Sacramento and Sacramento nighttime noise ordinance standards. Noise from construction work at the borrow sites and levee sites therefore is considered to be significant.

As indicated in Table 3.7-34 noise from haul trucks traveling on public roads is predicted to exceed 60 L_{dn} and therefore is considered to be significant. Similar to Alternative 1, noise from haul trucks on the designated on-site haul routes roads is not predicted to exceed 60 L_{dn} at adjacent residences and therefore is considered to be less than significant.

As with Alternative 1, Implementation of Mitigation Measure NOI-MM-1 would reduce the effect, but it is not anticipated that feasible measures would be available in all situations to reduce noise to below the applicable noise ordinance limits. This direct effect, therefore, is considered to be significant and unavoidable.

Effect NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration

Direct effects under Alternative 4 associated with exposure of sensitive receptors to construction-related vibration are the same as those under Alternative 1.

Effect NOI-3: Exposure of Sensitive Receptors to Traffic Noise from the Extension of Village Parkway

Implementation of Alternative 4 would require the extension of Village Parkway to accommodate the closure of South River Road. The extension of Village Parkway is a planned feature identified in the Southport Framework Plan. The noise analysis presented in the Southport Framework Plan draft EIR (Willdan Associates 1994) determined that land uses located within about 100 feet of this roadway would be directly exposed to traffic noise that exceeds 60 L_{dn}. Residences located within this distance would be therefore exposed to a significant noise impact. The draft EIR states that Mitigation Measure M.M. 4-8.1 in the draft EIR would reduce this effect to a less-than-significant level.

3.7.3.6 Alternative 5

Implementation of the Southport project Alternative 5 would result in the following noise effects (Table 3.7-35).

Table 3.7-35. Noise Effects and Mitigation Measures under Alternative 5

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise	Significant	No effect	Significant and unavoidable	NOI-MM-1: Employ Noise-Reducing Construction Practices
NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration	Significant	No effect	Significant and unavoidable	NOI-MM-2: Employ Vibration-Reducing Construction Practices
NOI-3: Exposure of Sensitive Receptors to Traffic Noise from the Extension of Village Parkway	Significant	No effect	Less than significant	M.M. 4-8-1 from the Southport Framework Plan draft EIR

Effect NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise

Direct effects under Alternative 5 associated with exposure of sensitive receptors to construction-related noise are similar to those under Alternative 1. Work to be conducted under Alternative 5 would be same as Alternative 2 with the exception that waterside slope-flattening rather than construction of an adjacent levee would occur in Segment A. Waterside slope flattening for Segment A would be similar to waterside slope flattening that would occur under Alternative 3. Table 3.7-36, Table 3.7-37, Table 3.7-38, and Table 3.7-39 show construction noise levels associated with each construction activity along each segment under Alternative 5 Year 1 and Year 2. Data in Table 3.7-36 and Table 3.7-37 is taken directly from Table 3.7-18 and Table 3.7-19 for Alternative 2. Data in Table 3.7-38 and Table 3.7-39 is from Table 3.7-20 and Table 3.7-21 for Alternative 2 with the exception that the Segment A data is taken from Table 3.7-26 and Table 3.7-27 for Alternative 3.

1 **Table 3.7-36. Summary of Predicted On-Site Construction Noise Levels under Alternative 5 Year 1**

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C	Building Demo	83	2,227	1,253
	Roadway Removal	88	4,143	2,330
	Roadway Replace	87	3,698	2,079
	Stripping	88	3,983	2,240
	Levee Degrade	90	4,931	2,773
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	89	4,521	2,542
	Planting	82	1,990	1,119
	Irrigation	82	1,881	1,058
	Utility Relocation	83	2,126	1,195
	Drainage	84	2,524	1,420
D	Building Demo	83	2,227	1,253
	Roadway Removal	87	3,573	2,009
	Roadway Replace	87	3,644	2,049
	Stripping	88	3,983	2,240
	Levee Degrade	NA	NA	NA
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	89	4,521	2,542
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
E	Roadway Replace	89	4,639	2,609
	Stripping	88	3,983	2,240
	Levee Degrade	NA	NA	NA
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	96	9,465	5,322
	Rip Rap Installation	94	NA	NA
	Wet Well Excavation/Installation	NA	NA	NA
	Pump Station Installation	NA	NA	NA
	Trench Excavation & Forcemain Installation	NA	NA	NA
	Utility Relocation	81	1,841	1,035
	Drainage	84	2,524	1,420

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
F	Building Demo	86	3,086	1,736
	Roadway Removal	88	4,143	2,330
	Roadway Replace	89	4,682	2,633
	Stripping	88	3,983	2,240
	Levee Degrade	90	4,931	2,773
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	89	4,521	2,542
	Existing Pump Station Removal	83	2,227	1,253
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
G	Building Demo	83	2,227	1,253
	Roadway Replace	86	3,136	1,763
	Stripping	88	3,983	2,240
	Levee Degrade	NA	NA	NA
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	96	9,465	5,322
	Utility Relocation	81	1,841	1,035
	Drainage	86	3,021	1,699
	Rip Rap Installation	89	4,521	2,542
C	Inlet/Outlet Degrade	89	4,668	2,625
F	Inlet/Outlet Degrade	89	4,668	2625

Note: In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

[a] Distance for exceedance of West Sacramento 45 dBA-L_{eq} nighttime noise standard: 4,653 feet.

[b] Distance for exceedance of Sacramento 50 dBA-L_{eq} nighttime noise standard: 2,616 feet.

Table 3.7-37. Summary of Predicted Off-Site Construction Noise Levels under Alternative 5 Year 1

Segment	Off-Site Material Borrow Activities	Cumulative Noise Level at 50 Feet from Activity (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
C	Off-Site Material Borrow	96	9,580	5,387
D	Off-Site Material Borrow	96	9,580	5,387
E	Off-Site Material Borrow	96	9,805	5,514
F	Off-Site Material Borrow	96	9,580	5,387
G	Off-Site Material Borrow	96	9,805	5,514

Table 3.7-38. Summary of Predicted On-Site Construction Noise Levels under Alternative 5 Year 2

Segment	Project Site Related Activities	Cumulative Noise Level at 50 Feet for Construction Subphase (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
A	Building Demo	86	3,086	1,736
	Roadway Removal	88	4,046	2,275
	Roadway Replace	87	3,698	2,079
	Stripping	88	3,983	2,240
	Levee Degrade	90	4,931	2,773
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	95	8,797	4,947
	Rip Rap Installation	91	5,533	3,111
	Utility Relocation	83	2,126	1,195
	Drainage	86	3,021	1,699
B	Building Demo	88	3,754	2,111
	Roadway Removal	88	4,095	2,303
	Roadway Replace	88	4,166	2,343
	Stripping	88	3,983	2,240
	Levee Degrade	90	4,931	2,773
	SB Cutoff Wall Installation	84	2,616[a]	1,471[b]
	Soil Borrow Extraction/Levee Placement	96	9,465	5,322
	Rip Rap Installation	90	5,053	2,841
	On-Site Material Borrow Restoration	NA	NA	NA
	Off-Site Material Borrow Restoration	NA	NA	NA
	Utility Relocation	83	2,126	1,195
	Drainage	86	3,021	1,699
	Planting	82	1,990	1,119
	Irrigation	81	1,772	997

Note: In situations where there is substantial shielding between the activity and the receiver (i.e., receivers located in Sacramento when construction is occurring at the toe of the levee) sound levels would be about 5 dB less than shown and distances would be about half the indicated distance.

[a] Distance for exceedance of West Sacramento 45 dBA-L_{eq} nighttime noise standard: 4,653 feet.

[b] Distance for exceedance of Sacramento 50 dBA-L_{eq} nighttime noise standard: 2,616 feet.

Table 3.7-39. Summary of Predicted Off-Site Construction Noise Levels under Alternative 5 Year 2

Segment	Off-Site Material Borrow Activities	Cumulative Noise Level at 50 Feet from Activity (dBA-L_{eq})	Distance to 50 dBA-L_{eq} Contour (Feet)	Distance to 55 dBA-L_{eq} Contour (Feet)
A	Off-Site Material Borrow	96	9,580	5,387
B	Off-Site Material Borrow	96	9,805	5,514

Segment C Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment D Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment E Levee Work

The distance between levee work and sensitive receptors in this segment would be similar to Alternative 1 except that construction would occur within about 200 feet of residences located along the east end of Tamarack Road.

Segment F Levee Work

The distance between levee work and sensitive receptors in this segment would be similar to Alternative 1 except that construction would occur within about 500 feet of residences located along the east end of Tamarack Road.

Segment G Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Onsite Haul Truck Activity

Onsite haul truck activity would be the same as under Alternative 1.

Offsite Haul Truck Activity on Public Roads

Table 3.7-40 summarizes predicted traffic noise levels based on the maximum projected project daily traffic volumes on public roads in the project area under Alternative 5.

Table 3.7-40. Project Traffic Noise Levels on Public Streets under Alternative 5

Roadway	Segment	Maximum Daily Project Trucks	Speed (mph)	L_{dn} at 50 Feet	Distance to 60 L_{dn} Contour (Feet)
Jefferson Blvd	W Capitol Ave to Lake Washington Blvd	1,227	45	64	83
Jefferson Blvd	Lake Washington to Linden Rd (S)	3,120	45	68	146
Jefferson Blvd	Linden Rd (S) to city limits (S)	3,120	45	68	146
Lake Washington Blvd	Stone Blvd to Jefferson Blvd	2,080	45	66	113
Industrial Blvd	Parkway Blvd to Stone Blvd	2,080	45	66	113
Industrial Blvd	Enterprise Blvd to Parkway Blvd	2,080	45	66	113
Enterprise Blvd	Seaport Blvd to Industrial Blvd	2,080	45	66	113
Linden Rd	Jefferson Blvd to Stonegate Dr	1,442	35	63	75
Linden Rd	Stonegate Dr to S River Rd	1,442	35	63	75
Davis Rd	Jefferson Blvd to S River Rd	1,577	35	63	80
Gregory Ave	Jefferson Blvd to S River Rd	1,778	35	64	85
Burrows Ave	Jefferson Blvd to S River Rd	1,697	35	64	83

Alternative 5—Year 2

Segment A Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Segment B Levee Work

The distance between levee work and sensitive receptors in this segment would be the same as under Alternative 1.

Onsite Haul Truck Activity

Onsite haul truck activity would be the same as under Alternative 1.

Offsite Haul Truck Activity on Public Roads

Table 3.7-40 above summarizes predicted traffic noise levels based on the maximum projected project daily traffic volumes on public roads in the project area under Alternative 5.

Alternative 5—Effect Conclusions

Effect NOI-1: Exposure of Sensitive Receptors to Temporary Construction-Related Noise

The summary of distances discussed above and the results in Table 3.7-36, Table 3.7-37, Table 3.7-38, and Table 3.7-39 indicate that noise from construction work at the borrow sites and levee sites could exceed both West Sacramento and Sacramento daytime noise ordinance standards are nearby residences in West Sacramento and Sacramento. The results also indicate that slurry wall construction could exceed both West Sacramento and Sacramento nighttime noise ordinance standards. Noise from construction work at the borrow sites and levee sites therefore is considered to be significant.

As indicated in the discussion above regarding project traffic noise, noise from haul trucks traveling on public roads is predicted to exceed 60 L_{dn} and therefore is considered to be significant. Similar to Alternative 1, noise from haul trucks on the designated on-site haul routes roads is not predicted to exceed 60 L_{dn} at adjacent residences and therefore is considered to be less than significant.

As with Alternative 1, Implementation of Mitigation Measure NOI-MM-1 would reduce the effect, but it is not anticipated that feasible measures would be available in all situations to reduce noise to below the applicable noise ordinance limits. This direct effect therefore is considered to be significant and unavoidable.

Effect NOI-2: Exposure of Sensitive Receptors to Temporary Construction-Related Vibration

Effects under Alternative 5 associated with exposure of sensitive receptors to construction-related vibration are the same as those under Alternative 1.

Effect NOI-3: Exposure of Sensitive Receptors to Traffic Noise from the Extension of Village Parkway

Implementation of Alternative 5 will require the extension of Village Parkway to accommodate the closure of South River Road. The extension of Village Parkway is a planned feature identified in the Southport Framework Plan. The noise analysis presented in the Southport Framework Plan draft EIR (Willdan Associates 1994) determined that land uses located within about 100 feet of this roadway would be exposed to traffic noise that exceeds 60 L_{dn}. Residences located within this distance would be therefore directly exposed to a significant noise impact. The draft EIR states that Mitigation Measure M.M. 4-8.1 in the draft EIR would reduce this effect to a less-than-significant level.

3.8 Vegetation and Wetlands

This section describes the regulatory and environmental setting for vegetation and wetlands, effects on vegetation and wetlands that would result from the proposed project, and mitigation measures that would reduce these effects.

3.8.1 Affected Environment

This section describes the affected environment for vegetation and wetlands in the Southport project area. The key sources of data and information used in the preparation of this section are cited in the text.

ICF botanists/wetland ecologists conducted prefield investigations and reconnaissance-level field surveys in the project area, as described in the Affected Environment section below. Special-status species with potential to occur in the project area also are discussed in the Affected Environment.

3.8.1.1 Regulatory Framework

Federal

The following Federal regulations related to vegetation and wetlands may apply to implementation of the Southport project.

Endangered Species Act

ESA protects species and their habitats that have been identified by NMFS or USFWS as threatened or endangered. ESA is administered by USFWS and NMFS. In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fish, and USFWS is responsible for other listed species. Under Section 7, the Federal agency conducting, funding, or permitting an action (the lead Federal agency, such as USACE) must consult with NMFS or USFWS, as appropriate, to ensure that the proposed project will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. Three Federally listed plant species, palmate-bracted bird's-beak, Colusa grass, and Crampton's tuctoria, occur in the project vicinity but are not anticipated to be affected by implementation of the Southport project. The project area does not contain critical habitat for any plant species.

Clean Water Act

The CWA is administered by the EPA and USACE. The discharge of dredged or fill material into waters of the United States is subject to permitting under CWA Section 404. Certification from the applicable RWQCB also is required when a proposed activity may result in discharge into waters of the United States, pursuant to CWA Section 401 and EPA's Section 404(b)(1) guidelines. The Southport project area supports waters of the United States, including wetlands, that would be affected by implementation of the Southport project.

Rivers and Harbors Act

Rivers and Harbors Act Section 10 requires authorization from USACE for the construction of any structure in, over or under any navigable waters of the United States. Tidal waterways within the Delta are considered navigable waters. The law applies to any dredging, excavation, filling, or other modification of a navigable water of the United States, as well as to all structures, including bank protection (e.g., riprap). The Southport project area supports a navigable water (Sacramento River). that would be affected by implementation of the Southport project.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) of 1958 requires that all Federal agencies consult with USFWS, NMFS, and the affected state wildlife agency for activities that affect, control, or modify surface waters, including wetlands and other waters. The Southport project area supports wetlands and other waters that would be affected by implementation of the Southport project.

Executive Order 11990: Protection of Wetlands

Executive Order (EO) 11990, signed May 24, 1977, directs all Federal agencies to refrain from assisting in or giving financial support to projects that encroach on publicly or privately owned wetlands. It further requires that Federal agencies support a policy to minimize the destruction, loss, or degradation of wetlands. The Southport project area supports wetlands that would be affected by implementation of the Southport project.

Executive Order 13112: Invasive Species

EO 13112, signed February 3, 1999, directs all Federal agencies to prevent and control the introduction of invasive species in a cost-effective and environmentally sound manner. The EO requires consideration of invasive species in NEPA analyses, including their identification and distribution, their potential effects, and measures to prevent or eradicate them. Invasive plant species could be spread or introduced by implementation of the Southport project.

State

The following state regulations related to vegetation and wetlands may apply to implementation of the Southport project.

California Native Plant Protection Act

The California Endangered Species Act (CESA) defers to the California Native Plant Protection Act (CNPPA) to ensure that state-listed plant species are protected when state agencies are involved in projects subject to CEQA. Plants listed as rare under CNPPA are not protected under CESA, but rather under CEQA. The California Department of Fish and Wildlife (CDFW) is consulted regarding impacts on state-listed species and potential mitigation for unavoidable impacts. One rare-listed species, Mason's lilaeopsis, and three state-listed endangered species, Boggs Lake hedge hyssop, Colusa grass, and Crampton's tuctoria, occur in the project vicinity but are not anticipated to be affected by implementation of the Southport project.

Section 1600 of the California Fish and Game Code

Sections 1600–1603 of the California Fish and Game Code (CFGC) state that it is unlawful for any person or agency to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources, or to use any material from the streambeds without first notifying CDFW. A Lake and Streambed Alteration Agreement (SAA) must be obtained if effects are expected to occur.

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 that supports wildlife, fish, or other aquatic life. This definition includes watercourses having 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, extending to the tops of banks and often including the outer edge of riparian vegetation canopy cover. Riparian trees that have a diameter of 6 inches or greater also fall within CDFW's jurisdiction. The Southport project area supports waterways and riparian vegetation that would be affected by implementation of the Southport project.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act, the State of California, through RWQCBs regulates discharges of waste into any waters of the state, regardless of whether USACE has concurrent jurisdiction under CWA Section 404. *Waters of the state* include all surface water or groundwater within the state. The Southport project area supports waters of the state that would be affected by implementation of the Southport project.

Local

The following local policies related to vegetation and wetlands may apply to implementation of the Southport project.

Yolo County

Yolo County 2030 Countywide General Plan

Policies in the Conservation Element of the Yolo County 2030 Countywide General Plan (Yolo County 2009; LSA Associates 2009) relate to vegetation and wetlands in the project area. Policies relating to resources in the Southport project area that could be affected by implementation of the project include preservation and/or restoration of open space, native vegetation and plant communities, ecological functions in the watershed, and special-status plant species; enforcement of permit and mitigation requirements; prohibition of development within a minimum of 100 feet from the top of banks for all lakes, perennial ponds, rivers, creeks, sloughs, and perennial streams; replacement of nonnative, invasive species with native plants; and increase of inundated floodplain habitats.

Yolo County Oak Woodland Conservation and Enhancement Plan

The Yolo County Oak Woodland Conservation and Enhancement Plan (Yolo County 2007) promotes voluntary efforts to conserve and enhance the county's existing oak woodlands to help minimize the disturbance of the health and longevity of existing oak woodlands. The Southport project area supports valley oak woodlands that would be affected by implementation of the Southport project.

Draft Yolo County Natural Heritage Program

The Yolo County Natural Heritage Program is a countywide Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP) to conserve the natural open space and agricultural landscapes that provide habitat for many special-status species in the county (Yolo County Natural Heritage Program 2009). The Yolo County Natural Heritage Program will describe the measures to conserve important biological resources and obtain permits for urban growth and public infrastructure projects. The Southport project area supports important biological resources to be conserved under the NCCP/HCP that would be affected by implementation of the Southport project.

City of West Sacramento

City of West Sacramento General Plan

Goals and policies in the City of West Sacramento General Plan (Part II, Section 6) (City of West Sacramento 2004) apply to vegetation and wetlands in the Southport project area that would be affected by implementation of the project. These policies include preservation, enhancement, and no net loss of riparian and wetland habitats, particularly at Bees Lakes, the Sacramento River, and DWSC; requirements for site-specific vegetation surveys; development setbacks from wetlands; maintenance of marsh vegetation along irrigation and drainage canals and the DWSC; preservation of special-status species populations; minimization of recreational use effects on riparian habitat; and promotion of using native plants for landscaping near the Sacramento River.

Tree Preservation Ordinance

The City's Tree Preservation Ordinance is found in the West Sacramento Municipal Code, Title 8 (Health and Safety), Chapter 24 (Tree Preservation). The City protects heritage and landmark trees, as defined in the ordinance, and requires tree permits for activities that would affect such trees. Tree permits require the applicant to replace a removed tree or to pay an in-lieu fee to the city. The Southport project area supports heritage trees that would be affected by implementation of the Southport project.

3.8.1.2 Environmental Setting

The following considerations are relevant to vegetation and wetlands conditions in the proposed Southport project area.

Project Area

The project area is in West Sacramento in Yolo County (Plate 1-5). For the purposes of this section, the Southport project area (encompassing the construction footprint, O&M and utility easements, roadway alignment and potential borrow sites) was expanded to include an additional 250-foot-wide buffer zone to support a full assessment of potential effects on wetlands and sensitive habitats. The project area occurs within the Great Central Valley subdivision of the California Floristic Province in Yolo County (Baldwin 2012:41). The topography of the portions of the project area adjacent to the levees is relatively level, and elevations in the project area range from less than 5 feet to approximately 20 feet above mean sea level.

Methods

The methods used to identify vegetation and wetland resources in the project area consisted of a prefield investigation, reconnaissance-level site visits, mapping of the current vegetation cover types, and a delineation of waters of the United States. Each of these components is described below.

Prefield Investigation

Prior to conducting the reconnaissance-level site visits, an ICF International botanist/wetland ecologist reviewed information pertaining to vegetation and wetland resources in the project region, including the California Natural Diversity Database (CNDDB), California Native Plant Society's (CNPS's) *Inventory of Rare and Endangered Plants of California*, and a USFWS list of species for the project region (California Natural Diversity Database 2011 and 2012; U.S. Fish and Wildlife Service 2011, 2012; California Native Plant Society 2011, 2012).

No Federal, state, or local regulatory agencies were contacted prior to conducting the prefield investigation.

Reconnaissance-Level Site Visits and Vegetation Mapping

ICF botanists/wetland ecologists conducted four reconnaissance-level site visits to evaluate existing vegetation and wetland resources and to map vegetation communities throughout the project area. The field visits were conducted on April 29, May 3, May 13, and May 31, 2011, in order to complete the actions below. An additional field visit to an additional potential borrow area was conducted on December 13, 2012.

- Identify land cover types.
- Evaluate whether potential habitat may be present for special-status plant species that have been identified in the project region.
- Identify potential waters of the United States and/or state, including wetlands, to delineate during future surveys (see discussion below).
- Identify invasive plant species present in the project area.

Delineation of Waters of the United States

ICF botanists/wetland ecologists and a soil scientist conducted site visits throughout the accessible parts of the project area for the purpose of delineating all potential waters of the United States, including wetlands, on June 15, 22, and 25 and August 7, 8, 14, and 15, 2012. The delineation was conducted in accordance with guidance provided in the 1987 *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987:53–69), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (U.S. Army Corps of Engineers 2008), and 33 CFR 328.3(e) and 329.11(a)(1). A verification site visit was conducted with USACE on December 11, 2012. A preliminary delineation of an additional proposed borrow area was conducted on January 4, 2013. A preliminary jurisdictional determination verifying the delineation was received from USACE on February 7, 2013.

Special-Status Plant Surveys

Special-status plant surveys have not yet been conducted in all parts of the project area, although many parts were covered during the vegetation mapping and delineation surveys. Not all parcels in the project area were granted access permission, which limited the areas available for the surveys. A list of plant species observed during all surveys is provided in Appendix D.1.

Arborist Survey

An ICF International certified arborist conducted tree surveys in August and September 2012. The arborist survey methods followed standard professional practices, and all tree location data were collected with a global positioning system unit with sub-meter accuracy. The arborist recorded the species, number of trunks, and diameter at breast height (diameter at 4.5 feet above the ground surface, unless otherwise noted, measured with a calibrated diameter-at-breast-height tape), tree height, dripline diameter, and the health and vigor of each tree.

Land Cover Types

Sixteen land cover types were identified in the project area. A crosswalk between the land cover types discussed in this section and those used by the Yolo County Natural Heritage Program for countywide vegetation mapping is provided in Table 3.8-1. This table also includes the mapped acreages for each land cover type.

Table 3.8-1. Crosswalk between Yolo County Natural Heritage Program and Southport Project Land Cover Types and Acreage in Project Area

Yolo County Natural Heritage Program Land Cover Type	Southport Project Land Cover Type	Acreage in the Project Area
Valley foothill riparian	Cottonwood riparian woodland	61.18
	Valley oak riparian woodland	15.44
	Walnut riparian woodland	3.02
	Riparian scrub	14.14
Woodlands and forest	Valley oak woodland	53.72
	Walnut woodland	0.71
Emergent wetlands	Emergent wetland	5.45
Grasslands and prairies	Nonnative annual grassland	84.19
Grain and hay	Cultivated agricultural field	343.60
	Disked/plowed agricultural field	238.85
	Fallow agricultural field	1,262.30
Irrigated grain crops	Same types as grain and hay	
Irrigated hay field	Same types as grain and hay	
Deciduous orchard	Walnut orchard	12.18
Open water	Pond	1.82
	Perennial drainage (Sacramento River)	35.70
	Ditch	24.04
Unvegetated, vacant, developed	Developed/landscaped	123.95
Total project area		2,280.28

Nine of the land cover types are considered natural communities: all four riparian habitats, emergent marsh, valley oak woodland, walnut woodland, nonnative annual grassland, pond, and perennial drainage. The other cover types are associated with human activities: all three agricultural field types, walnut orchard, agricultural ditch, and developed/landscaped. Each of the land cover types is discussed below and shown in Plate 3.8-1.

Riparian Communities

Riparian communities in general are some of the richest community types in terms of structural and biotic diversity of any plant community found in California. Riparian vegetation provides three important functions in addition to that of wildlife habitat: (1) acts as a travel lane between the river and adjacent uplands, providing an important migratory corridor for wildlife; (2) filters out pollutants, thus protecting water quality; and (3) helps to reduce the severity of floods by stabilizing riverbanks. Despite widespread disturbances resulting from urbanization, agricultural conversion, and grazing, riparian forests remain important wildlife resources because of their scarcity regionally and statewide and because riparian communities are used by a large variety of wildlife species.

Cottonwood Riparian Woodland

Cottonwood riparian woodland occurs on the sides of the Sacramento River levee, primarily on the waterside, and also surrounds the Bees Lakes area (Plate 3.8-1). It also occurs along some agricultural ditches. The project area contains a total of 61.18 acres of cottonwood riparian woodland. The dominant overstory species are Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), Goodding's black willow (*Salix gooddingii*), valley oak (*Quercus lobata*), and northern California black walnut (*Juglans hindsii*). The shrub layer is relatively open and contains small valley oaks, box elder (*Acer negundo* var. *californicum*), and tree tobacco (*Nicotiana glauca*). Blue elderberry (*Sambucus nigra*) shrubs also occur in several areas of this woodland. Representative species observed in the herbaceous understory are mugwort (*Artemisia douglasiana*), rough cocklebur (*Xanthium strumarium*), and cudweed (*Gnaphalium luteo-album*).

Some of the trees in the cottonwood riparian woodland meet the definition of heritage or landmark trees as defined in the City's Tree Preservation Ordinance. Riparian woodland (Great Valley cottonwood riparian) is identified as a sensitive natural community by the CNDDB (California Department of Fish and Game 2003). CDFW has adopted a no-net-loss policy for riparian habitat values, and the USFWS mitigation policy identifies California's riparian habitats in Resource Category 2, for which no net loss of existing habitat value is recommended (46 FR 7644).

Valley Oak Riparian Woodland

Valley oak riparian woodland occurs on the waterside of the Sacramento River levee and along larger irrigation ditches in the project area (Plate 3.8-1). Approximately 15.44 acres of valley oak riparian woodland are present in the project area. Plant species associated with valley oak riparian woodland include valley oak, sandbar willow (*Salix exigua*), red willow (*Salix laevigata*), poison-oak (*Toxicodendron diversilobum*), and Himalayan blackberry (*Rubus armeniacus*).

As described above for the cottonwood riparian woodland, some of the trees in the valley oak riparian woodland meet the definition of heritage or landmark trees as defined in the City's Tree Preservation Ordinance, and CDFW and USFWS policies support protection of riparian habitats. Valley oak riparian woodland (Great Valley valley oak riparian) is identified as a sensitive natural community by the CNDDB (California Department of Fish and Game 2003).

Walnut Riparian Woodland

Walnut riparian woodland occurs along an agricultural ditch in the project area (Plate 3.8-1). Approximately 3.02 acre of walnut riparian woodland is in the project area. The dominant overstory species are northern California black walnut and valley oak. The understory is dominated by Himalayan blackberry.

As described above for the cottonwood riparian woodland, some of the trees in the valley oak riparian woodland meet the definition of heritage or landmark trees as defined in the City's Tree Preservation Ordinance, and CDFW and USFWS policies support protection of riparian habitats. Naturally occurring California walnut woodland is identified as a sensitive natural community by the CNDDB (California Department of Fish and Game 2003), although the walnut riparian woodland in the project area was most likely planted along the parcel border where it occurs.

Riparian Scrub

Riparian scrub occurs intermittently on the waterside of the Sacramento River levee and along some ditches in the project area (Plate 3.8-1). Approximately 14.14 acres of riparian scrub are in the project area. The dominant overstory species are willows and saplings of riparian trees found in the riparian woodland land cover types, and elderberry shrubs also occur along some ditches. Woody vegetation in this community is lower-growing than that found in the woodland communities. Some areas of riparian scrub occur where rock has been placed on the levee for erosion control.

Most of the trees in the riparian scrub community are too small to meet the definition of heritage or landmark trees as defined in the City's Tree Preservation Ordinance. Although riparian scrub is not specifically identified as a sensitive natural community by the CNDDB (California Department of Fish and Game 2003), it may represent an early successional stage of the mature riparian woodland communities. CDFW has adopted a no-net-loss policy for riparian habitat values, and the USFWS mitigation policy identifies California's riparian habitats in Resource Category 2, for which no net loss of existing habitat value is recommended (46 FR 7644).

Nonriparian Woodland Communities

Valley Oak Woodland

Valley oak woodland occurs in stands ranging in size from a few trees to several acres and covers approximately 53.72 acres in the project area (Plate 3.8-1). This cover type is distinguished from the oak riparian type by not being associated with a drainage. The dominant overstory species is valley oak, although other tree species are present, including interior live oak (*Quercus wislizeni*) and northern California black walnut. Understory shrub species include Himalayan blackberry and elderberry, and herbaceous grassland species are also present.

Some of the trees in the valley oak woodland meet the definition of heritage or landmark trees as defined in the City's Tree Preservation Ordinance. Valley oak woodland is identified as a sensitive natural community by the CNDDB (California Department of Fish and Game 2003).

Walnut Woodland

One approximately 0.71-acre grove of walnut woodland occurs in the project area north of Linden Road near the intersection with South River Road (Plate 3.8-1). The trees are northern California black walnut (*Juglans hindsii*) and are not associated with any drainage. Although native stands of northern California black walnut are considered special-status species (CNPS List 1B.1) and California walnut woodland is identified as a sensitive natural community by the CNDDB (California Department of Fish and Game 2003), the grove of trees in the project area most likely is planted and not a native occurrence. The trees, therefore, would not be considered special-status species. However, some of the trees in the walnut woodland meet the definition of heritage or landmark trees as defined in the City's Tree Preservation Ordinance.

Wetland Community

Emergent Wetland

Emergent wetland vegetation occurs in undredged agricultural ditches, in the southernmost borrow area, and in patches along the Sacramento River DWSC in the project area and covers approximately 5.45 acres (Plate 3.8-1). The agricultural ditches included in the emergent wetland category support 50% or more cover of wetland vegetation. Ditches that had minimal wetland vegetation at the time of the field survey are discussed below in the Open Water section. It should be noted that annual maintenance of ditches and the DWSC may cause the location and extent of emergent wetland to vary.

Where present, wetland vegetation along the majority of irrigation ditches in the project area consisted of cattails, bulrush, and Himalayan blackberry. These irrigation ditches are considered waters of the United States by USACE because they are hydrologically connected to the Main Canal, which carries water from the Sacramento River that is pumped back into the DWSC.

Emergent wetlands in the DWSC are vegetated by tule (*Schoenoplectus acutus*), narrow-leaved cattail (*Typha angustifolia*), knotweed (*Persicaria* [*Polygonum*] *hydropiperoides*), and monkeyflower (*Mimulus guttatus*), as well as English plantain (*Plantago lanceolata*) and dallisgrass (*Paspalum dilatatum*). Some emergent wetlands were vegetated almost entirely by tule and narrow-leaved cattail.

Herbaceous Community

Nonnative Annual Grassland

Nonnative annual grassland occurs throughout the project area on levee slopes, along roadsides, and in undeveloped parcels (Plate 3.8-1). Two areas of pasture associated with residences are primarily annual grasses that are grazed by horses and were mapped as nonnative annual grassland. Similar vegetation occurs in the fallow agricultural fields, described below, but those areas are larger and are subject to intermittent cultivation. The project area contains 84.19 acres of nonnative annual grassland.

The nonnative annual grassland is dominated by naturalized annual grasses with intermixed perennial and annual forbs. Grasses commonly observed in the project area are foxtail barley (*Hordeum murinum* ssp. *leporinum*), ripgut brome (*Bromus diandrus*), Italian ryegrass, and soft chess (*Bromus hordeaceus*). Other grasses observed were wild oats (*Avena* spp.), Bermuda grass (*Cynodon dactylon*), and rattail fescue (*Vulpia myuros* var. *myuros*). Forbs commonly observed in annual grasslands in the project area are yellow star-thistle (*Centaurea solstitialis*), prickly lettuce (*Lactuca serriola*), bristly ox-tongue (*Picris echioides*), sweet fennel (*Foeniculum vulgare*), Italian thistle (*Carduus pycnocephalus*), horseweed (*Conyza canadensis*), black mustard (*Brassica nigra*), fireweed (*Epilobium brachycarpum*), broad-leaf pepper grass (*Lepidium latifolium*), common sunflower

(*Helianthus annuus*), pigweed (*Chenopodium* sp.), cheeseweed (*Malva parviflora*), bindweed (*Convolvulus arvensis*), and telegraph weed (*Heterotheca grandiflora*). The annual grasslands in the project area contain a relatively large proportion of ruderal species, likely because of substantial disturbance from human activities. Elderberry shrubs occur in several areas of nonnative annual grassland.

Agricultural Communities

Cultivated Agricultural Field

Cultivated agricultural field includes large parcels of wheat, ryegrass, and row crops that were in active cultivation at the time of the 2011 and 2012 field surveys (Plate 3.8-1). These areas could be transitioned to either fallow or disked/plowed conditions at other times. Cultivated agricultural field covers approximately 343.60 acres in the project area.

Disked/Plowed Agricultural Field

Disked or plowed agricultural field includes large parcels that were in active cultivation but were not vegetated at the time of the 2011 field surveys (Plate 3.8-1). These areas could be transitioned to either fallow or cultivated conditions at other times. Disked/plowed agricultural field covers approximately 238.85 acres in the project area.

Fallow Agricultural Field

Fallow agricultural fields occur in large parcels throughout the project area where cultivation is inactive but could be reinitiated (Plate 3.8-1). Approximately 1262.30 acres of fallow agricultural field occur in the project area. The dominant species in these fields are essentially the same as those described for nonnative annual grassland, but fallow fields cover larger areas than the noncultivated grasslands in the project area. Elderberry shrubs occur in several areas of fallow agricultural field.

Walnut Orchard

Two areas of walnut orchard occur in the southern half of the project area, comprising approximately 12.18 acres. The orchards are located approximately halfway between the north and south boundaries of the project area and between the Sacramento River and the Yolo Shortline Rail Corridor (Plate 3.8-1). Walnut orchards are distinguished from the walnut woodland in several respects—the trees are usually English walnut grafted onto a black walnut rootstock and planted in rows for cultivation and harvesting, and the orchard is generally managed intensively, with understory layers that are often unvegetated and sprayed with herbicides or disked.

Open Water Areas

Pond

Ponds in the project area include two features known as Bees Lakes (Plate 3.8-1). The two ponds total approximately 1.82 acres in the project area. The ponds are primarily open water features, although they support partial cover of floating aquatic species such as water meal (*Wolffia* sp.) or duckweed (*Lemna* sp.) and surrounded by cottonwood riparian woodland. They are located at the base of the Sacramento River levee on the landside and may be connected to the Sacramento River by groundwater. These ponds qualify as waters of the United States.

Perennial Drainage

Perennial drainage occurs in the project area in the Sacramento River (Plate 3.8-1). The Sacramento River forms the eastern project area boundary and comprises approximately 35.70 acres in project area. The perennial drainage land cover type is unvegetated, but the river is bordered along much of its length in the project area by riparian woodland or scrub vegetation, as described above. The Sacramento River is a traditional navigable water (TNW), considered a water of the United States.

Ditch

Ditches occur throughout the project area (Plate 3.8-1) and cover approximately 24.04 acres. Ditches in this category include unvegetated agricultural ditches used to irrigate fields and several roadside ditches used to drain runoff. The unvegetated ditches are more highly maintained than the ditches that support emergent wetland vegetation, which are discussed above. Some unvegetated ditches support riparian scrub or riparian woodland habitat along the banks.

The Main Canal in the project area is included as a blue-line feature on the USGS quadrangle. This ditch averages 90 feet in width. The bank of the ditch is vegetated by an emergent wetland community dominated by cattails (*Typha* sp.), bulrush (*Schoenoplectus* sp.), and Himalayan blackberry, but the majority of the ditch is open water. Reclamation District No. 900 currently controls the flow, which is dependent on water pumped from the Sacramento River and is used for irrigation. At its end, water is pumped from the ditch into the DWSC.

Other irrigation ditches branch off the Main Drain to supply water to individual fields in the project area. These additional ditches are generally narrower (widths of approximately 15 feet and 40 feet) and convey water from the Main Drain to individual fields. The locations and sizes of irrigation ditches in the project area are shown in Plate 3.8-1. Mapped ditches in the project area are considered waters of the United States. Smaller ditches that are excavated in upland areas and are temporary features generally are not regulated by state or Federal agencies and were not included on the land cover mapping on Plate 3.8-1.

Developed/Landscaped

The developed/landscaped land cover type was applied to residential parcels that include houses and other structures and where the vegetation is mostly landscaped, horticultural species. This land cover type also includes roads and large paved areas, including the Reclamation District pumping plant on the landside of the DWSC levee. This land cover type comprises approximately 123.95 acres and occurs throughout the project area (Plate 3.8-1).

Waters of the United States, Including Wetlands

The project area contains waters of the United States consisting of the Sacramento River, emergent wetland, pond, and ditches. A preliminary delineation was conducted and submitted to the USACE to determine their jurisdiction in the project area. A site visit was conducted on December 11, 2012 to verify the USACE jurisdiction.

Special-Status Plant Species

Special-status plants are species that are legally protected under CESA, ESA, or other regulations, as well as species considered sufficiently rare by the scientific community to qualify for such listing. For the purposes of this EIS, sensitive plants include:

- Species listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.12 [listed plants] and various notices in the *Federal Register* [proposed species]).
- Species that are candidates for possible future listing as threatened or endangered under ESA (75 FR 69222, November 10, 2010).
- Species listed or proposed for listing by the State of California as threatened or endangered under CESA (14 CCR 670.5).
- Species that meet the definitions of rare or endangered under the State CEQA Guidelines Section 15380.
- Plants listed as rare under the CNPPA (CFGC Section 1900 et seq.).
- Plants considered by CNPS to be "rare, threatened, or endangered in California" (Lists 1B and 2, California Native Plant Society 2012).
- Plants listed by CNPS as plants about which more information is needed to determine their status, and plants of limited distribution (Lists 3 and 4, California Native Plant Society 2012), which may be included as special-status species on the basis of local significance or recent biological information.

Special-status plant species identified with potential to occur in the project area were based on the presence of suitable habitat and microhabitat. Species presumed absent from the project area are those without suitable habitat or microhabitat.

Twenty-four special-status plant species were identified as occurring in the project region (California Natural Diversity Database 2012; California Native Plant Society 2012; U.S. Fish and Wildlife Service 2012) (Appendix D.3). Five of the 24 species are Federally and/or state-listed as endangered or threatened: palmate-bracted bird's-beak (*Cordylanthus palmatus*), Boggs Lake hedge hyssop (*Gratiola heterosepala*), Mason's lilaeopsis (*Lilaeopsis masonii*), Colusa grass (*Neostapfia colusana*), and Crampton's tuctoria (*Tuctoria mucronata*). The status, distribution, habitat requirements, and identification period of the twenty species are shown in Table 3.8-2.

- Three species occur in habitat (vernal pools) that is not present in the project area: legenere (*Legenere limosa*), Colusa grass (*Neostapfia colusana*), and bearded popcorn flower (*Plagiobothrys hystriculus*).
- Thirteen species have habitat present in annual grassland, but suitable microhabitat (adobe clay soils, alkaline soils) is not present and/or the habitat is too disturbed by mowing or discing. No alkaline, serpentine, or adobe clay soils have been documented in the 16 soil mapping units present in the project area: Clear Lake soils, flooded; Lang sandy loam,; Lang sandy loam, deep; Lang silt loam; Made land; Merritt silty clay loam; Riz loam; Sacramento silty clay loam; Sacramento soils, flooded; Sycamore silt loam; Tyndall very fine sandy loam, deep; Valdez silt loam, deep; Water; Willows silty clay loam; Willows soils, flooded; and Yolo silty clay loam (Andrews 1972:15, 16, 18, 27– 30, 33, 34, 36–39, 41, 42; Natural Resources Conservation Service 2011).
- One species is northern California black walnut (*Juglans hindsii*). Although the riparian woodland communities are potential habitat for northern California black walnut and one stand of planted black walnut trees occurs in the project area, no protected native stands were observed.

1 **Table 3.8-2. Special-Status Plants Identified as Occurring in the Project Region for the Southport Project**

Common and Scientific Name	Legal Status[a] Federal/ State/CNPS	Geographic Distribution/ Floristic Province[b]	Habitat Requirements	Identification Period	Potential for Occurrence in Southport Project Area
Ferris's milk vetch *Astragalus tener* var. *ferrisiae*	–/–/1B.1	Historical range included the Central Valley from Butte to Alameda Counties; currently only occurs in Butte and Glenn Counties	Seasonally wet areas in meadows and seeps, sub-alkaline flats in valley and foothill grassland; 16–246 feet	Apr–May	Habitat present in grasslands but no suitable microhabitat (alkaline flats) is present. Nearest recorded occurrence is ~5 miles southwest of the project area.
Alkali milk vetch *Astragalus tener* var. *tener*	–/–/1B.2	Southern Sacramento Valley, northern San Joaquin Valley, eastern San Francisco Bay	Playas, on adobe clay in valley and foothill grassland, vernal pools on alkali soils; below 197 feet	Mar–Jun	Habitat present in grasslands but suitable microhabitat (adobe clay) is not present. Nearest recorded occurrence is ~5 miles southwest of the project area.
Heartscale *Atriplex cordulata* var. *cordulata*	–/–/1B.2	Western Central Valley and valleys of adjacent foothills	Saline or alkaline soils in chenopod scrub, meadows and seeps, sandy areas in valley and foothill grassland; below 1,230 feet	Apr–Oct	Habitat present in grasslands and sandy soils occur in the project area, but grasslands are highly disturbed by human activities. No saline or alkaline soils have been documented in the project area. Nearest recorded occurrence (extirpated) was ~9 miles northwest of the project area.
Brittlescale *Atriplex depressa*	–/–/1B.2	Western and eastern Central Valley and adjacent foothills on west side of Central Valley	Alkaline or clay soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland, vernal pools; below 1,050 feet	Apr–Oct	Habitat present in grasslands but no suitable microhabitat (alkaline soils) is present. Nearest recorded occurrence is ~9 miles northwest of the project area.
San Joaquin saltscale *Atriplex joaquiniana*	–/–/1B.2	Western edge of the Central Valley from Glenn to Tulare Counties	Alkaline soils in chenopod scrub, meadows and seeps, playas, valley and foothill grassland; below 2,739 feet	Apr–Oct	Habitat present in grasslands but no suitable microhabitat (alkaline soils) is present. Nearest recorded occurrence is ~6 miles west of the project area.
Bristly sedge *Carex comosa*	–/–/2.1	Scattered occurrences throughout California; Oregon, Washington, and elsewhere	Coastal prairie, marshes and swamps at lake margins, valley and foothill grassland; below 625 meters	May–Sep	Habitat present in annual grasslands, but habitat is likely too disturbed (mowing and discing) to support the species. Habitat present at edge of Bees Lakes ponds. Nearest recorded occurrence is ~9.5 miles south of the project area.

Common and Scientific Name	Legal Status[a] Federal/ State/CNPS	Geographic Distribution/ Floristic Province[b]	Habitat Requirements	Identification Period	Potential for Occurrence in Southport Project Area
Palmate-bracted bird's-beak *Chloropyron palmatum* [*Cordylanthus palmatus*]	E/E/1B.1	Livermore Valley and scattered locations in the Central Valley from Colusa to Fresno Counties	Alkaline grassland, alkali meadow, chenopod scrub; 16–508 meters	May–Oct	Grasslands in project area lack typical associates (iodine bush [*Allenrolfea occidentalis*]) and no suitable microhabitat (alkaline soils) is present. Nearest recorded occurrence is more than 10 miles away.
Peruvian dodder *Cuscuta obtusiflora* var. *glandulosa*	–/–/2.2	Not seen since 1948; occurrences in Butte, Los Angeles, Merced, Sacramento?, San Bernardino*, and Sonoma Counties; Baja California and elsewhere	Freshwater marshes and swamps; 15-280 meters	Jul-Oct	Suitable habitat in emergent wetland habitats in agricultural ditches that are subject to disturbance from human activities. Nearest recorded occurrence is ~9 miles southeast of the project area. Not observed within accessible ditch habitat in June 2012.
Dwarf downingia *Downingia pusilla*	–/–/2.2	Inner North Coast Ranges, southern Sacramento Valley, northern and central San Joaquin Valley	Mesic areas in valley and foothill grassland, vernal pools; below 1,460 feet	Mar–May	Habitat present in mesic annual grasslands, but habitat is likely too disturbed (mowed or disced) to support the species. Nearest recorded occurrence is ~6.5 miles south of the project area.
Stinkbells *Fritillaria agrestis*	–/–/4.2	Outer North Coast Ranges, Sierra Nevada foothills, Central Valley, central western California	Clay, sometimes serpentine soils in chaparral, cismontane woodland, pinyon-juniper woodland, valley and foothill grassland; 33–5,102 feet	March–June	Habitat present in grassland and clay subsoils may be present at surface from disturbance to project area. Grasslands are highly disturbed from human activities (mowing and discing). No serpentine soils occur in the project area. Nearest recorded occurrence is ~8.5 miles northeast of the project area.
Boggs Lake hedge hyssop *Gratiola heterosepala*	–/E/1B.2	Inner North Coast Ranges, central Sierra Nevada foothills, Sacramento Valley, Modoc Plateau	Marshes and swamps along lake margins, vernal pools on clay soils; 32–7,792 feet	Apr–Aug	No vernal pool habitat present. Potential for emergent wetland habitat at Bees Lakes pond edges, although ponds are unlikely to be naturally occurring features. Nearest recorded occurrence is ~10 miles southeast of the project area. Not observed at accessible areas of the Bees Lakes ponds in June 2012.

Common and Scientific Name	Legal Status[a] Federal/ State/CNPS	Geographic Distribution/ Floristic Province[b]	Habitat Requirements	Identification Period	Potential for Occurrence in Southport Project Area
Rose-mallow *Hibiscus lasiocarpus* var. *occidentalis*	–/–/2.2	Central and southern Sacramento Valley, deltaic Central Valley, and elsewhere in the U.S.	Freshwater marsh along rivers and sloughs; below 394 feet	Jun–Sep	Emergent wetland habitat is present only in agricultural ditches that are subject to disturbance from human activities. Nearest recorded occurrence is ~5 miles north of the project area. Not observed within accessible ditch or riverbank habitat in June 2012.
Northern California black walnut *Juglans hindsii*	–/–/1B.1	Last two native stands in Napa and Contra Costa Counties; historically widespread through southern Inner North Coast Ranges, southern Sacramento Valley, northern San Joaquin Valley, San Francisco Bay	Riparian scrub and riparian woodland; below 1,443 feet	Apr–May	Riparian habitat present and one planted stand of black walnut, but no native stands observed during field surveys. Nearest recorded occurrence along the Sacramento River ~4.5 miles downstream of the project area is extirpated.
Legenere *Legenere limosa*	–/–/1B.1	Sacramento Valley, North Coast Ranges, northern San Joaquin Valley and Santa Cruz mountains	Vernal pools; below 2,887 feet	Apr–Jun	No vernal pool habitat present. Nearest recorded occurrence is ~6.5 miles southeast of the project area.
Heckard's pepper-grass *Lepidium latipes* var. *heckardii*	–/–/1B.2	Southern Sacramento Valley	Alkaline flats in valley and foothill grassland; 32–656 feet	Mar–May	Habitat present in grasslands but no suitable microhabitat (alkaline soils) is present. Nearest recorded occurrence is ~6.5 miles southwest of the project area.
Mason's lilaeopsis *Lilaeopsis masonii*	–/R/1B.1	Southern Sacramento Valley, Sacramento–San Joaquin River Delta, northeast San Francisco Bay Area in Alameda, Contra Costa, Marin, Napa, Sacramento, San Joaquin, Solano, and Yolo Counties	Freshwater or brackish marsh, riparian scrub, in tidal zone	Apr–Nov	Habitat present on the Sacramento River bank, but not known to occur in this area; flow and boat wakes are likely too great for establishment of this species. Habitat also present on the DWSC banks. Nearest recorded occurrence is on the DWSC ~0.75 miles south of the project area.
Little mousetail *Myosurus minimus* ssp. *apus*	–/–/3.1	Central Valley, San Francisco Bay area, southern Outer Coast Ranges, South Coast	Alkaline soils in valley and foothill grassland and vernal pools; 66–2,100 feet	Mar–Jun	Project area is lower than species' known elevation range. No alkaline soils or vernal pool habitat present. No recorded occurrences within 10 miles of the project area.

Common and Scientific Name	Legal Status[a] Federal/ State/CNPS	Geographic Distribution/ Floristic Province[b]	Habitat Requirements	Identification Period	Potential for Occurrence in Southport Project Area
Baker's navarretia *Navarretia leucocephala* ssp. *bakeri*	–/–/1B.1	Inner North Coast Ranges, western Sacramento Valley	Mesic areas in cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, vernal pools;16–5,709 feet	Apr–Jul	Habitat present in mesic annual grasslands, but habitat is likely too disturbed (mowing and discing) to support the species. Nearest recorded occurrence is ~6.5 miles southwest of the project area.
Colusa grass *Neostapfia colusana*	T/E/1B.1	Central Valley with scattered occurrences from Colusa to Merced Counties	Adobe soils of vernal pools; 16–656 feet	May–Aug	No vernal pool habitat present. Nearest recorded occurrence is ~5.5 miles west of the project area.
Bearded popcorn flower *Plagiobothrys hystriculus*	–/–/1B.1	Endemic to Solano County	Mesic grassland, vernal pools; 10-274 meters	Apr-May	Habitat present in mesic annual grasslands, but habitat is likely too disturbed to support the species. Nearest recorded occurrence is ~4 miles southwest of the project area.
Sanford's arrowhead *Sagittaria sanfordii*	–/–/1B.2	Scattered locations in Central Valley and Coast Ranges from Del North to Fresno Counties	Freshwater marshes, sloughs, canals, and other slow-moving water habitats; below 2,132 feet	May–Oct	Suitable habitat in emergent wetland habitats in agricultural ditches that are subject to disturbance from human activities. Nearest recorded occurrence is ~1.5 miles east of the project area. Not observed within accessible ditch habitat in June 2012.
Suisun Marsh aster *Symphotrichum lentum*	–/–/1B.2	Sacramento–San Joaquin River Delta, Suisun Marsh, Suisun Bay: Contra Costa, Napa, Sacramento, San Joaquin, and Solano Counties	Brackish and freshwater marshes and swamps; below 3 meters	May–Nov	Suitable habitat in emergent wetland habitats in agricultural ditches that are subject to disturbance from human activities and parts of the Sacramento River. Nearest recorded occurrence is ~2 miles west of the project area. Not observed within accessible ditch or riverbank habitat in June 2012.
Saline clover *Trifolium hydrophilum*	–/–/1B.2	Sacramento Valley, central western California	Salt marsh, mesic alkaline areas in valley and foothill grasslands, vernal pools, marshes and swamps; below 300 meters	Apr–Jun	Habitat present in grasslands but no suitable microhabitat (alkaline soils) is present. Nearest recorded occurrence is ~6 miles southwest of the project area.

Common and Scientific Name	Legal Status[a] Federal/ State/CNPS	Geographic Distribution/ Floristic Province[b]	Habitat Requirements	Identification Period	Potential for Occurrence in Southport Project Area
Crampton's tuctoria *Tuctoria mucronata*	E/E/1B.1	Southwestern Sacramento Valley, Solano and Yolo Counties	Mesic areas in valley and foothill grassland, vernal pools; 16–33 feet	Apr–Aug	Habitat present in mesic annual grasslands, but habitat is likely too disturbed to support the species. Nearest recorded occurrence is ~5.5 miles west of the project area.

Source: California Native Plant Society 2012; California Natural Diversity Database 2012.

[a] Status explanations:

Federal

E = listed as endangered under the Federal Endangered Species Act.

T = listed as threatened under the Federal Endangered Species Act.

– = no listing.

State

E = listed as endangered under the California Endangered Species Act.

R = listed as rare under the California Native Plant Protection Act (this category is no longer used for newly listed plants, but some plants previously listed as rare retain this designation.

– = no listing.

California Native Plant Society (CNPS) California Rare Plant Rank

1B = List 1B species: rare, threatened, or endangered in California and elsewhere.

2 = List 2 species: rare, threatened, or endangered in California but more common elsewhere.

3 = List 3 species: more information is needed about this plant.

4 = List 4 species: limited distribution and on a watch list.

0.1 = seriously endangered in California.

0.2 = fairly endangered in California.

* = presumed extirpated from that County.

[b] Floristic provinces as defined in Baldwin 2012.

- Habitat for one species, Mason's lilaeopsis (*Lilaeopsis masonii*), includes mudflats on river banks; however, the Sacramento River is too fast-flowing and has boat wakes that are too large for the establishment of this species. Mudflats along the DWSC could support Mason's lilaeopsis, and potential for the occurrence of this species is moderate.

- Six species have low potential to occur in emergent wetland habitat in the project area: bristly sedge (*Carex comosa*), Peruvian dodder (*Cuscuta obtusifolia* var. *glandulosa*), Boggs Lake hedge hyssop *(Gratiola heterosepala*), rose-mallow *(Hibiscus lasiocarpus*), Sanford's arrowhead *(Sagittaria sanfordii*), and Suisun Marsh aster (*Symphotrichum lentum*). Suitable habitat for bristly sedge and Boggs Lake hedge-hyssop could occur on the margins of the Bees Lakes ponds, although these ponds are probably not naturally occurring and are unlikely to support these species. Peruvian dodder, rose-mallow, Sanford's arrowhead, and Suisun Marsh aster could occur in agricultural ditches that support emergent wetland. Rose-mallow and Suisun Marsh aster could also occur on parts of the Sacramento River bank. However, these habitats are likely disturbed by maintenance activities in the ditches and wave action or scour on the river bank, so the potential for occurrence is low.

Invasive Plant Species

Invasive plants in the project area were identified based on the California Department of Food and Agriculture *Pest Ratings of Noxious Weed Species and Noxious Weed Seed* (California Department of Food and Agriculture 2010) and the California Invasive Plant Council's California Invasive Plant Inventory (California Invasive Plant Council 2006, 2007). The list of plant species observed provided in Appendix D.1 identifies which species are included on either of these lists.

3.8.2 Environmental Consequences

This section describes the environmental consequences relating to vegetation and wetlands for the proposed Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative. Sufficiency or adequacy of mitigation discussed throughout refers to the ability of identified measures to reduce an effect below the CEQA threshold of significance. WSAFCA's potential obligations to offset project effects through compensatory mitigation to various agencies will be determined during project approval in consultation with affected agencies.

3.8.2.1 Assessment Methods

This evaluation of vegetation and wetlands is based on professional standards and information cited throughout the section.

The key effects were identified and evaluated based on the environmental characteristics of the Southport project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project.

3.8.2.2 Determination of Effects

For this analysis, an environmental effect was significant related to vegetation and wetlands if it would result in any of the effects listed below. These effects are based on NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

- 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 or USFWS.
- Substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by CDFW or USFWS.
- Substantial adverse effect on Federally protected wetlands as defined by CWA Section 404 (including, but not limited to, marshes and vernal pools) through direct removal, filling, hydrological interruption, or other means.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted habitat conservation plan, natural communities conservation plan, or other approved local, regional, or state habitat conservation plan.

Effect Assumptions

The following assumptions were made regarding project effects on vegetation and wetlands in the project area.

- All construction activities, including equipment staging and access, would take place only within the project area shown in Plate 1-5.
- For all proposed alternatives, construction of seepage berms would prevent through- and under-seepage from the adjacent levee. As part of the proposed project, the seepage berms would be hydroseeded with native grassland species after construction. Therefore, the seepage berm area would not support wetland hydrology and would comprise upland habitat after construction.
- Construction of adjacent levees and levee slope flattening would both result in removal of landside and waterside woody riparian vegetation.
- The depth of borrow area excavation may intercept the water table in the project area during construction; following material extraction, borrow areas would be restored to a depth of no greater than 3 feet below grade. Borrow areas would be hydroseeded with native grassland species and would support upland habitat after construction.
- For the purpose of this analysis, excavation in borrow areas is assumed to avoid sensitive habitats wherever feasible, including riparian woodlands, valley oak and walnut woodlands, emergent wetlands, ditches, ponds, and perennial drainages. Protected trees located outside of woodland habitats would also be avoided or such loss mitigated in accordance with the City's Tree Preservation Ordinance.
- Hydrology of the Bees Lakes area is supported by groundwater, and pond depth is dependent on water level in the Sacramento River. The agricultural ditch on the west side of the Bees Lakes

area is a separate feature from the ponds and shows no evident surface water connection to the ponds.

- Under Alternatives 2 and 5, five breaches of the existing levee would be excavated, and under Alternative 4, two breaches would be excavated. These breaches would vary from 600 to 1,500 feet in length. While the analysis assumes that at least part of the breach areas would be replanted with riparian vegetation following construction, more than 10 years could elapse before the trees planted in the restoration area would reach a similar mature size to the existing riparian trees that would be removed.
- Loss of agricultural and annual grassland vegetation would not be considered an adverse effect from a botanical standpoint, because these habitats are common and not considered sensitive community types. They are also more easily reestablished after disturbance than riparian or wetland communities. The loss of agricultural and annual grassland habitats could be adverse for wildlife, however, and this effect is discussed in Section 3.10, Wildlife.

Effect Mechanisms

Vegetation and wetland resources could be directly and indirectly affected by the project alternatives. The following types of activities could cause varying degrees of effects on these resources.

- Vegetation removal for seepage berm and levee construction, utilization of borrow sites, and recontouring of the existing levee.
- Grading and fill placement during construction of levee alternatives.
- Placement of slurry cutoff walls, interrupting groundwater connectivity.
- Channel dewatering or installation of temporary water-diversion structures.
- Temporary stockpiling and sidecasting of soil, construction materials, or other construction wastes.
- Soil compaction, dust, and water runoff from the construction site into adjacent areas.
- Introduction or spread of invasive plant species into adjacent open space areas.
- Runoff of herbicides, fertilizers, diesel fuel, gasoline, oil, raw concrete, or other toxic materials used for levee construction, operations, and maintenance into sensitive biological resource areas (e.g., riparian habitat, wetlands).
- Placement of rock slope protection on the waterside of levees.
- O&M activities, including removal of weeds, tree and shrub trimming up to four times per year, and reconditioning of levee slopes and road with a bull dozer, as needed.

3.8.3 Effects and Mitigation Measures

For ease of reference, Table 3.8-3 summarizes effects to waters of the United States by alternative. Effect findings, including significance and available mitigation, are discussed below beginning in Section 3.8.3.2.

Table 3.8-3. Summary of Permanent Effect Acreages on Waters of the United States by Alternative

Project Alternative	Emergent Wetland	Pond	Perennial Drainage	Ditch	Total
Alternative 1	0	0	48.70	1.48	50.18
Alternative 2	0	1.82	35.86	1.93	39.61
Alternative 3	0	0.11	48.00	1.41	49.41
Alternative 4	0	0	38.74	1.85	40.59
Alternative 5	0	0	35.76	1.85	37.61

3.8.3.1 No Action Alternative

In general, the No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be implemented, and no construction-related effects on vegetation or wetlands would occur. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

As presented in Chapter 2, "Alternatives," the No Action Alternative is characterized by three possible vegetation effect scenarios.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

Under modified application of the ETL as proposed in the ULDC, no vegetation would be added to the levee prism or within 15 feet of the landside and waterside levee toes. Understory vegetation that is less than 4 inches in diameter at breast height or over 12 inches high would be removed, and new volunteer vegetation would not be allowed to grow on the levee. In addition, existing vegetation would be allowed to die out within its natural lifecycle so that, over time, the levee would become covered with only grasses. Understory vegetation maintenance would be similar to current vegetation management activities, such as mowing levee grasses and thinning restoration plantings. Trees and larger shrubs would die out over a course of time, which could take 30 years or more.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

Implementation of the No Action Alternative would result in the following effects on vegetation (Table 3.8-4).

Table 3.8-4. Vegetation Effects for the No Action Alternative

Effect	Scenario	Finding—Direct
VEG-NA-1: Disturbance or Removal of Riparian Trees in Compliance with the USACE Levee Vegetation Policy	No ETL	No effect
	Modified ETL	Significant
	Full ETL	Significant

Effect VEG-NA-1: Disturbance or Removal of Riparian Trees in Compliance with the USACE Levee Vegetation Policy

Table 3.8-5 below summarizes the potential loss of trees based on the three No Action Alternative scenarios. The extent of the full ETL effect is dependent on what portion of the existing levee would be officially deemed as the levee prism according to USACE. In some cases, the current levees are wider than the minimum requirements, and existing vegetation may fall outside of the vegetation-free zone. Implementation of the modified ETL as proposed in the ULDC would not directly remove trees, but in the long term would result in a loss of all trees.

Table 3.8-5. Tree Removal or Loss under the No Action Alternative

	Full ETL	No ETL	Modified ETL
Potential Approximate Number of Trees Removed or Lost over Time	1,260	0	1,260

Under the full ETL and over many years under the modified ETL, the only plant species permitted in the vegetation-free zone would be non-irrigated perennial grasses, with preference given to native species that are appropriate to local climate, conditions, and surrounding or adjacent land uses.

Permanent loss of the woody vegetation in compliance with USACE's policies would have a substantial adverse effect on riparian habitat and, therefore, would result in an adverse effect on riparian habitat. These effects are considered significant.

3.8.3.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on vegetation and wetlands (Table 3.8-6). The acreage of habitat loss within each segment of the project is provided in Table 3.8-7. Effect locations are shown on Plate 3.8-2.

Table 3.8-6. Vegetation and Wetlands Effects and Mitigation Measures for Alternative 1

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction	Significant	Significant	Significant and unavoidable	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor
VEG-2: Loss of Waters of the United States as a Result of Project Construction	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-5: Compensate for the Loss of Waters of the United States
VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-6: Compensate for Loss of Protected Trees

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction	Potentially significant	No effect	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-7: Retain Qualified Botanists to Conduct Floristic Surveys for Special-Status Plants during Appropriate Identification Periods VEG-MM-8: Avoid or Compensate for Substantial Effects on Special-Status Plants
VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction	Less than significant	Less than significant	NA	None
VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	Potentially significant	Potentially significant	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor

Table 3.8-7. Temporary and Permanent Effect Acreages under Alternative 1

Project Component	Cottonwood Riparian Woodland	Valley Oak Riparian Woodland	Walnut Riparian Woodland	Riparian Scrub	Valley Oak Woodland	Walnut Woodland	Emergent Wetland[1]	Pond[1]	Perennial Drainage[1]	Ditch[1]
Project Area										
Temporary	0	0.63	0	0	0	0	0	0	0	0.24
Permanent	25.77	0.25	2.40	9.80	14.74	0.71	0	0	48.70	1.48
Total All Effects	***25.77***	***0.88***	***2.40***	***9.80***	***14.74***	***0.71***	***0***	***0***	***48.70***	***1.72***

[1] These types are under the jurisdiction of the U.S. Army Corps of Engineers, based on verification of the delineation of Waters of the United States.

Effect VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction

Under Alternative 1, riparian habitat on the existing levees would be removed for construction of the proposed adjacent levees and seepage berms. To allow for placement of rock slope erosion protection and permit necessary inspection and maintenance activities, all woody vegetation would be permanently removed from the waterside and landside of the existing levee, as well as within the footprint of the adjacent levee, seepage berm, and O &M corridor.

Construction of Alternative 1 in Segments A through G would permanently remove a total of approximately 25.77 acres of cottonwood riparian woodland, 0.25 acre of valley oak riparian woodland, 2.40 acres of walnut riparian woodland, and 9.80 acres of riparian scrub (see Table 3.8-7). Loss of riparian habitat would constitute a direct effect.

The greatest loss of riparian woodland would occur in Segments B, C, and F. In Segment E at Bees Lakes, a minimal amount of woody vegetation would be removed to construct a seepage berm on the landside of the Bees Lakes wetlands and riparian habitat. In this segment, only a small area of cottonwood riparian woodland would be removed for construction of the setback levee.

Loss of riparian habitats on the existing levee would be permanent, because riparian restoration would not be permitted on the levees or seepage berms in order to comply with the USACE levee vegetation policy. The policy requires that the crown, slopes, and areas within 15 feet of the waterside and landside levee toes remain free of all woody vegetation.

Riparian habitat is located at the southern edge of one proposed staging area for Alternative 1 and could be temporarily affected during project construction. Indirect effects on riparian habitat adjacent to the construction area could occur because of changes in off-site drainage patterns caused by grading during construction.

Riparian communities, including cottonwood riparian woodland and valley oak riparian woodland are considered sensitive natural communities by the CNDDB (California Natural Diversity Database 2010). These woodlands and the riparian scrub would be regulated by CDFW and USFWS (46 FR 7644) under no-net-loss policies for existing riparian habitat values.

Because the loss of riparian habitat as a result of the proposed project would be substantial, the disturbance and removal of riparian habitat would be considered a significant effect. Implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2, Protection of Regulated and Riparian Trees) and implementation of Mitigation Measures VEG-MM-1, VEG-MM-2, VEG-MM-3, and VEG-MM-4 would reduce permanent direct effects to a lesser level and would prevent temporary and indirect effects on riparian habitat. Due to the requirement to mitigate offsite and the length of time required for newly planted trees to reach mature size, however, permanent effects on riparian habitat would remain significant and unavoidable.

Mitigation Measure VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat

For direct effects on woody riparian habitat that cannot be avoided, WSAFCA will compensate for the loss of riparian habitat to ensure no net loss of habitat functions and values. Compensation ratios will be based on site-specific information and determined through coordination with the appropriate state and Federal agencies during the permitting process. Compensation will be provided based on the ratio determined (e.g., 2:1=2 acres restored/created/enhanced or credits purchased for every 1 acre removed). Compensation may be a combination of onsite restoration, offsite restoration or mitigation credits. WSAFCA will develop a restoration and monitoring plan that describes how riparian habitat will be enhanced or recreated and monitored over a minimum period of time, as determined by the appropriate state and Federal agencies.

If WSAFCA identifies onsite areas that are outside the USACE vegetation-free zone and chooses to compensate onsite or in the project vicinity, a revegetation plan will be prepared. Mitigation site selection will avoid areas where future disturbance or maintenance is likely. The revegetation plan will be prepared by a qualified restoration ecologist and reviewed by the appropriate agencies prior to removal of existing riparian vegetation. The revegetation plan will specify the planting stock appropriate for each riparian land cover type and each mitigation site, ensuring the use of genetic stock from the project area. The plan will employ the most successful techniques available at the time of planting. Success criteria will be established as part of the plan and will include a minimum of 80% revegetation success at the end of 5 years and will attain 70% revegetation success after 3 years and 75% vegetative coverage after 5 years.

WSAFCA will monitor and maintain the plantings as necessary for 5 years, including weed removal, irrigation, and herbivory protection. WSAFCA will submit annual monitoring reports of survival to the regulatory agencies issuing permits related to habitat effects, including CDFW, USACE, NMFS, and USFWS. Replanting will be necessary if success criteria are not met and replacement plants will subsequently be monitored and maintained to meet the success criteria. The riparian habitat mitigation will be considered successful when the sapling trees established meet the success criteria, the habitat no longer requires active management, and vegetation is arranged in groups that, when mature, replicate the area, natural structure, and species composition of similar riparian habitats in the region.

Mitigation Measure VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species

To clearly demarcate the project boundary and protect sensitive natural communities, WSAFCA or its contractors will install temporary exclusion fencing around the project boundaries (including access roads, staging areas, etc.) 1 week prior to the start of construction activities. WSAFCA will ensure that the temporary fencing is continuously maintained until all construction activities are completed and that construction equipment is confined to the designated work areas, including any off-site mitigation areas and access thereto. The exclusion fencing will be removed only after construction for the year is entirely completed.

Exclusionary construction fencing and explanatory signage will be placed around the perimeter of sensitive vegetation communities that could be affected by construction activities throughout the period during which such effects occur. Signage will explain the nature of the sensitive resource and warn that no effect on the community is allowed. The fencing will include a buffer zone of at least 20 feet between the resource and construction activities. All exclusionary fencing will be maintained in good condition throughout the construction period.

Mitigation Measure VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel

Before any work occurs in the project area, including grading, a qualified biologist will conduct mandatory contractor/worker awareness training for construction personnel. The awareness training will be provided to all construction personnel to brief them on the need to avoid effects on sensitive biological resources (e.g., riparian habitat, special-status species, wetlands and other sensitive biological communities) and the penalties for not complying with permit requirements. The biologist will inform all construction personnel about the life history of special-status species with potential for occurrence on site, the importance of maintaining habitat, and the terms and conditions of the BO or other authorizing document. Proof of this instruction will be submitted to USFWS, CDFW, or other overseeing agency, as appropriate.

The training will also cover the restrictions and guidelines that must be followed by all construction personnel to reduce or avoid effects on sensitive biological communities and special-status species during project construction. The crew leader will be responsible for ensuring that crew members adhere to the guidelines and restrictions. Educational training will be conducted for new personnel as they are brought on the job during the construction period. General restrictions and guidelines for vegetation and wildlife that must be followed by construction personnel are listed below.

- Project-related vehicles will observe the posted speed limit on hard-surfaced roads and a 10-mile-per-hour speed limit on unpaved roads during travel in the project site.
- Project-related vehicles and construction equipment will restrict off-road travel to the designated construction area.
- All food-related trash will be disposed of in closed containers and removed from the project area at least once a week during the construction period. Construction personnel will not feed or otherwise attract fish or wildlife to the project site.
- No pets or firearms will be allowed in the project site.
- To prevent possible resource damage from hazardous materials such as motor oil or gasoline, construction personnel will not service vehicles or construction equipment outside designated staging areas.

Mitigation Measure VEG-MM-4: Retain a Biological Monitor

WSAFCA will retain qualified biologists to monitor construction activities adjacent to sensitive biological resources (e.g., special-status species, riparian habitat, wetlands, elderberry shrubs). The biologists will assist the construction crew, as needed, to comply with all project implementation restrictions and guidelines. In addition, the biologists will be responsible for ensuring that WSAFCA or its contractors maintain the construction barrier fencing adjacent to sensitive biological resources.

Effect VEG-2: Loss of Waters of the United States as a Result of Project Construction

Construction of Alternative 1 would result in the permanent fill of features that are waters of the United States, including a perennial drainage and unvegetated agricultural and roadside ditches. Placement of fill would occur in ditches that are within the footprint of the proposed adjacent levees, seepage berms, and O&M corridor, as well as in the footprint of the setback levee at Bees Lakes in Segments D and E. This analysis assumes that the ditches would not be replaced after the excavation is completed. In addition, rock slope protection would be placed within open water in the Sacramento River for erosion control.

Construction of Alternative 1 in Segments A through G would result in the permanent loss of 48.70 acres of perennial drainage and 1.48 acres of unvegetated ditches (Table 3.8-7). These losses constitute a direct adverse effect. This extent of effect is based on the verified delineation of waters of the United States and waters of the state in the project area.

Alternative 1 would have no effect on Bees Lakes, the ponds located in Segment E, as no fill would occur at that location. Further, although Alternative 1 would include installation of a 30-foot-deep slurry cutoff wall in Segment E, static groundwater levels on both the landside and waterside of the slurry cutoff wall in the proximity of Bees Lakes would be unaffected, resulting in no effect to Bees Lakes water levels.

An agricultural ditch located at the southern end of one proposed staging area for Alternative 1 could be temporarily affected during project construction. Indirect effects on wetlands and other waters adjacent to the construction area could occur because of changes in off-site drainage patterns caused by grading during construction.

The proposed project would have a direct adverse effect on Federally protected waters of the United States through direct removal, filling, and hydrological interruption; therefore, this effect would be significant. With implementation of the EC to develop a SWPPP (Chapter 2, Section 2.4.12, Stormwater Pollution Prevention Plan) and Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, and VEG-MM-5, no additional mitigation would be needed to reduce permanent direct effects to a less-than-significant level and would prevent temporary and indirect effects on wetlands and other waters.

Mitigation Measure VEG-MM-5: Compensate for the Loss of Waters of the United States

Compensation for the loss of waters of the United States will include restoring or enhancing open water habitat at a mitigation ratio that will be developed in coordination with regulatory agencies to ensure no net loss of habitat functions and values. Before receiving a Corps 404 permit for fill of existing open water habitat, WSAFCA will prepare a restoration plan to compensate for the loss of open water habitat and submit the plan to the appropriate regulatory agencies for review. In most, if not all, cases, open water habitat will be compensated out-of-kind by restoring the riparian habitat adjacent to open water habitat. Restoration of riparian habitat will improve open water habitat quality by increasing the amount of cover adjacent to the aquatic habitat for birds and terrestrial species, and the amount of shaded riverine area in the aquatic habitat for fish and other aquatic species.

The restoration plan will be prepared by a qualified restoration ecologist. The restoration plan will specify the planting stock appropriate for each riparian cover type and each mitigation site, ensuring the use of genetic stock from the project area. The plan will employ the most successful techniques available at the time of planting. Success criteria will be established as part of the plan. The restoration will be conducted on site or in the vicinity, but mitigation site selection will avoid areas where future maintenance would be likely.

If off-site mitigation is necessary, a location adjacent to open water will be selected. An area that currently supports minimal riparian habitat value would be desirable. WSAFCA will implement the restoration plan, maintain plantings for a minimum of at least 10 years (including weed removal, irrigation, and herbivory protection), and conduct annual monitoring for 4 years, followed by monitoring every 2 years for the next 6 years. As feasible, existing native wetland vegetation from the affected sites should be harvested and maintained for replanting after construction.

Effect VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction

Construction of Alternative 1 would result in the direct disturbance or removal of numerous trees that may be considered heritage trees under the City's Tree Preservation Ordinance. Many of these affected trees are within riparian habitat and are included in the discussion in Effect VEG-1. Other heritage trees occur in non-riparian valley oak woodland and walnut woodland. These trees occur in Segments A through D, F, and G. In all of these segments, the trees are located within the footprint of adjacent levees, seepage berms, O & M corridors, and utility corridors; and they would be removed during construction.

Additional effects on heritage trees could occur during construction as a result of damage to trees located adjacent to the construction footprint. Activities conducted within the dripline of trees, such as trenching or grading, movement of construction vehicles and equipment, and spillage or dumping of fuel, oil, concrete, or other harmful substances, could result in damage to root systems and possible tree mortality.

However, as discussed in Section 3.2, Water Quality and Groundwater Resources, construction of slurry cutoff walls in various segments in Alternative 1 would result in an average decrease in shallow static groundwater levels of 1.5 feet in Segments A and B, and 1.3 feet in Segment G. There would be no measureable effect in Segments C through F. This decrease would not affect landside biological resources, including trees, because the root systems of mature trees that access groundwater would not be affected by minimal changes in groundwater depth. There would be no resulting direct or indirect effect.

The removal or harming of heritage trees as a result of construction activities associated with Alternative 1 would conflict with the City's tree ordinance, and this would be a significant effect. Implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2) and Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, and VEG-MM-6 would reduce this direct effect to less-than-significant levels.

Mitigation Measure VEG-MM-6: Compensate for Loss of Protected Trees

WSAFCA will apply for a tree permit for the removal of any protected trees during construction. WSAFCA will replace trees that must be removed with trees at or near the location of the effect or another location within West Sacramento approved by the City's tree administrator. WSAFCA will also replace any replacement trees that die within 3 years of the initial planting.

Replacement trees are required at a ratio of 1:1 (i.e., 1-inch diameter of replacement plant for every 1-inch diameter of tree removed). Trees may also be mitigated through payment of an in-lieu fee, which will be used to purchase and plant trees elsewhere in West Sacramento. Mitigation will be subject to approval by the City's tree administrator and will take into account species affected, replacement species, location, health and vigor, habitat value, and other factors to determine fair compensation for tree loss.

Effect VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction

No known occurrences of special-status plants are in the Alternative 1 project area; however, blooming-period surveys of the entire project area have not yet been conducted for special-status plant species with potential to occur in the region. Mason's lilaeopsis has potential to occur on mud flats along the edge of the DWSC in one of the areas of proposed borrow for project construction. However, the DWSC and its banks would be entirely avoided by borrow excavation. Therefore, the project would have no direct effect on Mason's lilaeopsis. Bristly sedge and Boggs Lake hedge-hyssop have low potential to occur on the margins of the Bees Lakes ponds; however, the ponds would not be affected under Alternative 1.

Peruvian dodder, rose-mallow, Sanford's arrowhead, and Suisun Marsh aster have low potential to occur in agricultural ditches in the project area. Rose-mallow and Suisun Marsh aster have low potential to occur on the Sacramento River bank. Due to the historic and ongoing disturbance of most of the project area, there is low potential for the presence of special-status plants; however, if any of these species are present in the project area, project construction would result in their removal. As discussed for Effect VEG-2, agricultural ditches would be filled within the footprint of the adjacent levees and seepage berms. If special-status plants are present, they would be removed in these areas. Peruvian dodder, rose-mallow, Sanford's arrowhead, and Suisun Marsh aster are on CNPS California Rare Plant Rank lists, but are not state or Federally listed. Loss of CNPS-listed plant species may be considered significant under CEQA and regulated by CDFW if the loss is substantial and could affect the long-term survival of the affected population.

Because the presence and extent of any special-status plants in the project construction area are unknown, this would be a potentially significant direct effect. Implementation of Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, VEG-MM-7, and VEG-MM-8 would reduce this effect to a less-than-significant level.

Mitigation Measure VEG-MM-7: Retain Qualified Botanists to Conduct Floristic Surveys for Special-Status Plants during Appropriate Identification Periods

WSAFCA will retain qualified botanists to survey all parcels located in the project area to document the presence of special-status plants before project implementation. The botanists will conduct a floristic survey that follows the CDFW botanical survey guidelines (California Department of Fish and Game 2009). All plant species observed will be identified to the level necessary to determine whether they qualify as special-status plants or are plant species with unusual or significant range extensions. The guidelines also require that field surveys be conducted when special-status plants that could occur in the area are evident and identifiable, generally during the blooming period. To account for different special-status plant identification periods, one or more series of field surveys may be required in spring and summer.

If any special-status plants are identified during the surveys, the botanist will photograph and map locations of the plants, document the location and extent of the special-status plant population on a CNDDB Survey Form, and submit the completed Survey Form to the CNDDB. The amount of compensatory mitigation required will be based on the results of these surveys, as described in Mitigation Measure VEG-MM-8.

Mitigation Measure VEG-MM-8: Avoid or Compensate for Substantial Effects on Special-Status Plants

If one or more special-status plants are identified in the project area during preconstruction surveys, conducted pursuant to Mitigation Measure VEG-MM-7, WSAFCA will redesign or modify proposed project components of the project to avoid indirect or direct effects on special-status plants wherever feasible. If special-status plants can be avoided by redesigning proposed projects, implementation of Mitigation Measures VEG-MM-2 (barrier fencing), VEG-MM-3 (awareness training), and VEG-MM-4 (biological monitor) would avoid significant effects on special-status plants.

If complete avoidance of special-status plants is not feasible, the effects of the proposed project on special-status plants would be compensated by off-site preservation at a ratio to be negotiated with the resource agencies. Suitable habitat for affected special-status plant species will be purchased within a conservation area, preserved, and managed in perpetuity. Detailed information will be provided to CDFW and USFWS, if necessary, on the location and quality of the preservation area, the feasibility of protecting and managing the area in perpetuity, and the responsible parties involved. Other pertinent information will also be provided, to be determined through future coordination with CDFW and USFWS, if necessary. Alternatively, credits for affected special-status plant species may be purchased at a mitigation bank.

Effect VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction

Invasive plants are already present in the Alternative 1 project area. However, construction activities could introduce new invasive plants to the project area or contribute to the spread of existing invasive plants to un-infested areas outside the project area. Invasive plants or their seeds may be dispersed by construction equipment if appropriate prevention measures are not implemented. The introduction or spread of invasive plants as a result of the proposed project could have significant direct and indirect effects on sensitive natural communities within and outside the project area by displacing native flora. The implementation of the EC to avoid or minimize the spread or introduction of invasive plant species (Chapter 2, Section 2.4.3, Invasive Plant Species Prevention) will ensure that the proposed project would not have a significant effect on sensitive natural communities from the introduction or spread of invasive plants. With implementation of the EC, direct and indirect effects would be reduced to less-than-significant levels. No mitigation is required.

Effect VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan

In the Alternative 1 project region, there are three habitat conservation plans under development but not yet formally adopted and one adopted plan. The plans under development are the Yolo County HCP/NCCP, the South Sacramento HCP, and the Bay Delta NCCP. To the north of the project area, the adopted Natomas Basin HCP/NCCP applies to a 53,537-acre area in the northern portion of Sacramento County and the southern portion of Sutter County. The only one of these plans that would apply to the project area is the Yolo County HCP/NCCP, which is in the planning stages at the time of this writing, and no public draft is available. The Administrative Draft Yolo HCP/NCCP was completed in July 2013; a second Administrative Draft is presently underway. Although there is no adopted HCP/NCCP, the advisory recommendations by the JPA (Yolo County Habitat/Natural Community Conservation Plan Joint Powers Agency 2006) include no further loss of wetlands and oak woodland; restoration, enhancement, and maintenance of healthy riparian corridors and restoration of wide areas of riparian habitat; increased areas of naturally inundated floodplain; maintenance and enhancement of natural habitats within agricultural landscapes; and reduced exotic vegetation in riparian habitats. Assuming these recommendations are adopted, implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2) and implementation of Mitigation Measures VEG-MM-1, VEG-MM-2, VEG-MM-3, and VEG-MM-4 would reduce the potential direct adverse effects of Alternative 1 on riparian habitat to a less-than-significant level, compensate for the remaining permanent effects on riparian habitat, and prevent temporary and indirect effects on riparian habitat as described above. Therefore, Alternative 1 would comply with the recommendations after implementation of mitigation measures. However, as no adopted HCP/NCCP is in place, Alternative 1 has no effect.

Another plan that is not an HCP/NCCP but that does apply to the project area is the Yolo County Oak Woodland Conservation and Enhancement Plan (Yolo County 2007). The proposed project would not conflict with this plan because it promotes conservation of the county's existing oak woodlands but the plan does not prohibit or regulate project effects on oak woodlands. Therefore, no adopted or approved plans, other than the oak woodland conservation plan, are available for the project area, and there would be no effect. No mitigation is required.

3.8.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on vegetation and wetlands (Table 3.8-8). The acreage of habitat loss within each segment of the project is provided in Table 3.8-9. Effect locations are shown on Plate 3.8-3.

Table 3.8-8. Vegetation and Wetlands Effects and Mitigation Measures for Alternative 2

	Finding		With	
Effect	**Direct**	**Indirect**	**Mitigation**	**Mitigation Measure**
VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction	Significant	Significant	Significant and unavoidable	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor
VEG-2: Loss of Waters of the United States as a Result of Project Construction	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-5: Compensate for the Loss of Waters of the United States
VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-6: Compensate for Loss of Protected Trees

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction	Potentially significant	No effect	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-7: Retain Qualified Botanists to Conduct Floristic Surveys for Special-Status Plants during Appropriate Identification Periods VEG-MM-8: Avoid or Compensate for Substantial Effects on Special-Status Plants
VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction	Less than significant	Less than significant	NA	None
VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	No effect	No effect	NA	None
VEG-7: Opportunity for Habitat Restoration in Enlarged Floodplain Following Project Construction	Beneficial	Beneficial	NA	None

Table 3.8-9. Temporary and Permanent Effect Acreages under Alternative 2

Project Component	Cottonwood Riparian Woodland	Valley Oak Riparian Woodland	Walnut Riparian Woodland	Riparian Scrub	Valley Oak Woodland	Walnut Woodland	Emergent Wetland[1]	Pond[1]	Perennial Drainage[1]	Ditch[1]
Project Footprint										
Temporary	0	0.45	0	0	0.03	0	0	0	0	0.06
Permanent	36.69	1.26	3.02	8.47	16.43	0.71	0	1.82	35.86	1.93
Total All Effects	***36.69***	***1.71***	***3.02***	***8.47***	***16.46***	***0.71***	***0***	***1.82***	***35.86***	***1.99***

[1] These types are under the jurisdiction of the U.S. Army Corps of Engineers, based on verification of the delineation of Waters of the United States.

Effect VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction

Under Alternative 2, effects on riparian habitat would occur within the following components of the project area: the existing Sacramento River levee, erosion repair sites, breach locations in the existing levee, degradation of the existing levee, the floodplain created between the existing levee and the new setback levee, the Village Parkway alignment, and the O&M corridors.

Construction of Alternative 2 in Segments A through G would permanently remove a total of approximately 36.69 acres of cottonwood riparian woodland, 1.26 acres of valley oak riparian woodland, 3.02 acres of walnut riparian woodland, and 8.47 acres of riparian scrub (Table 3.8-9). Loss of riparian habitat would constitute a direct effect.

The existing Sacramento River levee would be mostly retained, with the exception of the two breach locations, but it would no longer functions as a means of flood risk-reduction. Riparian habitat on the remaining levee segments between the breaches would be removed where grading is necessary to lower the elevation of the levee surface and to restore over-steepened or eroding banks. Where grading is needed, the levee segments would be replanted with riparian vegetation as part of the project.

Perennial open water may be created at the breach locations in Segments B, C, and F. Rock slope protection or another form of revetment to prevent erosion would be needed along the entire breach, extending landward from the centerline of the degraded levee crown approximately 100 feet. Rock slope protection would also extend 100 feet upstream and downstream along the degraded levee shoulders at both ends of the breach, on both the landside and waterside. Removal of riparian habitat would be considered permanent in the revetment and in perennial drainage areas, although part of the lowered surface at the interface of the breach locations and the Sacramento River would be planted with riparian vegetation and maintained.

Construction of the proposed setback levees would restore a portion of the historical Sacramento River floodplain in the area between the existing levees and setback levees. The floodplain area would be lowered in Segments B, C, D, and F to create areas that would be inundated more frequently than the higher floodplain surfaces. Riparian habitat and oak woodland restoration would occur on the restored floodplain in these segments, with the more hydrophytic species occurring on lowered floodplain surfaces or close to the Sacramento River. In Segment E, the Bees Lakes area would become hydrologically connected to the Sacramento River. The hydrology of Bees Lakes would be modified to provide positive drainage from the lake to avoid fish entrapment, which could also result in a change to the surrounding riparian habitat. The extent of this change cannot be quantified without additional modeling results and project design; however, it is likely that some reduction in the number of riparian trees surrounding the Bees Lakes could occur due to increased flood levels.

Riparian habitat is located at the southern edge of one proposed staging area for Alternative 2 and could be temporarily affected during project construction. Indirect effects on riparian habitat adjacent to the construction area could occur because of changes in off-site drainage patterns caused by grading during construction.

Permanent loss of riparian habitat as a result of constructing Alternative 2 would occur within the parts of the breach locations that require revetment for erosion control. Changes in the hydrology of the Bees Lakes area could result in additional permanent loss of riparian habitat and an increase in a wetland or open water habitat. Implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2) and implementation of Mitigation Measures VEG-MM-1, VEG-MM-2, VEG-MM-3, and VEG-MM-4 would reduce the level of permanent direct effects to a lesser level and would prevent temporary and indirect effects on riparian habitat. As a result of the length of time required for newly planted trees to reach mature size, however, permanent effects on riparian habitat would remain significant and unavoidable.

The new riparian habitat that would be created within the expanded floodplain would eventually compensate for the loss of riparian habitat at a ratio of at least 2:1 and would be considered a beneficial effect, as described below in Effect VEG-7.

Effect VEG-2: Loss of Waters of the United States as a Result of Project Construction

Under Alternative 2, this effect would be less than that described for Alternative 1. See Table 3.8-3 above. The effect resulting from placement of waterside rock slope protection associated with adjacent levee construction in perennial open water would be reduced to only Segments A and G under Alternative 2. Effects would also occur in the footprint of the setback levee and levee breaches in Segments B, C, D, and F, with small effects due to construction of the Village Parkway across unvegetated ditches. Construction of seepage berms, adjacent levees, and O&M corridors would result in additional effects to waters of the United States. However, due to the floodplain creation in the offset area, this alternative would result in a net increase in waters of the United States. The breach locations and the floodplain created between the existing levee and the new setback levee would be graded to provide positive drainage onto and off the floodplain, creating seasonal and, possibly, perennial aquatic habitat. Based on preliminary modeling results, the restored floodplain surface would be completely or partially inundated seasonally. Breach locations and floodplain lowering would result in the creation of emergent wetland and seasonally inundated other waters, and perennial open water could be created at the inlet and outlet of the floodplain.

Construction of Alternative 2 would result in the permanent loss of 1.82 acres of pond habitat, 35.86acres of perennial drainage and 1.93 acres of unvegetated ditches (Table 3.8-9). These losses constitute a direct adverse effect. This extent of effect is based on the verified delineation of waters of the United States and waters of the state in the project area. No fill would be placed in the ponds located in Segment E at Bees Lakes; however, the hydrology of ponds would be modified to provide a hydrologic connection and positive drainage to the Sacramento River, and this would be considered a permanent loss.

An agricultural ditch located at the southern end of one proposed staging area for Alternative 2 could be temporarily affected during project construction. Indirect effects on wetlands and other waters adjacent to the construction area could occur because of changes in off-site drainage patterns caused by grading during construction.

Construction of Alternative 2 would have a substantial adverse effect on Federally protected waters of the United States through direct removal, filling, and hydrological interruption. Implementation of the EC to develop a SWPPP (Chapter 2, Section 2.4.12) and Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, and VEG-MM-5 would reduce the level of permanent direct effects and would prevent temporary and indirect effects on wetlands and other waters. In addition, the project would have a beneficial effect due to restoration of the Sacramento River floodplain in the Bees Lakes area and Segments B, C, D, E, and F and due to creation of open water and emergent wetland habitat. This created habitat would compensate for the permanent loss of waters of the United States elsewhere in the project area at a ratio of at least 2:1. No additional mitigation is required to reduce these effects to a less-than-significant level.

Effect VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction

Under Alternative 2, this effect would be the similar to that described for Alternative 1, except that the potential effect would occur in the footprint of the adjacent and setback levees and seepage berms for Segments A through G and within the Village Parkway alignment. While shallow aquifer static groundwater levels would also be reduced an average of 1.5 feet in Segment C, there would be no resulting effect to groundwater-fed vegetation.

In addition, protected trees could be indirectly affected by flooding in the restored floodplain. The removal or harming of heritage trees as a result of construction activities associated with Alternative 2 and postconstruction conditions would conflict with the City's tree ordinance, and this would be a significant effect. Implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2) and Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, and VEG-MM-6 would reduce direct and indirect effects to less-than-significant levels.

Effect VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction

Under Alternative 2, this effect would be the similar to that described for Alternative 1, except that the potential effect would occur in the footprint of the adjacent and setback levees, the Village Parkway alignment, and the Bees Lakes area. Two special-status plant species, bristly sedge and Boggs Lake hedge-hyssop, have low potential to occur on the margins of the Bees Lakes ponds. Implementation of Alternative 2 would alter the hydrology of the Bees Lakes area, which could remove special-status plants if they are present. Bristly sedge is on the CNPS California Rare Plant Rank list but is not state or Federally listed. Loss of CNPS-listed plant species may be considered significant under CEQA and regulated by CDFW if the loss is substantial and could affect the long-term survival of the affected population. Boggs Lake hedge hyssop is state-listed endangered, and loss of this species would be considered significant. Because the presence and extent of any special-status plants in the project construction area is unknown, this would be a potentially significant direct effect. Implementation of Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, VEG-MM-7, and VEG-MM-8 would reduce this effect to a less-than-significant level.

Effect VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction

Under Alternative 2, this effect would be the same as described for Alternative 1. Direct and indirect effects are considered less than significant with the implementation of the EC to avoid or minimize the spread or introduction of invasive plant species (Chapter 2, Section 2.4.3). No mitigation is required.

Effect VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or other Approved Local, Regional or State Habitat Conservation Plan

Under Alternative 2, this effect would be the similar to that described for Alternative 1, except that the proposed floodplain restoration would provide additional compliance with the JPA advisory recommendations for restoration of wide areas of riparian habitat. There would be no effect, and no mitigation is required.

Effect VEG-7: Opportunity for Habitat Restoration in Enlarged Floodplain Following Project Construction

When the existing levee is breached at the five locations after installation of the setback levee at the Sacramento River levee, the enlarged floodplain created between the river's edge and setback levee area would be dedicated to riparian and wetland habitat restoration and revegetated accordingly. Based on preliminary modeling results, the restored floodplain surface would be completely or partially inundated seasonally. Where inundation is perennial, open water habitat would be created. As part of the project, WSAFCA would retain a qualified restoration ecologist or landscape architect to develop a revegetation plan that would ensure the long-term duration of the function and value of the restored habitat.

The habitat restoration would include a mosaic of wetland, riparian, and oak woodland habitats. It is anticipated that riparian scrub and cottonwood riparian woodland would be established primarily on the Sacramento River levee and in portions of the restored floodplain relatively close to the Sacramento River where groundwater conditions may be elevated. Riparian habitat likely would transition to valley oak riparian habitat, which is less dependent on groundwater, as the distance from the river increases. This would be a beneficial effect.

3.8.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on vegetation and wetlands (Table 3.8-10). The acreage of habitat loss within each segment of the project is provided in Table 3.8-11. Effect locations are shown on Plate 3.8-4.

Table 3.8-10. Vegetation and Wetlands Effects and Mitigation Measures for Alternative 3

	Finding		With	
Effect	**Direct**	**Indirect**	**Mitigation**	**Mitigation Measure**
VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction	Significant	Significant	Significant and unavoidable	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor
VEG-2: Loss of Waters of the United States as a Result of Project Construction	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-5: Compensate for the Loss of Waters of the United States
VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-6: Compensate for Loss of Protected Trees

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction	Potentially significant	No effect	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-7: Retain Qualified Botanists to Conduct Floristic Surveys for Special-Status Plants during Appropriate Identification Periods VEG-MM-8: Avoid or Compensate for Substantial Effects on Special-Status Plants
VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction	Less than significant	Less than significant	NA	None
VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	No effect	No effect	NA	None

Table 3.8-11. Temporary and Permanent Effect Acreages under Alternative 3

Project Component	Cottonwood Riparian Woodland	Valley Oak Riparian Woodland	Walnut Riparian Woodland	Riparian Scrub	Valley Oak Woodland	Walnut Woodland	Emergent Wetland[1]	Pond[1]	Perennial Drainage[1]	Ditch[1]
Project Footprint										
Temporary	0	0.65	0	0.05	0	0	0	0	0	0.26
Permanent	34.16	0.23	2.09	9.85	13.80	0.71	0	0.11	48.00	1.41
Total All Effects	***34.16***	***0.88***	***2.09***	***9.90***	***13.80***	***0.71***	***0***	***0.11***	***48.00***	***1.67***

[1] These types are under the jurisdiction of the U.S. Army Corps of Engineers, based on verification of the delineation of Waters of the United States.

Effect VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction

Under Alternative 3, this effect would be the similar to that described for Alternative 1, except that riparian habitat on the existing levees would be removed for recontouring of the existing levee for slope flattening and construction of seepage berms. All woody vegetation would be permanently removed from both the waterside and landside of the existing levee along most of its length, as well as within the footprint of the seepage berm, O&M corridor, and utilities corridor.

Construction of Alternative 3 in Segments A through G would permanently remove a total of 34.16 acres of cottonwood riparian woodland, 0.23 acre of valley oak riparian woodland, 2.09 acres of walnut riparian woodland, and 9.85 acres of riparian scrub (Table 3.8-11). Loss of riparian habitat would constitute a direct effect. Recontouring of the existing levee in Segment E would remove part of the riparian habitat on the landside of the levee in the Bees Lakes area and the corresponding waterside of the levee.

Riparian habitat is located at the southern edge of one proposed staging area for Alternative 3 and could be temporarily affected during project construction. Indirect effects on riparian habitat adjacent to the construction area could occur because of changes in off-site drainage patterns caused by grading during construction.

Because the loss of riparian habitat as a result of the proposed project would be substantial, the disturbance and removal of riparian habitat would be considered a significant effect. Implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2) and implementation of Mitigation Measures VEG-MM-1, VEG-MM-2, VEG-MM-3, and VEG-MM-4 would reduce permanent direct effects to a lesser level and would prevent temporary and indirect effects on riparian habitat. However, due to the requirement to mitigate off-site and the length of time required for newly planted trees to reach mature size, permanent effects to riparian habitat would remain significant and unavoidable.

Effect VEG-2: Loss of Waters of the United States as a Result of Project Construction

Under Alternative 3, this effect would be the similar to that described for Alternative 1, except that under Alternative 3 the potential effects would occur in the footprint of the recontoured levees, seepage berms, and O&M corridors. Placement of fill would occur in agricultural ditches that are within the footprint of the recontoured levees, seepage berms, O&M corridors, and utility corridors. This analysis assumes that the ditches would not be replaced after the excavation is completed. In addition, rock slope protection would be placed within perennial open water in the Sacramento River where needed for erosion control.

A small amount of fill would occur in the ponds located in Segment E at Bees Lakes for recontouring of the existing levee. As described in Alternative 1, construction of a slurry cutoff wall in Segment E would have no effect on the Bees Lakes ponds. Although Alternative 3's slurry cutoff wall would be located closer to the Bees Lakes area than in Alternative 1, groundwater modeling results show no effect to shallow static groundwater levels on both the waterside and landside of a slurry cutoff wall in Segment E.

Construction of Alternative 3 in Segments A through G would result in the permanent loss of 0.11 acre of pond habitat, 48.00 acres of perennial drainage, and 1.41 acres of unvegetated ditches (Table 3.8-11). These losses constitute a direct adverse effect. This extent of effect is based on the verified delineation of waters of the United States and waters of the state in the project area.

An agricultural ditch located at the southern end of one proposed staging area for Alternative 3 could be temporarily affected during project construction.

Indirect effects on wetlands and other waters adjacent to the construction area could occur because of changes in off-site drainage patterns caused by grading during construction.

The proposed project would have a substantial adverse effect on Federally protected waters of the United States through direct removal, filling, and hydrological interruption; therefore, this effect would be considered significant. With implementation of the EC to develop an SWPPP (Chapter 2, Section 2.4.12) and Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, and VEG-MM-5, no additional mitigation would be needed to reduce permanent direct effects to a less-than-significant level, prevent temporary and indirect effects on wetlands, and prevent temporary effects on other waters.

Effect VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction

Under Alternative 3, this effect would be the similar to that described for Alternative 1, except that the potential effect would occur in the footprint of the recontoured levees, seepage berms, O&M corridors, and utility corridors near Segments B, C, D, and F. The removal or harming of heritage trees as a result of construction activities associated with Alternative 3 would conflict with the City's tree ordinance, and this would be a significant effect. Implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2) and Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, and VEG-MM-6 would reduce direct and indirect effects to less-than-significant levels. Construction of slurry cutoff walls under Alternative 3 would have no effect on vegetation as described in Alternative 1.

Effect VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction

Under Alternative 3, this effect would be the similar to that described for Alternative 1, except that the potential effect would occur in the footprint of the recontoured levee slope and the seepage berm. Because the presence and extent of any special-status plants in the project construction area is unknown, this would be a potentially significant direct effect. Implementation of Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, VEG-MM-7, and VEG-MM-8 would reduce this effect to a less-than-significant level.

Effect VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction

Under Alternative 3, this effect would be the same as described for Alternative 1. Direct and indirect effects are considered less than significant with the implementation of EC to avoid or minimize the spread or introduction of invasive plant species (Chapter, Section 2.4.3). No mitigation is required.

Effect VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or other Approved Local, Regional or State Habitat Conservation Plan

Under Alternative 3, this effect would be the same as described for Alternative 1; there would be no effect, and no mitigation is required.

3.8.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on vegetation and wetlands (Table 3.8-12). The acreage of habitat loss within each segment of the project is provided in Table 3.8-13. Effect locations are shown on Plate 3.8-5.

Table 3.8-12. Vegetation and Wetlands Effects and Mitigation Measures for Alternative 4

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction	Significant	Significant	Significant and unavoidable	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor
VEG-2: Loss of Waters of the United States as a Result of Project Construction	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-5: Compensate for the Loss of Waters of the United States
VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-6: Compensate for Loss of Protected Trees

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction	Potentially significant	No effect	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-7: Retain Qualified Botanists to Conduct Floristic Surveys for Special-Status Plants during Appropriate Identification Periods VEG-MM-8: Avoid or Compensate for Substantial Effects on Special-Status Plants
VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction	Less than significant	Less than significant	NA	None
VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	No effect	No effect	NA	None
VEG-7: Opportunity for Habitat Restoration in Enlarged Floodplain Following Project Construction	Beneficial	Beneficial	NA	None

Table 3.8-13. Temporary and Permanent Effect Acreages under Alternative 4

Project Component	Cottonwood Riparian Woodland	Valley Oak Riparian Woodland	Walnut Riparian Woodland	Riparian Scrub	Valley Oak Woodland	Walnut Woodland	Emergent Wetland[1]	Pond[1]	Perennial Drainage[1]	Ditch[1]
Project Footprint										
Temporary	0	0.56	0	0.08	0.02	0	0	0	0	0.04
Permanent	21.59	0.91	2.13	9.00	13.93	0.71	0	0	38.74	1.85
Total All Effects	***21.59***	***1.47***	***2.13***	***9.08***	***13.95***	***0.71***	***0***	***0***	***38.74***	***1.89***

[1] These types are under the jurisdiction of the U.S. Army Corps of Engineers, based on verification of the delineation of Waters of the United States.

Effect VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction

Under Alternative 4, this effect would be similar to that described for Alternative 2, except that additional permanent loss of riparian habitat would occur in Segments B and F for construction of an adjacent levee with waterside rock slope protection instead of a setback levee. Construction of Alternative 4 in Segments A through G would permanently remove a total of approximately 21.59 acres of cottonwood riparian woodland, 1.47 acres of valley oak riparian woodland, 2.13 acres of walnut riparian woodland, and 9.08 acres of riparian scrub (Table 3.8-13). Loss of riparian habitat would constitute a direct effect.

Similar to Alternative 2, the existing Sacramento River levee and riparian habitat between the breaches would be removed where grading and levee degradation are necessary. In addition, riparian habitat would be removed at the erosion repair sites. Where grading and levee degradation are needed, the levee segments would be replanted with riparian vegetation as part of the project. A portion of the rock slope protection placed for erosion site repair would be replanted as well.

As with Alternative 2, perennial open water and riparian habitat restoration would be created in parts of the breach locations in Segments B, C, D, and F. Also as described under Alternative 2, construction of the proposed setback levees would restore part of the historical Sacramento River floodplain in Segments B, C, and D, and riparian and oak woodland habitats would be restored. In contrast to Alternative 2, the proposed ring levee in Segment E would prevent a direct hydrologic connection between Bees Lakes and the Sacramento River.

Riparian habitat is located at the southern edge of one proposed staging area for Alternative 4 and could be temporarily affected during project construction. Indirect effects on riparian habitat adjacent to the construction area could occur because of changes in off-site drainage patterns caused by grading during construction.

Permanent loss of riparian habitat as a result of constructing Alternative 4 would occur within the parts of the breach locations that require revetment for erosion control, however the proposed riparian restoration in parts of the revetment would partially offset this loss. Implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2) and implementation of Mitigation Measures VEG-MM-1, VEG-MM-2, VEG-MM-3, and VEG-MM-4, would reduce the level of permanent direct effects to a lesser level and would prevent temporary and indirect effects on riparian habitat. Due to the length of time required for newly planted trees to reach mature size, however, permanent effects on riparian habitat would remain significant and unavoidable.

The new riparian habitat that would be created within the expanded floodplain would eventually compensate for the loss of riparian habitat at a ratio of at least 2:1 and would be considered a beneficial effect, as described below in Effect VEG-7.

Effect VEG-2: Loss of Waters of the United States as a Result of Project Construction

Under Alternative 4, this effect would be the similar to that described for Alternative 2. Due to the floodplain creation, this alternative would result in a net increase in waters of the United States. The breach locations and the floodplain created between the existing levee and the new setback levee would be graded to provide positive drainage onto and off the floodplain, creating seasonal and, possibly, perennial aquatic habitat. Based on preliminary modeling results, the restored floodplain surface would be completely or partially inundated seasonally. Breach locations and floodplain lowering would result in the creation of emergent wetland and seasonally inundated other waters, and perennial open water could be created at the inlet and outlet of the floodplain.

Construction of Alternative 4 would result in the permanent loss of 38.74acres of perennial drainage and 1.85 acres of unvegetated ditches (Table 3.8-13). These losses constitute a direct adverse effect. This extent of effect is based on the verified delineation of waters of the United States and waters of the state in the project area. No fill would be placed in the ponds located in Segment E at Bees Lakes, and in contrast to Alternative 2, the hydrology of ponds would not be modified. Construction of a slurry cutoff wall in Segment E would have no effect on the Bees Lakes ponds as described in Alternative 1.

An agricultural ditch located at the southern end of one proposed staging area for Alternative 4 could be temporarily affected during project construction. Indirect effects on wetlands and other waters adjacent to the construction area could occur because of changes in off-site drainage patterns caused by grading during construction.

Alternative 4 would have a substantial adverse effect on Federally protected waters of the United States through direct removal, filling, and hydrological interruption; therefore, this effect would be considered significant. Implementation of the EC to develop a SWPPP (Chapter 2, Section 2.4.12) and Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, and VEG-MM-5 would reduce the level of permanent direct effects and would prevent temporary and indirect effects on wetlands and other waters. In addition, the project would have a beneficial effect due to the partial restoration of the Sacramento River and creation of open water and emergent wetland habitat in Segments C and D. This created habitat would compensate for the loss of waters of the United States elsewhere in the project area at a ratio of at least 2:1. No additional mitigation is required to reduce permanent direct effects to a less-than-significant level.

Effect VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction

Under Alternative 4, this effect would be similar to that described for Alternative 1, except that the potential effect would occur in the footprint of the adjacent and setback levees and seepage berms for Segments A through G. In addition, protected trees could be indirectly affected by flooding in the restored floodplain. The removal or harming of heritage trees as a result of construction activities associated with Alternative 4 and postconstruction conditions would conflict with the City's tree ordinance, and this would be a significant effect. Implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2) and Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, and VEG-MM-6 would reduce direct and indirect effects to less-than-significant levels. Construction of slurry cutoff walls under Alternative 4 would have no effect on vegetation as described in Alternative 1.

Effect VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction

Under Alternative 4, this effect would be the similar to that described for Alternative 1, except that the potential effect would occur in the footprint of the setback levees, adjacent levee, and Village Parkway alignment. Because the presence and extent of any special-status plants in the project construction area is unknown, this would be a potentially significant direct effect. Implementation of Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, VEG-MM-7, and VEG-MM-8 would reduce this effect to a less-than-significant level.

Effect VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction

Under Alternative 4, this effect would be the same as described for Alternative 1. Direct and indirect effects are considered less than significant with the implementation of EC to avoid or minimize the spread or introduction of invasive plant species (Chapter 2, Section 2.4.3). No mitigation is required.

Effect VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or other Approved Local, Regional or State Habitat Conservation Plan

Under Alternative 4, this effect would be the same as described for Alternative 2. There would be no effect, and no mitigation is required.

Effect VEG-7: Opportunity for Habitat Restoration in Enlarged Floodplain Following Project Construction

Under Alternative 4, this effect would be similar to that described for Alternative 2, except that the floodplain would not be enlarged in Segment F and the Bees Lakes area would not be inundated but would be surrounded by a ring levee consisting of road embankments leading to Linden Road and Davis Road. When the existing levee is breached at the three locations after installation of the setback levee at the Sacramento River levee, the enlarged floodplain would be dedicated to riparian and wetland habitat restoration and revegetated accordingly, as described for Alternative 2. As described for Alternative 2, it is anticipated that wetland, riparian scrub, and cottonwood riparian woodland would be established and would transition to valley oak riparian habitat as the distance from the river increases. While the size of the restoration area under Alternative 4 would be less than that under Alternative 2, this would remain a beneficial effect.

3.8.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on vegetation and wetlands (Table 3.8-14). The acreage of habitat loss within each segment of the project is provided in Table 3.8-15. Effect locations are shown on Plate 3.8-6.

Table 3.8-14. Vegetation and Wetlands Effects and Mitigation Measures for Alternative 5

	Finding		With	
Effect	**Direct**	**Indirect**	**Mitigation**	**Mitigation Measure**
VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction	Significant	Significant	Significant and unavoidable	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor
VEG-2: Loss of Waters of the United States as a Result of Project Construction	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-5: Compensate for the Loss of Waters of the United States
VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction	Significant	Significant	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-6: Compensate for Loss of Protected Trees

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction	Potentially significant	No effect	Less than significant	VEG-MM-2: Install Exclusion Fencing along the Perimeter of the Construction Work Area and Implement General Measures to Avoid Effects on Sensitive Natural Communities and Special-Status Species VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel VEG-MM-4: Retain a Biological Monitor VEG-MM-7: Retain Qualified Botanists to Conduct Floristic Surveys for Special-Status Plants during Appropriate Identification Periods VEG-MM-8: Avoid or Compensate for Substantial Effects on Special-Status Plants
VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction	Less than significant	Less than significant	NA	None
VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	No effect	No effect	NA	None
VEG-7: Opportunity for Habitat Restoration in Enlarged Floodplain Following Project Construction	Beneficial	Beneficial	NA	None

Table 3.8-15. Temporary and Permanent Effect Acreages under Alternative 5

Project Component	Cottonwood Riparian Woodland	Valley Oak Riparian Woodland	Walnut Riparian Woodland	Riparian Scrub	Valley Oak Woodland	Walnut Woodland	Emergent Wetland[1]	Pond[1]	Perennial Drainage[1]	Ditch[1]
Project Footprint										
Temporary	0	0.45	0	0	0.02	0	0	0	0	0.06
Permanent	17.31	1.57	2.56	9.15	14.73	0.71	0	0	35.76	1.85
Total All Effects	***17.31***	***2.02***	***2.56***	***9.15***	***14.75***	***0.71***	***0***	***0***	***35.76***	***1.91***

[1] These types are under the jurisdiction of the U.S. Army Corps of Engineers, based on verification of the delineation of Waters of the United States.

Effect VEG-1: Disturbance or Removal of Riparian Habitat as a Result of Project Construction

Under Alternative 5, this effect would be similar to that described for Alternative 2 except that less permanent loss of riparian habitat would occur in Segment E since Bees Lakes would not be open to flows from the Sacramento River. Segment A would also have less permanent loss of landside vegetation because the slope flattening footprint would be narrower than the adjacent levee footprint proposed under Alternative 2.

Construction of Alternative 5 in Segments A through G would permanently remove a total of approximately 17.31 acres of cottonwood riparian woodland, 1.57 acres of valley oak riparian woodland, 2.56 acres of walnut riparian woodland, and 9.15 acres of riparian scrub (Table 3.8-15). Loss of riparian habitat would constitute a direct effect.

Similar to Alternative 2, the existing Sacramento River levee would be mostly retained in Segments C, D, and F, with the exception of the five breach locations, and riparian habitat between the breaches would be removed where grading and levee degradation are necessary. In addition, riparian habitat would be removed at the erosion repair sites. Where grading is needed, the levee segments would be replanted with riparian vegetation as part of the project. A portion of the rock slope protection placed for erosion site repair would be replanted as well.

As with Alternative 2, perennial open water and riparian habitat restoration would be created in parts of the breach locations in Segments B, C, D, and F. Also as described for Alternative 2, construction of the proposed setback levees would restore part of the historical Sacramento River floodplain in Segments B, C, D, and F, and riparian and oak woodland habitats would be restored. In contrast to Alternative 2, the proposed ring levee in Segment E would prevent a direct hydrologic connection between Bees Lakes and the Sacramento River.

Riparian habitat is located at the southern edge of one proposed staging area for Alternative 5 and could be temporarily affected during project construction. Indirect effects on riparian habitat adjacent to the construction area could occur because of changes in offsite drainage patterns caused by grading during construction.

Permanent loss of riparian habitat as a result of constructing Alternative 5 would occur within the parts of the breach locations that require revetment for erosion control. Implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2) and implementation of Mitigation Measures VEG-MM-1, VEG-MM-2, VEG-MM-3, and VEG-MM-4 would reduce the level of permanent direct effects to a lesser level and would prevent temporary and indirect effects on riparian habitat. Due to the length of time required for newly planted trees to reach mature size, however, permanent effects on riparian habitat would remain significant and unavoidable.

The new riparian habitat that would be created within the expanded floodplain would compensate for the loss of riparian habitat at a ratio of at least 2:1 and would be considered a beneficial effect, as described below in Effect VEG-7.

Effect VEG-2: Loss of Waters of the United States as a Result of Project Construction

Under Alternative 5, this effect would be similar to that described for Alternative 2. Due to the floodplain creation, this alternative would result in a net increase in waters of the United States. The breach locations and the floodplain created between the existing levee and the new setback levee would be graded to provide positive drainage onto and off the floodplain, creating seasonal and, possibly, perennial aquatic habitat. Based on preliminary modeling results, the restored floodplain surface would be completely or partially inundated seasonally. Breach locations and floodplain lowering would result in the creation of emergent wetland and seasonally inundated other waters, and perennial open water could be created at the inlet and outlet of the floodplain.

Construction of Alternative 5 would result in the permanent loss of 35.76 acres of perennial drainage and 1.85 acres of unvegetated ditches (Table 3.8-15). These losses constitute a direct adverse effect. This extent of effect is based on the verified delineation of waters of the United States and waters of the state in the project area. No fill would be placed in the ponds located in Segment E at Bees Lakes, and in contrast to Alternative 2, the hydrology of ponds would not be modified. Construction of a slurry cutoff wall in Segment E would have no effect on the Bees Lakes ponds as described in Alternative 1.

An agricultural ditch located at the southern end of one proposed staging area for Alternative 5 could be temporarily affected during project construction. Indirect effects on wetlands and other waters adjacent to the construction area could occur because of changes in offsite drainage patterns caused by grading during construction.

Alternative 5 would have a substantial adverse effect on Federally protected waters of the United States through direct removal, filling, and hydrological interruption; therefore, this effect would be considered significant. Implementation of the EC to develop a SWPPP (Chapter 2, Section 2.4.12) and Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, and VEG-MM-5 would reduce the level of permanent effects and would prevent temporary and indirect effects on wetlands and other waters. In addition, the project would have a beneficial effect due to the partial restoration of the Sacramento River and creation of open water and emergent wetland habitat in Segments C and D. This created habitat would compensate for the loss of waters of the United States elsewhere in the project area at a ratio of at least 2:1. No additional mitigation is required to reduce permanent direct effects to a less-than-significant level.

Effect VEG-3: Disturbance or Removal of Protected Trees as a Result of Project Construction

Under Alternative 5, this effect would be similar to that described for Alternative 1, except that the potential effect would occur in the footprint of the adjacent and setback levees and seepage berms for Segments B through G and in the footprint of the waterside slope flattening for Segment A. In addition, protected trees could be indirectly affected by flooding in the restored floodplain. The removal or harming of heritage trees as a result of construction activities associated with Alternative 5 and postconstruction conditions would conflict with the City's tree ordinance, and this would be a significant effect. Implementation of the EC to comply with the City's tree ordinance (Chapter 2, Section 2.4.2) and Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, and VEG-MM-6 would reduce direct and indirect effects to less-than-significant levels. Construction of slurry cutoff walls under Alternative 5 would have no effect on vegetation as described in Alternative 2.

Effect VEG-4: Potential Loss of Special-Status Plant Populations Caused by Habitat Loss Resulting from Project Construction

Under Alternative 5, this effect would be the similar to that described for Alternative 1, except that the potential effect would occur in the footprint of the setback levees, adjacent levee, and the Village Parkway alignment. Because the presence and extent of any special-status plants in the project construction area is unknown, this would be a potentially significant direct effect. Implementation of

Mitigation Measures VEG-MM-2, VEG-MM-3, VEG-MM-4, VEG-MM-7, and VEG-MM-8 would reduce this effect to a less-than-significant level.

Effect VEG-5: Introduction or Spread of Invasive Plants as a Result of Project Construction

Under Alternative 5, this effect would be the same as described for Alternative 1. Direct and indirect effects are considered less than significant with the implementation of EC to avoid or minimize the spread or introduction of invasive plant species (Chapter 2, Section 2.4.3). No mitigation is required.

Effect VEG-6: Conflict with Provisions of an Adopted HCP/NCCP or other Approved Local, Regional or State Habitat Conservation Plan

Under Alternative 5, this effect would be the same as described for Alternative 2. There would be no effect, and no mitigation is required.

Effect VEG-7: Opportunity for Habitat Restoration in Enlarged Floodplain Following Project Construction

Under Alternative 5, this effect would be similar to that described for Alternative 2, except that the Bees Lakes area would not be inundated but would be surrounded by a ring levee consisting of road embankments leading to Linden Road and Davis Road. However, Alternative 5 would include a 1-year backwater interim condition in the offset areas, as described in Section 2.2.8.1, Alternative 5 Flood Risk–Reduction Measures. The creation of the backwater during the interim condition would create a more sheltered environment due to lower water velocities, allowing restoration plantings to establish during the fall, winter, and spring following construction Year 1 without exposure to through-flows from the Sacramento River. Thus, the backwater condition in Alternative 5 increases the likelihood of long-term planting success. As described for Alternative 2, it is anticipated that wetland, riparian scrub, and cottonwood riparian woodland would be established and would transition to valley oak riparian habitat as the distance from the river increases. The size of the restoration area under Alternative 5 would be similar to that under Alternative 2. This would be a beneficial effect.

3.9 Fish and Aquatic Resources

3.9.1 Affected Environment

This section describes the regulatory framework and affected environment for fish and aquatic resources in the Southport project area.

3.9.1.1 Regulatory Framework

Federal

The following Federal regulations related to fish and aquatic resources may apply to implementation of the Southport project.

Endangered Species Act

ESA protects fish and wildlife species and their habitats that have been identified by NMFS or USFWS as threatened or endangered. *Endangered* refers to species, subspecies, or distinct population segments (DPSs) that are in danger of extinction through all or a significant portion of their range. *Threatened* refers to species, subspecies, or DPSs that are likely to become endangered in the near future.

ESA is administered by USFWS and NMFS. In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fish, and USFWS is responsible for other listed species.

Implementation of any project alternative that may result in take of any species protected by ESA would be subject to approval and oversight by NMFS and USFWS, as relevant, and subject to the terms and conditions of any BO from those agencies. BOs have been issued by USFWS and NMFS based on Alternative 5, as described in Chapter 5, "Regulatory Framework and Compliance," and appended to this Final EIS as Appendices J-4 and J-5, respectively. Compliance with the terms and conditions of the BOs would further ensure no implemented alternative would jeopardize the continued existence of any threatened or endangered species.

Provisions of Sections 9 and 7 of the ESA are relevant to this project and are summarized below.

Section 9: ESA Prohibitions

Section 9 of the ESA prohibits the take of any fish or wildlife species listed under ESA as endangered. Take of threatened species also is prohibited under Section 9, unless otherwise authorized by Federal regulations.[1] *Take*, as defined by the ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." *Harm* is defined as "any act that kills or injures the species, including significant habitat modification." In addition, Section 9 prohibits removing, digging up, cutting, and maliciously damaging or destroying Federally listed plants on sites under Federal jurisdiction.

[1] In some cases, exceptions may be made for threatened species under ESA Section 4(d); in such cases, USFWS or NMFS issues a "4(d) rule" describing protections for the threatened species and specifying the circumstances under which take is allowed.

Section 7: ESA Authorization Process for Federal Actions

Section 7 of the ESA provides a means for authorizing take of threatened and endangered species by Federal agencies. Under Section 7, the Federal agency conducting, funding, or permitting an action (the lead Federal agency, such as USACE) must consult with NMFS or USFWS, as appropriate, to ensure that the proposed project will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat.

Critical Habitat

Critical habitat, as defined in ESA Section 3, is the specific area within the geographic area occupied by a species, at the time it is listed in accordance with ESA, on which are found those biological features essential to the conservation of the species, and may require special management considerations or protection; it also includes specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

The study area contains critical habitat for the following species:

- Central Valley spring-run Chinook salmon
- Central Valley winter-run Chinook salmon
- Central Valley steelhead
- Southern DPS green sturgeon
- Delta smelt

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires all Federal agencies to consult with NMFS regarding all actions or proposed actions permitted, funded, or undertaken that may adversely affect essential fish habitat (EFH). EFH is defined as “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.”

State

The following state regulations related to fish and aquatic resources may apply to implementation of the Southport project.

California Endangered Species Act

CESA (CFGC Sections 2050–2116) states that all native species or subspecies of a fish, amphibian, reptile, mammal, or plant and their habitats that are threatened with extinction and those experiencing a significant decline that, if not halted, would lead to a threatened or endangered designation, will be protected or preserved.

Under Section 2081 of the CFGC, a permit from CDFW is required for projects that could result in the take of a species that is state-listed as threatened or endangered. Under CESA, *take* is defined as an activity that would directly or indirectly kill an individual of a species. The definition does not include harm or harass, as the definition of take under ESA does. As a result, the threshold for take under CESA is higher than that under ESA. For example, habitat modification is not necessarily considered take under CESA. The potential for state-listed wildlife and plant species to occur in areas that could be affected by the Southport project is discussed below in Section 3.10.2.4, Special-Status Wildlife Species.

Section 2090 of CFGC requires state agencies to comply with endangered species protection and recovery and to promote conservation of these species. CDFW administers the act and authorizes take through CFGC Section 2081 incidental take agreements (except for species designated as fully protected) and Section 2080.1 consistency determinations. If it is determined that the proposed Southport project will result in take of a state-listed species, an incidental take permit or consistency determination will be obtained through consultation with CDFW.

Section 1600 of the California Fish and Game Code

Sections 1600–1603 of the CFGC state that it is unlawful for any person or agency to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources or to use any material from the streambeds without first notifying CDFW. A Lake and Streambed Alteration Agreement (LSA) must be obtained if effects are expected to occur. 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 that supports wildlife, fish, or other aquatic life. This definition includes watercourses having 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 extending to the tops of banks and often including the outer edge of riparian vegetation canopy cover.

Local

The following local policies related to fish and aquatic resources may apply to implementation of the Southport project.

City of West Sacramento General Plan

Section VI, Natural Resources Goals and Policies, of the City of West Sacramento General Plan (City of West Sacramento 2004) identifies policies designed to protect habitat and biological resources that are applicable to the resources located in the study area, including fishery resources and aquatic habitat. Relevant policies include supporting state and Federal policies for preservation and enhancement of riparian and wetland habitats; supporting mitigation measures that provide for no net loss of riparian or wetland habitat; and implementing measures to ensure that development does not adversely affect fishery resources in the Sacramento River, Deep Water Ship Channel, and Lake Washington.

Yolo County General Plan

The Yolo County General Plan was adopted in 1983 (Yolo County 2009). The objective of the general plan is to provide guidance for the development of Yolo County. Relevant goals and objectives include preservation and enhancement of existing biological resources, no net loss of wetland and/or riparian habitat, and maintenance of unique or sensitive plant or animal habitat.

3.9.1.2 Environmental Setting

Fish Resources in the Study Area

The study area includes the project area, as defined in Chapter 1, and the adjacent Sacramento River channel extending from the project area boundaries to the limits of water quality effects that may occur during construction activities. Potential borrow activities from the previously dredged and stockpiled spoils adjacent to the DWSC would be limited to upland areas and would not affect fish and aquatic resources in the DWSC.

The Sacramento River channel adjacent to the project area provides migratory and seasonal rearing habitat for anadromous fish such as Chinook salmon, steelhead, river lamprey, and green sturgeon. Other migratory species such as Sacramento splittail, delta smelt, and longfin smelt may spawn in the Sacramento River within the study area along shallow river margins.

Table 3.9-1 lists the fish species that may occur in the study area.

Table 3.9-1. Fish Species Potentially Occurring in Project Area

Common Name—Origin	Scientific Name
Lamprey (two species)—native	*Lampetra* spp.
Chinook salmon (winter-, spring-, fall-, and late fall–runs)—native	*Oncorhynchus tshawytscha*
Chum salmon (rare)—native	*Oncorhynchus keta*
Steelhead/rainbow trout—native	*Oncorhynchus mykiss*
White sturgeon—native	*Acipenser transmontanus*
Green sturgeon—native	*Acipenser medirostris*
Delta smelt—native	*Hypomesus transpacificus*
Longfin smelt–native	*Spirinchus thaleichthys*
Wakasagi—nonnative	*Hypomesus nipponensis*
Sacramento sucker—native	*Catostomus occidentalis*
Sacramento pikeminnow—native	*Ptychocheilus grandis*
Sacramento splittail—native	*Pogonichthys macrolepidotus*
Sacramento blackfish—native	*Orthodon microlepidotus*
Hardhead—native	*Mylopharodon conocephalus*
Speckled dace—native	*Rhinichthys osculus*
California roach—native	*Lavinia symmetricus*
Hitch—native	*Lavina exilicauda*
Golden shiner—nonnative	*Notemigonus crysoleucas*
Fathead minnow—nonnative	*Pimephales promelas*
Goldfish—nonnative	*Carassius auratus*
Carp—nonnative	*Cyprinus carpio*
Threadfin shad—nonnative	*Dorosoma petenense*
American shad—nonnative	*Alosa sapidissima*
Black bullhead—nonnative	*Ictalurus melas*
Brown bullhead—nonnative	*Ictalurus nebulosus*
White catfish—nonnative	*Ictalurus catus*
Channel catfish—nonnative	*Ictalurus punctatus*
Mosquito fish—nonnative	*Gambusia affinis*
Inland silverside—nonnative	*Menidia audena*
Threespine stickleback—native	*Gasterosteus aculaetus*
Striped bass—nonnative	*Morone saxatilis*
Bluegill—nonnative	*Lepomis macrochirus*
Green sunfish—nonnative	*Lepomis cyanellus*
Redear sunfish—nonnative	*Lepomis microlophus*

Common Name—Origin	Scientific Name
Warmouth—nonnative	*Lepomis gulosus*
White crappie—nonnative	*Pomoxis annularis*
Black crappie—nonnative	*Pomoxis nigromaculatus*
Largemouth bass—nonnative	*Micropterus salmoides*
Redeye bass—nonnative	*Micropterus coosae*
Spotted bass—nonnative	*Micropterus punctulatus*
Small mouth bass—nonnative	*Micropterus dolomieui*
Bigscale logperch—nonnative	*Percina macrolepida*
Prickly sculpin—native	*Cottus asper*
Tule perch—native	*Hysterocarpus traski*

Aquatic Habitat

Aquatic habitat in the Southport project area consists of shaded riverine aquatic (SRA) cover, floodplain, open water, and seasonal and emergent wetlands. Because of their importance to Federal, state, and local ecosystem and species conservation and recovery efforts, SRA cover and floodplain habitats are described in more detail below.

Shaded Riverine Aquatic Cover

Nearshore areas support large and diverse fish and wildlife populations. These areas provide important rearing, migration, and spawning habitat for a number of fish species. For example, juvenile Chinook salmon and steelhead use nearshore habitat for shelter, hiding, feeding, and as holding areas during their rearing and emigration periods. Vegetated nearshore habitat also provides spawning areas for fish species such as splittail, delta smelt, black bass, and sunfish.

The USFWS defines SRA cover as the unique nearshore aquatic area occurring at the interface between a river and adjacent woody riparian habitat. Key attributes of SRA cover are (a) the adjacent bank being composed of natural, eroding substrates supporting riparian vegetation that either overhangs or protrudes into the water, and (b) the water containing variable amounts of woody debris , such as leaves, logs, branches and roots, often substantial detritus, and variable water velocities, depths and flows. Instream cover often consists of dead woody material (instream woody material [IWM]) that has fallen from the overhanging riparian vegetation. However, whole trees, which periodically become dislodged from the adjacent eroding banks, also contribute to SRA cover. These attributes provide high-value feeding areas, burrowing substrates, escape cover, and reproductive cover for numerous regionally important fish and wildlife species. (U.S. Fish and Wildlife Service 1992.)

Riparian vegetation is a component of nearshore and SRA cover and directly influences the quality of fish habitat. Its presence contributes to cover, food, instream habitat complexity, streambank stability, and temperature regulation (National Marine Fisheries Service 2008). Large woody debris usually originates from riparian trees and provides habitat complexity in aquatic environments, an essential component of fish habitat. The roots of riparian vegetation at the land-water interface and on adjacent berms provide streambank stability and cover for rearing fish (Meehan and Bjorn 1991).

Riparian vegetation also provides shade and an insulating canopy that moderates water temperatures in both summer and winter. While the influence of shade on regulating river temperatures decreases as rivers become larger, the moderating effects of shade on nearshore water temperatures may be important to some fish species, including juvenile salmonids, during the growing season. (National Marine Fisheries Service 2008.)

Riparian vegetation also influences the food chain of a stream, providing organic detritus and terrestrial insects. Terrestrial organisms falling from overhanging branches contribute to the food base of the aquatic community. Salmonids in particular are primarily insectivores and feed mainly on drifting food organisms. (National Marine Fisheries Service 2008.)

Field observations and examination of a recent aerial photograph of the project area indicate that existing SRA cover values are relatively low along much of the project levee. However, the river bank within the project boundaries includes several areas with moderate- to high-quality SRA cover as indicated by the presence of dense riparian vegetation, live woody vegetation and IWM overhanging and in the water, and natural substrates (i.e., absence of large rock or other artificial substrates). Based on these general criteria, a total of seven bank segments encompassing approximately 4,260 linear feet of moderate- to high-quality SRA cover were delineated on an aerial photograph of the project area taken in October 2012 (Google Inc. 2013) (Plate 3.9-1).

Floodplain Habitat

Floodplains are recognized as major contributors to aquatic production and species diversity in large river systems where native fish species have evolved specific adaptations to exploit these variable but highly productive habitats (Welcomme et al. 1989; Junk et al. 1989; Gutreuter et al. 1999). In the Central Valley, restoring floodplain habitat and connectivity of large rivers to their floodplains has been identified as an important objective of ecosystem restoration and recovery efforts for native fishes in the Central Valley. Historically, the Sacramento River Valley contained extensive areas of seasonal floodplains and wetlands that flooded nearly every winter and spring. These habitats supported significant production of native fish species and contributed substantially to overall biological productivity of the river and estuary (Ahearn et al. 2006).

As in many large river systems, the Sacramento River has been highly modified for flood management and water storage, conveyance, and supply. The frequency, extent, and duration of floodplain inundation have been reduced substantially by the resulting hydrologic changes, and the quality of remaining habitat has been further reduced by confinement of the river and remaining floodplains by levees. Losses of natural floodplain connectivity from human alterations have impaired the ecological functions of floodplain habitat and contributed to declines of many native fish species and communities specifically adapted to the natural flood pulse (Winemiller 1996). Substantial losses of floodplain habitat likely contributed to declines of Chinook salmon and other floodplain-adapted species in the Central Valley.

The typical spawning and rearing periods for many floodplain-adapted fishes coincide with natural flood pulses. Chinook salmon populations in the Sacramento River and its major tributaries exhibit a predominantly ocean-type life history in which large numbers of juveniles move rapidly to the lower reaches of the system soon after emergence. Historically, peak migrations of juvenile salmon from upstream spawning areas coincided with peak winter and spring flow events that dispersed juveniles to downstream habitats and created large expanses of inundated floodplains and wetlands along their migration routes. The dominance of this life history trait may be linked in part to the high productivity of valley floodplain and estuarine habitats that favored rapid growth and survival of juveniles prior to seaward migration (Healey 1991).

Much of current understanding of the significance of floodplain habitat to Chinook salmon and other native fish species in the Central Valley is based on recent studies conducted in the Yolo Bypass (Sommer et al. 1997; Sommer et al. 2001, 2005) and on a restored floodplain of the Cosumnes River (Moyle et al. 2005; Jeffres et al. 2008). Sommer et al. (2001), using paired releases of tagged Chinook salmon, found that growth rates of juvenile salmon released in the Yolo Bypass and recovered in the Delta were significantly higher than the growth rates of juveniles released in the Sacramento River. Relatively large differences in mean size of juveniles, and long periods of time (averaging 30–56 days per release group) between release and recapture in the Yolo Bypass, provided additional evidence of substantial floodplain rearing and growth (Sommer et al. 2005). Jeffres et al. (2008) reported similar results for juvenile Chinook salmon held in enclosures on a restored natural floodplain of the Cosumnes River. Juvenile salmon grew faster in seasonal floodplain habitat than in the main channel or in perennial ponds on the floodplain. In both studies, higher floodplain growth rates were attributed to higher foraging efficiency of juveniles associated with substantially higher prey densities, higher water temperatures, and lower water velocities.

Higher growth rates of Chinook salmon also have been observed in seasonal off-channel habitats of the Sacramento River. For example, Limm and Marchetti (2003) concluded that juvenile salmon rearing in off-channel ponds and non-natal tributaries grew faster than salmon rearing in the main channel, and attributed these differences to higher water temperatures and prey densities in these habitats. High growth rates of juvenile salmon also were evident in off-channel ponds that were seasonally available to juveniles during large flood events (Jones & Stokes 1999).

Floodplains can greatly expand the quantity and quality of habitat available to juvenile salmon and other fishes during seasonal inundation periods. Limited evidence suggests that survival of juvenile salmon that use the Yolo Bypass as a migration route may, at least in some years, be higher than that of juveniles that use the adjacent Sacramento River (Sommer et al. 2001; Sommer et al. 2005). Floodplain use may increase survival by reducing exposure of young fish to unfavorable main channel environments and producing faster-growing and/or larger juveniles that survive better during their seaward migration. These benefits, coupled with increases in the amount of rearing habitat resulting from floodplain inundation, would be expected to increase juvenile production and result in increased adult abundance in subsequent years. However, floodplain rearing also carries the additional risks of stranding, increased predation, and low dissolved oxygen associated with permanent ponds and topographic variability of floodplains (Jeffres et al. 2008).

Most of the relevant studies and literature regarding floodplain use by juvenile salmonids in the Central Valley focus on Chinook salmon because of the strong association of this species with seasonal floodplain habitat. Use of floodplains by juvenile steelhead has been documented, but the relative importance of floodplain habitat to steelhead is unclear.

Special-Status Fish Species

Special-status fish species that are known to occur or have the potential to occur in the study area are:

- Chinook salmon—Sacramento River winter-run Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*)—FE/SE
- Chinook salmon—Central Valley spring-run ESU (*O. tshawytscha*)—FT/ST
- Chinook salmon—Central Valley fall-/late fall–run ESU (*O. tshawytscha*)—FSC/SSC

- Steelhead—Central Valley DPS (*O. mykiss*)—FT
- North American green sturgeon—Southern DPS (*Acipenser medirostris*)—FT/SSC
- Delta smelt (*Hypomesus transpacificus*)—FT/SE
- Longfin smelt (*Spirinchus thaleichthys*)—ST
- Sacramento splittail (*Pogonichthys macrolepidotus*)—SSC
- River lamprey (*Lampetra ayresi*)—SSC

The status, distribution, and relevant life history information for each species is presented below, and summarized in Table 3.9-2. Table 3.9-3 summarizes the primary periods of species and life stage occurrence in the project area.

Table 3.9-2. Special-Status Fish Species with Potential to Occur in the Study Area

Common and Scientific Name	Status[a] Federal/State	California Distribution	Habitats	Occurrence in the Study Area
Delta smelt *Hypomesus transpacificus*	T/E	Primarily in the Sacramento–San Joaquin estuary, but has been found as far upstream as the mouth of the American River on the Sacramento River and Mossdale on the San Joaquin River; range extends downstream to San Pablo Bay	Occurs in estuary habitat in the Delta where fresh and brackish water mix in the salinity range of 2–7 parts per thousand (Moyle 2002).	High
Longfin smelt *Spirinchus thaleichthys*	–/T	San Francisco estuary, Humboldt Bay, Eel River estuary, and Klamath River estuary	Occurs in open waters of estuaries and seasonally migrates to spawn in freshwater habitats of upper estuary; spawns over sand, rocks, and aquatic plants.	High
Sacramento splittail *Pogonichthys macrolepidotus*	–/SSC	Occurs throughout the year in low-salinity waters and freshwater areas of the Sacramento–San Joaquin River Delta, Yolo Bypass, Suisun Marsh, Napa River, and Petaluma River (Moyle 2002)	Spawning takes place among submerged and flooded vegetation in sloughs and the lower reaches of rivers.	High
Central Valley steelhead *Oncorhynchus mykiss*	T/–	Sacramento River and tributary Central Valley rivers	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 7.8 to 18°C (Moyle 2002). Habitat types are riffles, runs, and pools.	High—spawning during migration
Sacramento River winter-run Chinook salmon *Oncorhynchus tshawytscha*	E/E	Mainstem Sacramento River below Keswick Dam (Moyle 2002)	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5°C. Habitat types are riffles, runs, and pools (Moyle 2002).	High—spawning during migration
Central Valley spring-run Chinook salmon *Oncorhynchus tshawytscha*	T/T	Upper Sacramento River and Feather River	Has the same general habitat requirements as winter-run Chinook salmon. Coldwater pools are needed for holding adults (Moyle 2002).	High—spawning during migration

Common and Scientific Name	Status[a] Federal/State	California Distribution	Habitats	Occurrence in the Study Area
Central Valley fall-/late fall–run Chinook salmon *Oncorhynchus tshawytscha*	SC/SSC	Sacramento and San Joaquin Rivers and tributary Central Valley rivers	Occurs in well-oxygenated, cool, riverine habitat with water temperatures from 8.0 to 12.5°C. Habitat types are riffles, runs, and pools (Moyle 2002).	High—spawning during migration
Green sturgeon (southern DPS) *Acipenser medirostris*	T/SSC	Sacramento, Klamath and Trinity Rivers (Moyle 2002)	Spawn in large river systems with well-oxygenated water, with temperatures from 8.0 to 14°C.	High—spawning during migration
River lamprey *Lampetra ayresi*	–/SSC	Sacramento, San Joaquin, and Napa Rivers; tributaries of San Francisco Bay (Moyle 2002; Moyle et al. 1995)	Adults live in the ocean and migrate into fresh water to spawn.	High—spawning during migration

[a] Status Definitions

Federal

E = endangered under the Federal Endangered Species Act.
T = threatened under the Federal Endangered Species Act.
SC = species of concern.
– = no listing.

State

E = endangered under the California Endangered Species Act.
T = threatened under the California Endangered Species Act.
SSC = species of special concern.
– = no listing.

Table 3.9-3. Life Stage Timing and Distribution of Special-Status Fish Species Potentially Affected by Southport Project

Species/Life Stage	Distribution	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Winter-Run Chinook Salmon													
Adult migration and holding	San Francisco Bay to upper Sacramento River	■	■	■	■	■	■						
Juvenile rearing (natal stream)	Upper Sacramento River to San Francisco Bay	■	■	■	■			■	■	■	■	■	■
Juvenile movement and rearing	Upper Sacramento River to San Francisco Bay	■	■	■	■								
Spring-Run Chinook Salmon													
Adult migration	San Francisco Bay to upper Sacramento River and tributaries			■	■	■	■	■					
Juvenile movement	Upper Sacramento River and tributaries to San Francisco Bay	■	■	■	■	■					■	■	■
Late Fall–Run Chinook Salmon													
Adult migration	San Francisco Bay to upper Sacramento River and tributaries	■	■								■	■	■
Juvenile movement and rearing	Upper Sacramento River and tributaries	■	■	■	■	■	■				■	■	■
Fall-Run Chinook Salmon													
Adult migration and holding	San Francisco Bay to upper Sacramento River and tributaries							■	■	■	■	■	■
Juvenile movement	Upper Sacramento River and tributaries to San Francisco Bay	■	■	■	■	■	■						
Steelhead													
Adult migration	San Francisco Bay to upper Sacramento River and tributaries	■	■	■						■	■	■	■
Juvenile and smolt movement	Upper Sacramento River and tributaries to San Francisco Bay	■	■	■	■	■	■				■	■	■

Species/Life Stage	Distribution	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Green Sturgeon													
Adult migration and holding	San Francisco Bay to upper Sacramento River												
Juvenile rearing (natal stream to estuary)	Upper Sacramento River to San Francisco Bay												
Juvenile movement and rearing	Upper Sacramento River to San Francisco Bay												
Delta Smelt													
Adult migration	South Delta to north Delta and lower Sacramento River												
Spawning	Upper Delta to lower Sacramento River												
Longfin Smelt													
Adult migration and spawning	San Francisco Bay to upper Delta												
Sacramento Splittail													
Adult migration and spawning	Suisun Bay/Marsh to lower Sacramento and San Joaquin Rivers, including Yolo Bypass												
River Lamprey													
Adult migration and spawning	Pacific Ocean to Sacramento River												
Metamorphosis and movement	Sacramento River to Delta												

Sources: Wang and Brown 1993; U.S. Fish and Wildlife Service 1996; McEwan 2001; Moyle 2002; Hallock 1989; Beamesderfer et al. 2006.

Note: Gray shading indicates primary periods of species and life stage occurrence included in the assessment of project effects.

Chinook Salmon

Chinook salmon are anadromous fish, meaning that juveniles rear to adulthood in marine waters and return to natal freshwater streams to spawn. Juveniles rear in fresh water for a period of up to 1 year until smoltification (i.e., a physiological preparation for survival in the marine environment) and subsequent ocean residence.

Four distinct runs of Chinook salmon occur in the Sacramento River system: winter-run, spring-run, fall-run, and late fall–run. The runs are named for the season of adult migration, with each run having a distinct combination of adult migration, spawning, juvenile residency, and smolt migration periods. In general, fall- and late fall–run Chinook salmon spawn soon after entering their natal streams, while spring- and winter-run Chinook salmon typically hold in their natal streams for up to several months before spawning.

Winter Run

The Sacramento River winter-run Chinook salmon is listed as an endangered species under the ESA and CESA. Critical habitat for winter-run Chinook salmon includes the Sacramento River from Keswick Dam (RM 302) to Chipps Island (RM 0) in the Delta, and all waters of the San Francisco estuary to the Golden Gate Bridge north of the San Francisco/Oakland Bay Bridge (58 FR 33212). Critical habitat includes the water column, bottom, and adjacent riparian zone of the designated stream reaches (limited to streambank and nearshore areas used as cover and foraging habitat by juveniles) and the water column, foraging habitat, and food resources used by juvenile and adult winter-run Chinook salmon in the estuary.

Historically, winter-run Chinook salmon spawned in cold tributary streams upstream of present-day Shasta Reservoir, including the Little Sacramento, Pit, McCloud, and Fall Rivers and Battle Creek. Presently, winter-run Chinook salmon persist in the Sacramento River below Keswick Dam and are sustained by coldwater releases from Shasta Reservoir.

Adult winter-run Chinook salmon immigration (upstream migration) through the Delta and into the Sacramento River occurs from December through July, with a peak in March (Table 3.9-3). Winter-run Chinook salmon spawn primarily in the Sacramento River between Keswick Dam (RM 302) and Red Bluff Diversion Dam (RM 242) from mid-April to mid-August, with peak spawning occurring in May and June (National Marine Fisheries Service 2009).

Juvenile emigration (downstream migration) past the Red Bluff Diversion Dam (RM 242) may begin as early as mid-July and extend through March, with a peak in September (National Marine Fisheries Service 2009) (Table 3.9-3). The primary period of juvenile emigration through the lower Sacramento River into the Delta is November through early May, with a peak occurring between January and April (National Marine Fisheries Service 1997). Differences in peak emigration periods between these two locations suggest that juvenile winter-run Chinook salmon reside for up to several months in the upper or middle reaches of the Sacramento River before entering the lower Sacramento River and the Delta.

Spring Run

The Central Valley spring-run Chinook salmon is listed as threatened under the ESA and CESA. Critical habitat for spring-run Chinook salmon includes portions of the northern Delta; the Sacramento, Feather, and Yuba Rivers; and several smaller tributaries of the Sacramento River upstream of the Feather River (70 FR 52596). Within these reaches, critical habitat includes the stream channels and the lateral extent of these channels up to the ordinary high water mark (OHWM) or bankfull elevation (defined as the elevation at which water begins to leave the channel and move onto the floodplain or the elevation associated with the 1- to 2-year flood).

Spring-run Chinook salmon historically spawned in the upper and middle reaches of the San Joaquin, American, Yuba, Feather, Sacramento, McCloud, and Pit Rivers, with smaller populations in tributaries with suitable over-summering habitat. Naturally spawning populations currently are restricted to accessible reaches of the upper Sacramento River, Feather River, Yuba River, and several tributaries of the Sacramento River upstream of the Feather River. However, only Deer, Mill, and Butte Creeks are considered to be independent populations (National Marine Fisheries Service 2009).

Spring-run Chinook salmon enter the Sacramento River between March and September, and enter summer holding and spawning streams or reaches primarily in April, May, and June (Table 3.9-3). Adult spring-run Chinook salmon hold in deep pools through the summer until their eggs fully develop and become ready for spawning. Spawning typically occurs in September and October. The timing and pattern of juvenile emigration can vary depending on the stream of origin and environmental conditions (e.g., winter and spring flows), with most emigration occurring between November and June (Table 3.9-3). Most juvenile emigrate from their natal streams by June, but a small fraction may rear through the summer and emigrate in the fall or winter. (National Marine Fisheries Service 2009.)

Fall- and Late Fall–Run

Central Valley fall-run and late fall–run Chinook salmon are designated as Federal species of concern. Fall- and late fall–run Chinook salmon are recognized as distinct runs but are managed as a single ESU by NMFS because of their close genetic affinities.

Fall-Run

Fall-run Chinook salmon are the most abundant and widely distributed run in the Central Valley, with populations in most of the accessible reaches of the Sacramento and San Joaquin Rivers and their tributaries. Because of their abundance, due in part to hatchery production, fall-run Chinook salmon continue to support commercial and recreational fisheries of significant economic importance.

Fall-run Chinook salmon migrate into the Sacramento River and its tributaries from July through December, with peak immigration occurring in October and November (Table 3.9-3). Spawning occurs soon after arriving on the spawning grounds, primarily from October through December. Fall-run Chinook salmon emigrate from their natal streams as fry soon after emergence or rear for up to several months before emigrating as parr or smolts. Fry, parr, and smolts may be present in the lower Sacramento River from January through June (Reynolds et al. 1993).

Late Fall–Run

Late fall–run Chinook salmon spawn primarily in several tributaries of the upper Sacramento River, including Battle Creek, Cottonwood Creek, Clear Creek, and Mill Creek.

Late fall–run Chinook salmon migrate into the Sacramento River from October through April, with peak immigration occurring in December and January (Table 3.9-3). Spawning occurs mainly from

January through April. Following emergence, juveniles may rear in their natal streams for 7–13 months before migrating to the ocean at a relatively large size. Emigrating juveniles are likely to be present in the lower Sacramento River from October through June.

Central Valley Steelhead

Central Valley steelhead are listed as threatened under the ESA. Critical habitat for steelhead has been designated in the Sacramento River, but the Sacramento DWSC is excluded from the critical habitat designation (70 FR 52596). Steelhead, an anadromous variant of rainbow trout, is closely related to Pacific salmon. The species was once abundant in California coastal and Central Valley drainages. However, population numbers have declined significantly in recent years, especially in the tributaries of the Sacramento River. Steelhead typically migrate to marine waters after spending 1 year or more in fresh water. In the marine environment, they typically mature for 1 to 3 years before returning to their natal streams to spawn as 3- or 4-year-olds. Unlike Pacific salmon, steelhead are capable of spawning more than once before they die. Immigration of adult steelhead in the Sacramento River occurs in nearly all months but peaks in late September and October (Moyle 2002). The steelhead spawning season typically stretches from December through April (Table 3.9-3). After several months, fry emerge from the gravel and begin to feed. Juveniles rear in fresh water from 1 to 4 years (usually 2 years), then migrate to the ocean as smolts in the spring (March through June). (National Marine Fisheries Service 2008.)

Sacramento Splittail

Sacramento splittail is an endemic California minnow that was once widely distributed in lakes and rivers throughout the Central Valley, including the Sacramento River upstream to Redding and the American River as far east as Folsom (Moyle 2002). Present distribution includes Suisun Bay, the Napa and Petaluma Rivers (Sommer et al. 1997), the Sacramento River as far north as the Red Bluff Diversion Dam, portions of the Delta, and the San Joaquin River upstream of its confluence with the Tuolumne River (Moyle 2002). Sacramento splittail is a California species of special concern.

Adult splittail usually reach sexual maturity in their second year. They then migrate upstream in late fall to early winter before spawning. Spawning occurs from mid-winter through July in water temperatures between 48°F and 68°F (Wang 1986) at times of high winter or spring runoff (Moyle et al. 1995). Eggs acquire adhesive properties following exposure to water and adhere to vegetation or other benthic substrates (Wang 1986). Fertilized eggs generally hatch in 3 to 5 days, and larvae begin feeding on plankton soon thereafter. Juvenile splittail inhabit shallow areas with abundant vegetation that are devoid of strong currents (Wang 1986) as they travel downstream from the spawning grounds to the Delta.

Mature splittail generally are found in the shallows of sloughs in edgewater habitat by emergent vegetation. They feed primarily on benthic invertebrates and aquatic insect larvae (Moyle 2002). Although they are tolerant of brackish water (Moyle 2002), splittail tend to move from areas of relatively high salinity to those characterized by fresh water (Moyle et al. 1995).

Delta Smelt

Delta smelt are listed as threatened under the ESA and CESA. Critical habitat is designated from the Delta into the Sacramento River. Estuarine rearing habitat for juvenile and adult delta smelt typically is found in the waters of the lower Delta and Suisun Bay where salinity is between 2 and 7 parts per thousand (ppt). Delta smelt tolerate 0 to 19 ppt salinity. They typically occupy open shallow waters but also occur in the main channel in the region where fresh and brackish water mix. The zone may be hydraulically conducive to their ability to maintain position and metabolic efficiency (Moyle 2002). Habitat for pelagic fishes such as delta smelt in the estuary is open water, largely away from shorelines and vegetated inshore areas except perhaps during spawning.

Adult delta smelt begin spawning migration into the upper Delta in December or January (Table 3.9-3). Migration may continue over several months. Spawning occurs between January and July, with peak spawning during April through mid-May (Moyle 2002) (Table 3.9-3). Spawning occurs along the channel edges in the upper Delta, including the Sacramento River above Rio Vista, Cache Slough, Lindsey Slough, and Barker Slough. Spawning has been observed in the Sacramento River up to Garcia Bend during drought conditions, possibly attributable to adult movement farther inland in response to saltwater intrusion (Wang and Brown 1993). Eggs are broadcast over the river bottom where they attach to firm substrate, woody material, and vegetation. Hatching takes approximately 9 to 13 days, and larvae begin feeding 4 to 5 days later. Newly hatched larvae contain a large oil globule and are semi-buoyant. Larval smelt feed on rotifers and other zooplankton. As their fins and swim bladder develop, they move higher into the water column. Larvae and juveniles gradually move downstream toward rearing habitat in the estuarine mixing zone (Wang 1986).

Longfin Smelt

Longfin smelt are listed as threatened under the CESA. Adults and juveniles typically occur in open waters of estuaries but range from coastal marine waters and bays to the upper freshwater reaches of estuaries (Moyle 2002). In the San Francisco estuary, the population is concentrated in San Pablo and San Francisco Bays during the spring and summer, and begins a gradual upstream shift in distribution in the fall and winter as yearlings begin to move upstream to spawn. Spawning occurs mainly from February through April below Medford Island in the San Joaquin River and below Rio Vista in the Sacramento River. Longfin smelt are believed to spawn at or near the mixing zone between fresh and brackish water, but spawning habitat probably includes freshwater portions of the Sacramento River, eastern Suisun Bay, and Suisun Marsh; some spawning appears to occur upstream of Rio Vista in years with low outflow (Rosenfield 2010). Longfin smelt eggs are adhesive, and it is inferred from other smelt species that eggs are deposited on sandy substrates. After spawning, the embryos hatch in 40 days and newly hatched larvae are transported downstream into more brackish parts of the estuary. Metamorphosis into juveniles probably begins 30–60 days after hatching, depending on temperature.

Green Sturgeon

NMFS has divided sturgeon into two DPSs: the southern and northern DPS. The northern DPS comprises sturgeon from the Eel River northward; the southern DPS comprises populations below the Eel, specifically the Sacramento River population (71 FR 17757). The southern DPS, which occurs in the study area, is Federally listed as threatened (71 FR 17757, April 7, 2006). In October 2009, NMFS designated critical habitat for green sturgeon in the Sacramento River, which includes the project area (74 FR 52300). Green sturgeon are known to occur in the lower reaches of large rivers, including the Klamath, Eel, and Smith Rivers, from the Delta northward (Moyle 2002). Green sturgeon also have been found in saltwater from Ensenada, Mexico, to the Bering Sea and Japan (Miller and Lea 1972). Adults of this species tend to be associated with marine environments more than the more common white sturgeon, although spawning populations have been identified in the Sacramento and Klamath Rivers (Beak Consultants 1993). Virtually all green sturgeon spawning occurs upstream of Hamilton City and as far upstream as Keswick Dam (Adams et al. 2002). Green sturgeon are thought to spawn upstream of the Red Bluff Diversion Dam following modifications to the operation of that facility (Adams et al. 2002). The preferred spawning substrate is thought to be large cobble, although the substrate type may range from clean sand to bedrock. Eggs are broadcast and fertilized in relatively fast-flowing water where depths typically exceed 10 feet (Moyle 2002). In the Sacramento River, green sturgeon presumably spawn at temperatures ranging from 46°F to 57°F (Beak Consultants 1993).

Green sturgeon eggs hatch in approximately 8 days at 55°F (Moyle 2002). Larvae begin feeding 10 days after hatching. Metamorphosis to the juvenile stage is complete within 45 days of hatching. Juveniles spend 1 to 4 years in fresh and estuarine waters and migrate to salt water at lengths of 300 to 750 millimeters (mm) (National Marine Fisheries Service 2005). Little is known about movements, habitat use, and feeding habits of green sturgeon. Green sturgeon have been salvaged at the state and Federal fish collection facilities in every month, indicating that they are present in the Delta year-round.

River Lamprey

River lamprey is a state species of special concern. River lamprey are relatively small (averaging 6.7 inches long) and highly predaceous (Moyle 2002). They are anadromous and will attack fish in both fresh and saltwater (Moyle 2002). A great deal of what is known about the species is based on populations in British Columbia. There, adults migrate from the Pacific Ocean into rivers and streams in September and spawn in winter. Adults excavate a saucer-shaped depression in sand or gravel riffles where eggs are deposited. After spawning, the adults perish. Juvenile river lamprey, called ammocoetes, remain in backwaters for several years where they feed on algae and microorganisms (Moyle et al. 1986). The metamorphosis from juvenile to adult begins in July and is complete by the following April. From May through July, following completion of metamorphosis, river lamprey aggregate in the Delta before entering the ocean.

River lamprey is distributed in streams and rivers along the eastern Pacific Ocean from Juneau, Alaska, to San Francisco Bay. They may be most abundant in the Sacramento and San Joaquin River systems, although they are only rarely observed (Moyle et al. 1986).

Factors That Affect Abundance of Fish Species

Information relating abundance with environmental conditions is most available for listed species, especially Chinook salmon. The following section focuses on factors that potentially have affected the abundance of listed species in the Central Valley. Although not all species are discussed, factors affecting the listed species are assumed also to affect the abundance of other native species in similar fashion.

Many factors have contributed to historical declines of Central Valley Chinook salmon and steelhead. One of the major causes has been the construction of mainstem dams that blocked salmon and steelhead from accessing much of their historical spawning and rearing habitat. Downstream of these dams, major factors that contributed to declines, and that currently limit salmon and steelhead populations, include altered flows and water temperatures from dam operations and water diversions, losses of suitable spawning substrate, channel alterations (e.g., channelization, levees) associated with navigation and flood risk–reduction, and associated losses of riparian, floodplain, and wetland habitat. The loss of floodplain and estuarine rearing habitat has had an unknown effect, but there is growing evidence that such habitats were once of major importance for the growth and survival of juvenile salmon (Moyle 2002; National Marine Fisheries Service 2009; Moyle et al. 2008; Lindley et al. 2007).

Spawning Habitat Area

Spawning habitat area may limit the production of juveniles and subsequent adult abundance of some species. Spawning habitat area for fall- and late fall–run Chinook salmon, which compose more than 90% of the Chinook salmon returning to Central Valley streams, has been identified as limiting their population abundance. Existing spawning habitat area has not been identified as a limiting factor for the less-abundant winter-run and spring-run Chinook salmon (National Marine Fisheries Service 1996; U.S. Fish and Wildlife Service 1996), although habitat may be limiting in some streams (e.g., Butte Creek) during years of high adult abundance.

Delta smelt spawn in fresh water at low tide on aquatic, submerged, and inshore plants and over sandy and hard bottom substrates of sloughs and shallow edges of channels in the upper Delta and Sacramento River above Rio Vista (Wang 1986; Moyle 2002). Spawning habitat area has not been identified as a factor affecting delta smelt abundance (U.S. Fish and Wildlife Service 1996), but little is known about specific spawning areas and requirements in the Delta.

A lack of sufficient seasonally flooded vegetation may limit splittail spawning success (Young and Cech 1996; Sommer et al. 1997). Splittail spawn over flooded vegetation and debris on floodplains inundated by high flows from February to early July in the Sacramento River and San Joaquin River systems. The onset of spawning appears to be associated with rising water levels, increasing water temperature, and day length (Moyle 2002). The Sutter and Yolo Bypasses along the Sacramento River are important spawning habitat areas during high flow.

Rearing Habitat Area

Rearing habitat area may limit the production of juveniles and subsequent adult abundance of some species. USFWS (1996) has indicated rearing habitat area in Central Valley streams and rivers limits the abundance of juvenile fall-run and late fall–run Chinook salmon and juvenile steelhead. Rearing habitat for salmonids is defined by environmental conditions such as water temperature, dissolved oxygen, turbidity, substrate, water velocity, water depth, and cover (Jackson 1992; Bjornn and Reiser 1991; Healey 1991). Chinook salmon also rear along the shallow vegetated edges of Delta channels (Grimaldo et al. 2000).

Environmental conditions and interactions among individuals, predators, competitors, and food sources determine habitat quantity and quality and the productivity of the stream (Bjornn and Reiser 1991). Everest and Chapman (1972) found juvenile Chinook salmon and steelhead of the same size using similar in-channel rearing area.

Rearing area varies with flow. High flow increases the area available to juvenile Chinook salmon because they extensively use submerged terrestrial vegetation on the channel edge and the floodplain. Deeper inundation provides more overhead cover and protection from avian and terrestrial predators than shallow water (Everest and Chapman 1972 in Jackson 1992). In broad, low-gradient rivers, change in flow can greatly increase or decrease the lateral area available to juvenile Chinook salmon, particularly in riffles and shallow glides (Jackson 1992).

Rearing habitat for larval and early juvenile delta smelt encompasses the lower reaches of the Sacramento River below Isleton and the San Joaquin River below Mossdale. Estuarine rearing by juveniles and adults occurs in the lower Delta and Suisun Bay. USFWS (1996) has indicated that loss of rearing habitat area would adversely affect the abundance of larval and juvenile delta smelt. The area and quality of estuarine rearing habitat are assumed to be dependent on the downstream location of approximately 2 ppt salinity (Moyle et al. 1992). The condition where 2 ppt salinity is located in the Delta is assumed to provide less habitat area and lower quality than the habitat provided by 2 ppt salinity located farther downstream in Suisun Bay. During years of average and high outflow, delta smelt may concentrate anywhere from the Sacramento River around Decker Island to Suisun Bay (Moyle 2002). This geographic distribution may not always be a function of outflow and 2 ppt isohaline position. Outflow and the position of the 2 ppt isohaline may account for only about 25% of the annual variation in abundance indices for delta smelt (California Department of Water Resources and Bureau of Reclamation 1994).

Rearing habitat has not been identified as a limiting factor in splittail population abundance, but as with spawning, a lack of sufficient seasonally flooded vegetation may be limiting population abundance and distribution (Young and Cech 1996). Rearing habitat for splittail encompasses the Delta, Suisun Bay, Suisun Marsh, the lower Napa River, the lower Petaluma River, and other parts of San Francisco Bay (Moyle 2002). In Suisun Marsh, splittail concentrate in the dead-end sloughs that have small streams feeding into them (Daniels and Moyle 1983; Moyle 2002). As splittail grow, salinity tolerance increases (Young and Cech 1996). Splittail are able to tolerate salinity concentrations as high as 29 ppt and as low as 0 ppt (Moyle 2002).

Migration Habitat Conditions

The Sacramento River and the Delta provide a migration pathway between freshwater and ocean habitats for adult and juvenile steelhead and all runs of Chinook salmon.

Migration habitat conditions include streamflows that provide suitable water velocities and depths that provide successful passage. Flow in the Sacramento River and in the Delta provides the necessary depth, velocity, and water temperature; however, flow and environmental conditions in the Central Valley are not always at optimal levels (e.g., see discussion below for water temperature). In the Delta, the channel pathways affect migration of juvenile Chinook salmon. Juvenile Chinook salmon survival is lower for fish migrating through the central Delta (i.e., diverted into the Delta Cross Channel and Georgiana Slough) than for fish continuing down the Sacramento River (Newman and Rice 1997). Similarly, juvenile Chinook salmon entering the Delta from the San Joaquin River appear to have higher survival rates if they remain in the San Joaquin River channel instead of moving into Old River and the south Delta (Brandes and McLain 2001).

Larval and early juvenile delta smelt are transported by currents that flow downstream into the upper end of the mixing zone of the estuary where incoming saltwater mixes with outflowing fresh water (Moyle et al. 1992). Reduced flow may adversely affect transport of larvae and juveniles to rearing habitat.

Adult splittail gradually move upstream during the winter and spring months to spawn. Year-class success of splittail is positively correlated with wet years, high Delta outflow, and floodplain inundation (Sommer et al. 1997; Moyle 2002). Low flow impedes access to floodplain areas that support rearing and spawning.

Water Temperature

Fish species have different responses to water temperature conditions, depending on their physiological adaptations. Salmonids in general have evolved under conditions in which water temperatures need to be relatively cool. Delta smelt and splittail can tolerate warmer temperatures. In addition to species-specific thresholds, different life stages have different water temperature requirements. Eggs and larval fish are the most sensitive to warm water temperature.

Unsuitable water temperatures for adult salmonids such as Chinook salmon and steelhead during upstream migration lead to delayed migration and the potential for lower reproduction rates. Elevated summer water temperatures in holding areas cause mortality of spring-run Chinook salmon (U.S. Fish and Wildlife Service 1996). Warm water temperature and low dissolved oxygen also increase egg and fry mortality. USFWS (1996) cited elevated water temperatures as limiting factors for fall- and late fall–run Chinook salmon.

Juvenile salmonid survival, growth, and vulnerability to disease are affected by water temperature. In addition, water temperature affects prey species abundance and predator occurrence and activity. Juvenile salmonids alter their behavior depending on water temperature, including movement to take advantage of local water temperature refugia (e.g., movement into stratified pools, shaded habitat, subsurface flow) and improve feeding efficiency (e.g., movement into riffles).

Water temperature in Central Valley rivers frequently exceeds the tolerance of Chinook salmon and steelhead life stages. For example, adult fall-run Chinook salmon have been observed to stop their upstream migration when water temperatures exceed 66°F (Hallock et al. 1970). For Chinook salmon eggs and larvae, survival during incubation is assumed to decline with increasing temperature between 54°F and 61°F (Myrick and Cech 2001; Seymour 1956 in Alderice and Velsen 1978). For juvenile Chinook salmon, survival is assumed to decline as temperature warms from 64°F to 75°F (Myrick and Cech 2001; Rich 1987). Relative to rearing, Chinook salmon require cooler temperatures to complete the parr-smolt transformation and maximize their saltwater survival. Successful smolt transformation is assumed to deteriorate at temperatures ranging from 63°F to 73°F (Marine 1997 in Myrick and Cech 2001; Baker et al. 1995).

For steelhead, successful adult migration and holding are assumed to deteriorate as water temperature warms between 52°F and 70°F. Adult steelhead appear to be much more sensitive to thermal extremes than are juveniles (National Marine Fisheries Service 1996; McCullough 1999). Conditions supporting steelhead spawning and incubation are assumed to deteriorate as temperature warms between 52°F and 59°F (Myrick and Cech 2001). Juvenile rearing success is assumed to deteriorate at water temperatures ranging from 63°F to 77°F (Raleigh et al. 1984, Myrick and Cech 2001). Relative to rearing, smolt transformation requires cooler temperatures, and successful transformation occurs at temperatures ranging from 43°F to 50°F. Juvenile steelhead, however, have been captured at Chipps Island in June and July at water temperatures exceeding 68°F (Nobriga and Cadrett 2001). Juvenile Chinook salmon also have been observed to migrate at water temperatures warmer than expected based on laboratory experimental results (Baker et al. 1995).

Delta smelt and splittail populations are adapted to water temperature conditions in the Delta. Delta smelt may spawn at temperatures as high as 72°F (U.S. Fish and Wildlife Service 1996) and can rear and migrate at temperatures as warm as 82°F (Swanson and Cech 1995). Splittail may withstand temperatures as warm as 91°F but prefer temperatures between 66°F and 75°F (Young and Cech 1996).

Entrainment

All fish species are entrained to varying degrees by the SWP and CVP Delta export facilities and many other smaller diversions in the Delta and Central Valley rivers. Fish entrainment and subsequent mortality are highly variable among species and may be a function of the size of the diversion, the location of the diversion, the behavior of the fish (Swanson et al. 2004, 2005), and other factors, such as fish screens, the presence of predatory species, and water temperature. Diversions that divert relatively little water from the total channel and with low approach velocities are assumed to minimize stress and protect fish from entrainment.

Juvenile striped bass populations have declined steadily since the mid-1960s partially because of entrainment losses of eggs and young fish at water diversions (Foss and Miller 2001). The CVP and SWP fish facilities indicate entrainment of adult delta smelt during spawning migration from December through April (California Department of Water Resources and Bureau of Reclamation 1994). Juveniles are entrained primarily from April through June. Young-of-year splittail are entrained between April and August when fish are moving downstream into the estuary (Cech et al. 1979 as cited in Moyle 2002). Juvenile Chinook salmon are entrained in all months but primarily from November through June when juveniles are migrating downstream.

Although several studies documenting entrainment at small, unscreened Delta diversions are available, few address population-level effects or accurately estimate the total loss of fish at the diversions studied (Moyle and Israel 2005). Some diversions may in fact entrain large numbers of individuals. However, many studies report capturing mostly larval or post-larval fish, with the majority of the catch being dominated by nonnative species such as gobies, threadfin shad, and striped bass (Cook and Buffaloe 1998; Nobriga et al. 2004).

Contaminants

In the Sacramento and San Joaquin River basins, industrial and municipal discharge and agricultural runoff transport contaminants into rivers and streams that ultimately flow into the Delta. Principal pollutants in the Delta are agricultural chemicals and their derivatives (Herbold et al. 1992). Organophosphate insecticides, such as carbofuran, chlorpyrifos, and diazinon, are present throughout the Central Valley and dispersed in agricultural and urban runoff. The “first-flush” storm event or the “dormant spray” storm event is of most concern because of the higher concentration of contaminants in the runoff. In particular, diazinon and chlorpyrifos are applied to control wood-boring insects in dormant stone fruit orchards from December to February (Zamora et al. 2003). These contaminants enter rivers in winter runoff and enter the estuary in concentrations that can be toxic to invertebrates (CALFED Bay-Delta Program 2000). Unlike severe bioaccumulators such as organochlorine pesticides, organophosphate pesticides typically are metabolized by most invertebrates. However, some organophosphate pesticides do not bioaccumulate, and some do bioaccumulate. In particular, diazinon has a solubility of 68.9 mg/L (at 68°F) but should not bioaccumulate in aquatic organisms (Zamora et al. 2003). Chlorpyrifos, on the other hand, is more persistent in the environment and tends to be hydrophobic to the water column. Chlorpyrifos has a lower solubility than diazinon (1.12 mg/L at 75°F) and has a significant potential to bioaccumulate in aquatic organisms (Zamora et al. 2003). Because some organophosphates may accumulate in living organisms, they may become toxic to fish species, especially those life stages that remain in the system year-round and spend considerable time there during the early stages of development, such as Chinook salmon, steelhead, splittail, green sturgeon, and delta smelt.

Mercury contamination from historical mining activities is extensive on both sides of the Central Valley and occurs primarily from widely scattered hydraulic mining debris along eastside tributaries and active abandoned mines and associated debris piles on the west side. These sources continue to deposit significant amounts of mercury into the Bay-Delta system. The Cosumnes River, Yolo Bypass, and Sacramento River are the primary ongoing sources of mercury contamination in the Bay-Delta. Mercury occurs in several forms, including pure elemental mercury and toxic methylmercury. Mercury is mobile in aquatic systems as aqueous mercury or when attached to suspended particulate matter. Methylmercury is a significant water quality concern because small amounts can bioaccumulate in fish to levels that are toxic to humans and wildlife. In the Delta, mercury concentrations in bluegill, Sacramento sucker, and largemouth bass have been found to exceed the human health standard of 0.5 ppm by two to six times (Slotten 1991).

Other contaminants of particular concern in the Bay-Delta system include high concentrations of trace elements such as selenium, copper, cadmium, and chromium; however, their effects on higher trophic levels are poorly understood, in part as a result of the complex distribution of high concentrations in both time and space (Herbold et al. 1992). In general, it appears that the highest concentrations occur in areas where human activity adjacent to the bay is also the highest. Although these trace elements also occur naturally, concentrations of these trace elements have been found to be high enough to adversely affect the growth and reproduction of aquatic animals in laboratory experiments (Herbold et al. 1992).

Further discussion on water quality constituents of concern can be found in Section 3.2, Water Quality and Groundwater Resources.

Predation

Nonnative species cause substantial predation mortality on native species. Studies at Clifton Court Forebay estimated predator-related mortality of hatchery-reared fall-run Chinook salmon to be from about 60% to more than 95%. Although the predation contribution to mortality is uncertain, the estimated mortality suggests that striped bass and other predatory fish, primarily nonnative, pose a threat to juvenile Chinook salmon moving downstream, especially where the stream channel has been altered from natural conditions. Turbulence from water passing over dams and other structures may disorient juvenile Chinook salmon and steelhead, increasing their vulnerability to predators. Predators such as striped bass, largemouth bass, and catfish also prey on delta smelt and splittail (U.S. Fish and Wildlife Service 1996).

Food

Food availability and type affect survival of fish species. Species such as threadfin shad and wakasagi may affect delta smelt survival through competition for food. Introduction of nonnative food organisms also may have an effect on delta smelt and other species' survival. Nonnative zooplankton species are more difficult for small smelt and striped bass to capture, increasing the likelihood of larval starvation (Moyle 2002). Splittail feed on opossum shrimp, which in turn feed on native copepods that have shown reduced abundance, potentially attributable to the introduction of nonnative zooplankton and the Asiatic clam (*Potamorcorbula amurensis)*. In addition, flow affects the abundance of food in rivers, the Delta, and Suisun Bay. In general, higher flows result in higher productivity, including a higher input of nutrients from channel margins and floodplain inundation, and higher production when low salinity occurs in the shallows of Suisun Bay. Higher productivity increases the availability of prey organisms for delta smelt and other fish species.

3.9.2 Environmental Consequences

This section describes the environmental consequences relating to fish and aquatic resources for the Southport project. It describes the methods used to determine the effects of the project and defines the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.9.2.1 Assessment Methods

Project effects on fish and aquatic resources were identified and evaluated based on the regulatory and professional standards described below; existing environmental conditions in the Southport project area; relevant information on the life history, habitat requirements, and ecology of the key evaluation species; location, timing, magnitude, intensity, and duration of activities related to the construction and operation of the project; and proposed effect mechanisms linking the environmental effects of these activities with the predicted responses of the evaluation species. The key evaluation species selected for this assessment are Chinook salmon and steelhead because of their special status, occurrence in the project area, sensitivity to anticipated project effects, and general utility as indicators of the response of other native fishes to potential project effects and mitigation measures. These species generally capture the full range of project effects on native fishes and their habitat in the project area. Where project effects on other fish species are not adequately captured by these species, the specific effects on other species are described.

3.9.2.2 Determination of Effects

For this analysis, an environmental effect was considered potentially significant related to fish and aquatic resources if it would result in any of the effects listed below. These effects are based on NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice:

Populations of fish and other aquatic organisms may be reduced because of increased mortality and changes in habitat availability and suitability that affect survival, growth, migration, and reproduction. In general, effects on fish populations are adverse and significant when the project causes or contributes to substantial short- or long-term reductions in abundance and distribution. The assessment of potential effects takes into consideration the significance of an action in terms of its context and its intensity, as required by NEPA. Based on Section 15065 and Appendix G of the State CEQA Guidelines, an effect is found to be adverse and significant if it:

- has a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by CDFW or USFWS;
- interferes substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- substantially reduces the habitat of a fish population;
- causes a fish population to drop below self-sustaining levels;
- threatens to eliminate an animal community;

- reduces the number or restricts the range of a rare or endangered fish species; and
- is likely to result in considerable cumulative effects when viewed with past, current, and reasonably foreseeable future projects.

3.9.3 Effects and Mitigation Measures

3.9.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be implemented. No construction-related effects relating to fish and aquatic resources would occur. The consequences of levee failure and flooding are described under the No Action description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

Specific to vegetation, as presented in Chapter 2, "Alternatives," the No Action Alternative is characterized by three possible future scenarios.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

Full application of the USACE ETL would result in a loss of riparian vegetation and associated SRA cover within this zone. Under modified application of the ETL as proposed in the ULDC, no vegetation would be added to the levee prism or within 15 feet of the landside and waterside levee toes. Understory vegetation that is less than 4 inches in diameter at breast height or over 12 inches high would be removed, and new volunteer vegetation would not be allowed to grow on the levee. In addition, existing vegetation would be allowed to die out within its natural lifecycle so that, over time, the levee would become covered with only grasses. Understory vegetation maintenance would be similar to current vegetation management activities, such as mowing levee grasses and thinning restoration plantings. Trees and larger shrubs would die out over a course of time, which could take 30 years or more.

Implementation of the No Action Alternative would result in the following effects on fish (Table 3.9-4).

Table 3.9-4. Fish and Aquatic Resources Effects for the No Action Alternative

Effect	Scenario	Finding—Direct
FISH-NA-1: Loss of Riparian and SRA Cover Fish Habitat in Compliance with the USACE Levee Vegetation Policy	No ETL	No effect
	Modified ETL	Significant
	Full ETL	Significant

Effect FISH-NA-1: Loss of Riparian and SRA Cover Fish Habitat in Compliance with the USACE Levee Vegetation Policy

To comply with the USACE levee vegetation policy, all woody vegetation would be permanently removed from both the waterside and landside of the existing levees (including areas within 15 feet of the waterside and landside levee toes). The loss of riparian vegetation and associated SRA cover within this zone could result in substantial reductions in aquatic habitat values relative to existing conditions.

Riparian vegetation serves important functions in stream ecosystems by providing shade, sediment storage, nutrient inputs, channel and streambank stability, habitat diversity, and cover and shelter for fish (Murphy and Meehan 1991). The removal of riparian vegetation and IWM adversely affects the quantity and quality of shoreline habitat for juvenile salmonids and other native fishes that depend on this habitat for shelter from fast currents, protection from predators, and enhanced feeding opportunities relative to open water habitat. The removal of riparian vegetation can also affect stream temperatures by increasing the exposure of the stream to solar radiation, wind, and other ambient atmospheric conditions. The effect of riparian vegetation on stream temperatures is greatest on small streams and decreases with increasing stream size. Because of the large size of the Sacramento River relative to its existing shoreline canopy, the effect of riparian vegetation in moderating water temperatures is minor compared with the effects of reservoir operations, discharge, and meteorological conditions (National Marine Fisheries Service 2006).

Full compliance with the USACE levee vegetation policy is expected to result in the removal of nearly all riparian vegetation along the shoreline. Although existing riparian and SRA cover values are relatively low along much of the existing levee, moderate- to high-quality SRA cover is present in some areas where dense riparian vegetation and IWM extend to the low-water shoreline. Consequently, full compliance with the USACE levee vegetation policy is expected to result in substantial losses of riparian and SRA cover in the study area, resulting in significant adverse effects on fish resources and aquatic habitat.

If no vegetation is removed on the levees, the levees would continue to be maintained as they are presently. There would be no effect on fish and aquatic resources resulting from this vegetation management measure.

Under the Urban Levee Design Criteria, no new vegetation would be added to the levee prism and within 15 feet of the landside and waterside levee toes. Understory vegetation that is less than 4 inches in diameter at breast height or more than 12 inches high would be removed, and new volunteer vegetation would not be allowed to grow on the levee. In addition, existing vegetation would be allowed to die out within its natural life cycle so that, over time, the levee would reach a state of being covered only with grasses. Trees and larger shrubs would die out over a course of time, which could take 30 years or more. Ultimately, overall loss of riparian vegetation and SRA cover would be expected to be similar to that occurring under the full-compliance option.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.9.3.2 Alternative 1

Implementation of the Alternative 1 would result in the following effects on fish and aquatic resources (Table 3.9-5).

Table 3.9-5. Fish and Aquatic Resources Effects and Mitigation Measures for Alternative 1

	Finding		With	
Effect	**Direct**	**Indirect**	**Mitigation**	**Mitigation Measure**
FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities	Significant	Significant	Less than significant	FISH-MM-1: Limit In-Water Construction Activities to Periods of the Year that Minimize Effects on Fish
FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities	Less than significant	Less than significant	NA	None
FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Construction	Significant	Significant	Significant and unavoidable	FISH-MM-2: Implement Onsite and Offsite Compensation Measures to Replace Riparian and SRA Cover Losses
FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species	Less than significant	Less than significant	NA	None

Effect FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities

Construction activities would result in temporary noise, physical disturbance, and water quality effects that may cause injury or death of fish by disrupting normal behaviors and potentially increasing the susceptibility of some individuals to predation. Noise and other disturbances would be limited to the immediate construction area, affecting only small numbers of individuals. Increases in turbidity and suspended sediment associated with ground-disturbing activities are likely to extend beyond the immediate construction area and could result in short- to long-term effects of fish and aquatic resources depending on the effectiveness of the proposed erosion control measures. Under Alternative 1, the proposed activities that are most likely to increase turbidity and sedimentation are those that disturb shoreline sediments (e.g., installing rock slope protection) or soils on the adjacent bank or levee where they can be carried by surface runoff to the river (e.g., clearing and grubbing of vegetation).

Elevated concentrations of fine sediment and turbidity in the aquatic environment can have both direct and indirect effects on fish. The severity of these effects depends on the concentration and duration of exposure and the sensitivity of the species and life stage. Juvenile salmonids are expected to be the most sensitive species and life stage in the project area.

Increases in turbidity and suspended sediment can affect adult and juvenile salmonids by displacing them from preferred habitat. Migrating adults have been reported to avoid high silt loads or cease migration when avoidance is not possible (Cordone and Kelley 1961, as cited by Bjornn and Reiser 1991). Bell (1986) cited a study in which adult salmon did not move in streams where the sediment concentration exceeded 4,000 mg/L (as a result of a landslide). Juveniles tend to avoid streams that are chronically turbid (Lloyd et al. 1987) or move laterally or downstream to avoid turbidity plumes (Sigler et al. 1984). Juvenile coho salmon have been reported to avoid turbidities exceeding 70 NTUs (Bisson and Bilby 1982) and cease territorial behavior when exposed to a pulse of turbidity of 60 NTU (Berg 1982). Displacement of juveniles from preferred habitat may reduce growth and survival of juveniles by affecting feeding success or increasing their susceptibility to predation.

Laboratory studies have demonstrated that chronic or prolonged exposure to high turbidity and suspended sediment levels can lead to reduced growth rates. For example, Sigler et al. (1984) found that juvenile coho salmon and steelhead trout exhibited reduced growth rates and higher emigration rates in turbid water (25–50 NTU) compared to clear water. Reduced growth rates have generally been attributed to an inability of fish to effectively feed in turbid water (Waters 1995). Chronic exposure to high turbidity and suspended sediment may also affect growth and survival by impairing respiratory function, reducing tolerance to disease and contaminants, and causing physiological stress (Waters 1995). High suspended sediment concentrations can also indirectly affect feeding and growth by burying stream substrates and degrading the quality of the substrate for aquatic invertebrates, and important food source for juvenile salmonids and other fishes.

Based on observations during levee repair activities at other project sites on the Sacramento River, construction activities are expected to result in periodic turbidity levels that exceed 25–75 NTUs (National Marine Fisheries Service 2006). These areas would likely be defined by turbidity plumes that may extend along the shoreline up to 1,000 feet downstream from construction activities. The magnitude and duration of exposure would be well below levels associated with injury or reduced growth of juvenile salmonids but would be expected to temporarily disrupt normal feeding, sheltering, and migratory behavior. Some individuals may respond by moving away from protective cover, increasing their susceptibility to predation. Other species may be affected in similar ways although their tolerance levels vary depending on the species and life stage. For example, NMFS (2008) noted that short-term increases in suspended sediments or turbidity were unlikely to affect the foraging success of green sturgeon because this species uses olfactory cues as opposed to vision to locate prey. The species most sensitive to turbidity, sedimentation, and other physical disturbances are those that spawn in the project area. For example, spawning adults, eggs, and larvae of delta smelt may be present from February through July. Therefore, in-water construction activities during this period could have significant adverse direct and indirect effects on these special-status species. However, with implementation of the SWPPP EC to control erosion and sedimentation (Chapter 2, Section 2.4.12, Stormwater Pollution Prevention Plan), turbidity compliance monitoring (Chapter 2, Section 2.4.15, Turbidity Monitoring in Adjacent Water Bodies), and Mitigation Measure FISH-MM-1, these effects would be reduced to a less-than-significant level.

Mitigation Measure FISH-MM-1: Limit In-Water Construction Activity to Periods of the Year That Minimize Effects on Fish

In-water construction activities (e.g., placement of rock revetment) will be limited to the period August 1 to November 30 to avoid the primary juvenile migration periods of state and Federally listed salmon and steelhead and the primary spawning, egg, and larval stages of state and Federally listed delta smelt and state-listed longfin smelt. WSAFCA may conduct in-water activities as early as July 1 if the USFWS and the DFW determine that delta smelt are not likely to be present in the project area in the year of construction (spawning, egg, and larval life stages of longfin smelt occur earlier than July 1). WSAFCA must obtain written permission from the USFWS and the DFW before allowing the contractor to begin in-water work before August 1.

Effect FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities

Accidental spills or leakage of contaminants such as gasoline, lubricants, and other petroleum-based products could kill or injure fish in the project area, as well as making them more susceptible to disease and other sources of mortality (National Marine Fisheries Service 2006). Direct and indirect adverse effects related to contaminant spills and leaks are potentially significant but would be avoided by implementing the spill prevention and control procedures EC described in Chapter 2, Section 2.4.14, Spill Prevention, Control, and Countermeasure Plan. No mitigation is necessary.

Effect FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Construction

Under Alternative 1, riparian habitat on the existing levees would be removed for construction of the proposed adjacent levees and seepage berms. To comply with the USACE levee vegetation policy, all woody vegetation would be permanently removed from both the waterside and landside of the existing levee (including areas within 15 feet of the waterside and landside levee toes), as well as within the footprint of the adjacent levee, seepage berm, O&M corridor, and utilities corridor. Estimates of the total acres of riparian vegetation losses are presented in Table 3.8-7.

Direct and indirect effects associated with the removal of riparian vegetation and IWM on streams were discussed above under the No Action Alternative. In addition, the use of rock slope protection, as proposed under Alternative 1, could further magnify the severity and duration of these effects by inhibiting establishment of riparian vegetation, inhibiting recruitment and retention of sediment and woody debris, and eliminating shallow, low-velocity river margins preferred by juvenile fish.

Implementation of Alternative 1 is expected to result in the removal of nearly all riparian vegetation and SRA cover along the shoreline to make way for the installation of rock revetment. Although existing SRA cover values are relatively low along much of the existing levee, moderate- to high-quality SRA cover is present in some areas where dense riparian vegetation and IWM extends to the low-water shoreline. Based on the proposed locations of rock slope protection relative to the location of SRA cover delineated on an aerial photograph of the project site (see Section 3.9.1.2, Environmental Setting, Aquatic Habitat), implementation of Alternative 1 would result in an estimated loss of approximately 3,820 linear feet of moderate- to high-quality SRA cover. Thus, riparian and SRA cover losses are expected to be substantial, resulting in significant adverse indirect effects on fish resources and significant adverse direct effects on aquatic habitat. Implementation of Mitigation Measure FISH-MM-2 would reduce permanent effects on riparian and SRA cover and, over time, substantially reduce long-term deficits in habitat values along the affected shoreline.

However, because of the use of rock slope protection over a substantial portion of the shoreline (further impairing beneficial functions associated with natural shorelines), the requirement to implement offsite mitigation, and the length of time required for newly planted trees to reach mature size, permanent effects on riparian and SRA cover would remain significant and unavoidable.

Mitigation Measure FISH-MM-2: Implement Onsite and Offsite Compensation Measures to Replace Riparian and SRA Cover Losses

WSAFCA will implement onsite and, if necessary, offsite compensation measures to compensate for losses of riparian vegetation and SRA cover on the waterside slope of the existing levee. Onsite compensation will be used to the maximum extent practicable. However, compliance with the USACE levee vegetation policy and other regulatory or engineering constraints may limit the ability to achieve full onsite compensation. Therefore, offsite compensation may be needed to achieve no net loss of existing habitat values.

Because of restrictions on the planting of woody riparian vegetation on the waterside slope of the existing levee, potential onsite compensation measures include the construction of rock benches outboard of the existing levee to provide additional space for planting riparian vegetation and creating the components of natural SRA cover (IWM, shallow-water). Soil is typically incorporated into the top and upper slope of the rock bench to support riparian vegetation. The rock bench also serves to anchor IWM or other structural elements that may be added to enhance cover values and partially offset the short- to long-term losses that are projected to occur while the planted riparian vegetation matures. This design, which has been successfully employed at other sites on the Sacramento River and American River, serves to protect the levee from toe scour while creating many but not all of the components of natural SRA cover. An evaluation and monitoring program utilizing the Standard Assessment Methodology (SAM) (U.S. Army Corps of Engineers 2004) will be required to determine baseline habitat values, evaluate short- and long-term habitat losses, determine on- and offsite compensation requirements, and ensure the long-term success of the compensation measures.

Effect FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species

The operation of barges and other in-water equipment originating from regions or areas outside the project area could result in the introduction and spread of invasive aquatic animals and plants, including the Asian overbite clam (*Corbula amurensis*), quagga mussel (*Dreissena bugensis*), zebra mussel (*Dreissena polymorpha*), hydrilla (*Hydrilla verticillata*), and Brazilian elodea (*Egeria densa*) (California Department of Fish and Game 2008). These species can adversely affect native fishes and other ecologically and economically important species through a number of mechanisms, including competition for resources, predation, parasitism, interbreeding, disease transmission, or changes in the physical or chemical attributes of aquatic habitat. WSAFCA will address this potentially significant impact by coordinating with CDFW's Invasive Species Program and implementing appropriate prevention and control BMPs as part of the Aquatic Invasive Species Prevention EC described in Chapter 2, Section 2.4.22. No mitigation is necessary.

3.9.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on fish and aquatic resources (Table 3.9-6).

Table 3.9-6. Fish and Aquatic Resources Effects and Mitigation Measures for Alternative 2

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities	Significant	Significant	Less than significant	FISH-MM-1: Limit In-Water Construction Activities to Periods of the Year that Minimize Effects on Fish
FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities	Less than significant	Less than significant	NA	None
FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Construction	Significant	Significant	Significant and unavoidable	FISH-MM-2: Implement Onsite and Offsite Compensation Measures to Replace Riparian and SRA Cover Losses FISH-MM-3: Incorporate Riparian and Wetland Vegetation in the Design of the Levee Breaches
FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species	Less than significant	Less than significant	NA	None
FISH-5: Contamination of Aquatic Habitat Associated with Excavation and Exposure of Contaminated Borrow Material	Less than significant	Less than significant	NA	None
FISH-6: Fish Stranding in Offset Area Associated with Floodplain Inundation	Significant	No effect	Less than significant	FISH-MM-4: Develop and Implement a Drainage and Grading Plan that Minimizes Losses of Fish from Stranding
FISH-7: Increases in Aquatic Habitat Associated with Offset Floodplain Area	Beneficial	No effect	NA	FISH-MM-4: Develop and Implement a Drainage and Grading Plan that Minimizes Losses of Fish from Stranding

Effect FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities

Ground-disturbing activities during construction of the levee setback would increase the potential for erosion and discharge of fine sediment into the Sacramento River, potentially affecting sensitive fish and aquatic habitat. The general effects of turbidity and suspended sediment on the key evaluation species and life stages are described under Alternative 1, Effect FISH-1.

The potential magnitude of project effects on water quality and aquatic habitat in the Sacramento River resulting from levee setback construction is greater than that associated with Alternative 1 (adjacent levee) because of the large area of floodplain that would be exposed to river flows, and the extensive earthwork that would result in direct contact of exposed soils to flowing water (e.g., excavation of levee breaches). Under Alternative 2, project activities that could increase turbidity and sedimentation in the Sacramento River include degradation of the existing levee (creation of levee breaches), construction of the setback levee, and excavation of borrow material and other ground-disturbing activities within the offset area (e.g., floodplain lowering). The effects could range from temporary increases in turbidity and suspended sediment during construction to short- to long-term increases in turbidity and sedimentation resulting from erosion and transport of soils from the restored floodplain and constructed levee surfaces during high river flows and stormwater runoff.

Potential increases in turbidity and suspended sediment associated with construction of Alternative 2 would result in significant direct and indirect effects, although these effects would be reduced by implementation of a SWPPP and turbidity compliance monitoring as part of the ECs for the project (Chapter 2, Sections 2.4.12 and 2.4.15). In addition to employment of site-specific erosion control measures and waterside rock slope protection in areas where excessive scour or erosion is expected (e.g., levee breaches) based on hydraulic and sediment transport modeling result, the SWPPP EC, turbidity compliance monitoring EC, and implementation of Mitigation Measure FISH-MM-1, the effect would be reduced to a less-than-significant level.

Effect FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities

The general effects of contaminants and other hazardous construction materials on the key evaluation species and life stages are described under Alternative 1, Effect FISH-2. Based on similarities in project construction, design, and ECs, direct and indirect effects of Alternative 3 on fish resources and aquatic habitat related to potential contaminant spills or leaks are expected to be similar to that of Alternative 1. Adverse effects related to contaminant spills are potentially significant but would be avoided by implementing the spill prevention and control procedures EC described in Chapter 2, Section 2.4.14 . The effect would be less than significant. No mitigation is necessary.

Effect FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Breaching

Alternative 2 differs from Alternative 1 in that losses of existing riparian vegetation and SRA cover on the waterside slope of the existing levee would be limited to fewer shoreline segments and include the footprints of the proposed levee breaches and erosion repair sites. Degradation of the existing levee would result in permanent and direct losses of riparian vegetation and SRA cover at these locations, which could indirectly affect the health and survival of juvenile fish and aquatic species. It is assumed that the remaining segments of the levee, including existing vegetation and IWM on the waterside levee slopes, would remain undisturbed. Based on the proposed locations of rock slope protection and levee breaches relative to the location of SRA cover delineated on an aerial photograph of the project site (see Section 3.9.1.2, Environmental Setting, Aquatic Habitat), implementation of Alternative 2 would result in an estimated loss of approximately 2,790 linear feet of moderate- to high-quality SRA cover. Thus, riparian and SRA cover losses are expected to be substantial, resulting in significant adverse indirect effects on fish resources and significant adverse direct effects on aquatic habitat. Implementation of Mitigation Measure FISH-MM-2 would reduce permanent effects on riparian and SRA cover and, over time, substantially reduce long-term deficits in habitat values along the affected shoreline. Additional onsite compensation and habitat gains would likely be achieved through the creation and expansion of riparian and wetland habitat adjacent to the river within the levee breaches (Mitigation Measure FISH-MM-3) and discontinuation of levee maintenance activities on the abandoned levees. However, because of the use of rock slope protection over a substantial portion of the shoreline (further impairing beneficial functions associated with natural shorelines), the requirement to implement offsite mitigation, and the length of time required for newly planted trees to reach mature size, permanent effects on riparian and SRA cover would remain significant and unavoidable.

Mitigation Measure FISH-MM-3: Incorporate Riparian and Wetland Vegetation in the Design of the Levee Breaches

As needed, WSAFCA will incorporate riparian and wetland vegetation in the design of Alternative 2 to provide additional onsite compensation for losses of riparian and SRA cover. Compensation requirements will be determined following quantification of SRA cover losses and determination of compensation ratios. Breaching the existing levee and lowering the floodplain to achieve frequent inundation of the floodplain will provide an opportunity to compensate and expand the amount of riparian habitat and SRA cover available to fish over a broad range of flows. Floodplain lowering is a key component of the overall design to restore hydraulic connectivity between the river and floodplain and provide the necessary hydrologic conditions to support riparian and wetland vegetation on the restored floodplain. Compensation and enhancement of SRA cover will be important objectives of the final design. The current conceptual restoration design alternatives for the setback levee include the creation of one or more floodplain swales bordered by wetland and riparian benches to facilitate drainage of the floodplain and movements of fish between the river and floodplain during flood events. These swales and wetland/riparian benches will interface with the Sacramento River at low-elevation transition areas that extend from the floodplain to the river channel at the levee breaches. SRA cover along these swales will be available to fish on a seasonal or year-round basis depending on flows. Attainment of maximum compensation values for riparian and SRA cover is expected to take a minimum of 10–15 years as the vegetation matures and contributes to nearshore aquatic habitat values.

Effect FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species

Based on similarities in construction methods that could allow for the introduction of aquatic invasive species, direct and indirect effects of Alternative 2 on fish and aquatic resources related to potential introductions of aquatic invasive species are expected to be similar to those of Alternative 1. Implementation of the Aquatic Invasive Species Prevention EC (Chapter 2, Section 2.4.22) is expected to reduce these potentially significant effects to less-than-significant levels. No mitigation is necessary.

Effect FISH-5: Contamination of Aquatic Habitat Associated with Excavation and Exposure of Contaminated Borrow Material

If contaminants are present in the soil or borrow material in the levee offset area or used to construct the setback levee, contaminants could be released into the water when the area is inundated during flood events, resulting in potentially significant adverse effects on sensitive fish and aquatic habitat. However, this effect is avoided through implementation of the EC described in Chapter 2, Section 2.4.18, Soil Hazards Testing and Soil Disposal Plan. Implementation of this EC would make this direct and indirect effect less than significant.

Effect FISH-6: Fish Stranding in Offset Area Associated with Floodplain Inundation

Following periods of floodplain inundation, receding floodwaters may collect in existing ponds, ditches, borrow areas, and other depressions, resulting in fish stranding and high mortality rates due to lethal water temperatures, low dissolved oxygen, predation, and desiccation. Because of the potential for stranding of Chinook salmon, steelhead, and other special-status fish species that may enter the floodway, the direct adverse effect would be significant. Implementation of Mitigation Measures FISH-MM-4 would reduce this effect to a less-than significant level.

Mitigation Measure FISH-MM-4: Develop and Implement a Drainage and Grading Plan that Minimizes Losses of Fish from Stranding

WSAFCA will minimize fish stranding by developing and implementing a drainage and grading plan that minimizes the extent of ponding and facilitates complete drainage of the active floodplain to the main river. As part of the final levee setback design, WSAFCA will determine the specific topographic and hydrologic characteristics of the levee offset area and will define the flooding regime (depth, duration, and extent of flooding), drainage patterns, and potential fish stranding risks. The final project design will include re-contouring as necessary to facilitate complete drainage and unimpeded fish passage to the main river as floodwaters recede from the levee offset area. Features with substantial stranding risk will be filled and/or graded to minimize this risk. Under Alternative 2, Bees Lakes would become hydraulically connected to the main river, potentially resulting in fish stranding. However, the current conceptual design includes drainage modifications to facilitate passage of fish to the river following flood events.

A mitigation and monitoring plan will be developed by a qualified biologist on behalf of WSAFCA and will be approved by NMFS, USFWS, and CDFW before implementation of the levee setback project. The mitigation and monitoring plan will evaluate the effectiveness of the grading and drainage features in preventing or reducing fish stranding and will include provisions for remediation should the design fail to meet established performance or success criteria.

Effect FISH-7: Increases in Aquatic Habitat Associated with Offset Floodplain Area

Creation of the offset floodplain area would result in restoration of approximately 182 acres of the historical Sacramento River floodplain. The goal of the final restoration design would be to increase river-floodplain connectivity and restore ecologically functional floodplain habitat consistent with the flood-risk reduction goals of the project. Hydraulic, sediment transport, and habitat suitability models will be used to assess hydrodynamic, geomorphic, and ecological conditions on the restored floodplain and provide technical guidance during the planning and design process. Future modeling studies will determine the expected flooding regime (inundation extent, frequency, duration), hydraulic conditions (depths and velocities), and ecological benefits (habitat quantity and quality) of the proposed alternatives.

Based on preliminary hydraulic modeling results, the restored floodplain surface would be completely or partially inundated during annual flood events. Water depths across the floodplain are expected to be variable but in the range of 9–12 feet over most of the floodplain during a 2-year-recurrence interval river discharge. Portions of the floodplain would be lowered to increase floodplain inundation area and duration and create planting surfaces that would support native riparian and wetland vegetation communities. Implementation of Mitigation Measure FISH-MM-4 would minimize stranding losses and improve the ability of fish to successfully access the floodplain and return to the river. Floodplain elevations and grading patterns would be designed to result in complete drainage and dewatering of the offset area by early summer to discourage spawning by bass and other nonnative fish species. These characteristics are expected to result in a substantial direct beneficial effect to native fishes and overall productivity of the river-floodplain system in this portion of the Sacramento River.

3.9.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on fish and aquatic resources (Table 3.9-7).

Table 3.9-7. Fish and Aquatic Resources Effects and Mitigation Measures for Alternative 3

	Finding			
Effect	Direct	Indirect	With Mitigation	Mitigation Measure
FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities	Significant	Significant	Less than significant	FISH-MM-1: Limit In-Water Construction Activities to Periods of the Year that Minimize Effects on Fish
FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities	Less than significant	Less than significant	NA	None
FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Construction	Significant	Significant	Significant and unavoidable	FISH-MM-2: Implement Onsite and Offsite Compensation Measures to Replace Riparian and SRA Cover Losses
FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species	Less than significant	Less than significant	NA	None

Effect FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities

Based on similarities in project construction, design, and ECs, direct and indirect effects of Alternative 3 on fish resources and aquatic habitat related to increases in suspended sediment and turbidity are expected to be similar to that of Alternative 1. Therefore, in-water construction activities during this period could have significant adverse direct and indirect effects on these special-status species. However, with implementation of the SWPPP EC to control erosion and sedimentation (Chapter 2, Section 2.4.12, Stormwater Pollution Prevention Plan), turbidity compliance monitoring (Chapter 2, Section 2.4.15, Turbidity Monitoring in Adjacent Water Bodies), and Mitigation Measure FISH-MM-1, these effects would be reduced to a less-than-significant level.

Effect FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities

Based on similarities in project construction, design, and ECs, direct and indirect effects of Alternative 3 on fish resources and aquatic habitat related to potential contaminant spills or leaks are expected to be similar to that of Alternative 1. Therefore, implementation of spill prevention and control procedures as part of the ECs of the project (Chapter 2, Section 2.4.14) are expected to make these potentially significant effects less than significant levels. No mitigation is necessary.

Effect FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Construction

Based on similarities in project construction, design, and assumptions related to application of the USACE levee vegetation policy, direct and indirect effects of Alternative 3 on fish resources and aquatic habitat related to losses of SRA cover are expected to be similar to that of Alternative 1. Under these assumptions, riparian and SRA cover losses are expected to be substantial, resulting in significant adverse effects on fish resources and aquatic habitat. Implementation of Mitigation Measure FISH-MM-2 would reduce permanent effects on riparian and SRA cover and, over time, substantially reduce long-term deficits in habitat values along the affected shoreline. However, because of the use of rock slope protection over a substantial portion of the shoreline (further impairing beneficial functions associated with natural shorelines), the requirement to implement offsite mitigation, and the length of time required for newly planted trees to reach mature size, permanent effects on riparian and SRA cover would remain significant and unavoidable.

Effect FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species

Based on similarities in construction methods that could allow for the introduction of aquatic invasive species, direct and indirect effects of Alternative 3 on fish and aquatic resources related to potential introductions of aquatic invasive species are expected to be similar to those of Alternative 1. Implementation of the Aquatic Invasive Species Prevention EC (Chapter 2, Section 2.4.22) is expected to reduce these potentially significant effects to less-than-significant levels. No mitigation is necessary.

3.9.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on fish and aquatic resources (Table 3.9-8).

Table 3.9-8. Fish and Aquatic Resources Effects and Mitigation Measures for Alternative 4

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities	Significant	Significant	Less than significant	FISH-MM-1: Limit In-Water Construction Activities to Periods of the Year that Minimize Effects on Fish
FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities	Less than significant	Less than significant	NA	None
FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Construction	Significant	Significant	Significant and unavoidable	FISH-MM-2: Implement Onsite and Offsite Compensation Measures to Replace Riparian and SRA Cover Losses FISH-MM-3: Incorporate Riparian and Wetland Vegetation in the Design of the Levee Breaches
FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species	Less than significant	Less than significant	NA	None
FISH-5: Contamination of Aquatic Habitat Associated with Excavation and Exposure of Contaminated Borrow Material	Less than significant	Less than significant	NA	None
FISH-6: Fish Stranding in Offset Area Associated with Floodplain Inundation	Significant	No effect	Less than significant	FISH-MM-4: Develop and Implement a Drainage and Grading Plan that Minimizes Losses of Fish from Stranding
FISH-7: Increases in Aquatic Habitat Associated with Offset Floodplain Area	Beneficial	No effect	NA	FISH-MM-4: Develop and Implement a Drainage and Grading Plan that Minimizes Losses of Fish from Stranding

Effect FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities

Based on similarities in project construction, design, and ECs, direct and indirect effects of Alternative 4 on fish resources and aquatic habitat related to increases in suspended sediment and turbidity are expected to be similar to that of Alternative 2. Therefore, in-water construction activities during this period could have significant adverse direct and indirect effects on these special-status species. However, with implementation of the SWPPP EC to control erosion and sedimentation (Chapter 2, Section 2.4.12, Stormwater Pollution Prevention Plan), turbidity compliance monitoring (Chapter 2, Section 2.4.15, Turbidity Monitoring in Adjacent Water Bodies), and Mitigation Measure FISH-MM-1, these effects would be reduced to a less-than-significant level.

Effect FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities

Based on similarities in project construction, design, and ECs, direct and indirect effects of Alternative 4 on fish resources and aquatic habitat related to the potential release of contaminants are expected to be similar to that of Alternative 1. Therefore, implementation of spill prevention and control procedures as part of the ECs of the project (Chapter 2, Section 2.4.14) are expected to make these potentially significant effects less than significant. No mitigation is necessary.

Effect FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Breaching

Based on the proposed locations of rock slope protection and levee breaches relative to the location of SRA cover delineated on an aerial photograph of the project site (see Section 3.9.1.2, Environmental Setting, Aquatic Habitat), implementation of Alternative 4 would result in an estimated loss of approximately 3,820 linear feet of moderate- to high-quality SRA cover. Thus, riparian and SRA cover losses are expected to be substantial, resulting in significant adverse indirect effects on fish resources and significant adverse direct effects on aquatic habitat. Implementation of Mitigation Measure FISH-MM-2 would reduce permanent effects on riparian and SRA cover and, over time, substantially reduce long-term deficits in habitat values along the affected shoreline. Additional onsite compensation would likely be achieved through the creation and expansion of riparian and wetland habitat adjacent to the river within the levee breaches (Mitigation Measure FISH-MM-3). However, because of the use of rock slope protection over a substantial portion of the shoreline (further impairing beneficial functions associated with natural shorelines), the requirement to implement offsite mitigation, and the length of time required for newly planted trees to reach mature size, permanent effects on riparian and SRA cover would remain significant and unavoidable.

Effect FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species

Based on similarities in construction methods that could allow for the introduction of aquatic invasive species, direct and indirect effects of Alternative 4 on fish and aquatic resources related to potential introductions of aquatic invasive species are expected to be similar to those of Alternative 1. Implementation of the Aquatic Invasive Species Prevention EC (Chapter 2, Section 2.4.22) is expected to reduce these potentially significant effects to less than significant levels. No mitigation is necessary.

Effect FISH-5: Contamination of Aquatic Habitat Associated with Excavation and Exposure of Contaminated Borrow Material

Based on similarities in setback levee construction, design, and assumptions, the effects of Alternative 4 on fish resources and aquatic habitat related to the potential release of soil contaminants are expected to be similar to that of Alternative 2 (described in Chapter 2). Implementation of the EC described in Chapter 2, Section 2.4.18, would reduce direct and indirect effects to a less-than-significant level.

Effect FISH-6: Fish Stranding in Offset Area Associated with Floodplain Inundation

Based on similarities in setback levee construction, design, and assumptions, the effects of Alternative 4 on fish resources and aquatic habitat related to potential stranding of fish on the restored floodplain are expected to be similar to that of Alternative 2. The potential magnitude of fish stranding, while considered significant under both Alternatives, may be lower under Alternative 4 because Bees Lake would remain hydraulically isolated from the Sacramento River. Implementation of Mitigation Measure FISH-MM-4 would reduce this significant direct effect to a less-than significant level.

Effect FISH-7: Increases in Aquatic Habitat Associated with Offset Floodplain Area

Based on similarities in setback levee construction, design, and assumptions, the direct beneficial effect Alternative 4 on fish resources and aquatic habitat related to reconnection and restoration of functional floodplain habitat are expected to be similar to that described for Alternative 2, except approximately 115 acres would be restored to the floodplain.

3.9.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on fish and aquatic resources (Table 3.9-9).

Table 3.9-9. Fish and Aquatic Resources Effects and Mitigation Measures for Alternative 5

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities	Significant	Significant	Less than significant	FISH-MM-1: Limit In-Water Construction Activities to Periods of the Year that Minimize Effects on Fish
FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities	Less than significant	Less than significant	NA	None
FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Construction	Significant	Significant	Significant and unavoidable	FISH-MM-2: Implement Onsite and Offsite Compensation Measures to Replace Riparian and SRA Cover Losses FISH-MM-3: Incorporate Riparian and Wetland Vegetation in the Design of the Levee Breaches
FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species	Less than significant	Less than significant	NA	None
FISH-5: Contamination of Aquatic Habitat Associated with Excavation and Exposure of Contaminated Borrow Material	Less than significant	Less than significant	NA	None

Effect	Finding Direct	Finding Indirect	With Mitigation	Mitigation Measure
FISH-6: Fish Stranding in Offset Area Associated with Floodplain Inundation	Significant	No effect	Less than significant	FISH-MM-4: Develop and Implement a Drainage and Grading Plan that Minimizes Losses of Fish from Stranding
FISH-7: Increases in Aquatic Habitat Associated with Offset Floodplain Area	Beneficial	No effect	NA	FISH-MM-4: Develop and Implement a Drainage and Grading Plan that Minimizes Losses of Fish from Stranding

Effect FISH-1: Temporary Disturbance of Fish and Degradation of Habitat during Construction Activities

Based on similarities in project construction, design, and ECs, direct and indirect effects of Alternative 5 on fish resources and aquatic habitat related to increases in suspended sediment and turbidity are expected to be similar to that of Alternative 2. Therefore, in-water construction activities during this period could have significant adverse direct and indirect effects on these special-status species. However, with implementation of the SWPPP EC to control erosion and sedimentation (Chapter 2, Section 2.4.12, Stormwater Pollution Prevention Plan), turbidity compliance monitoring (Chapter 2, Section 2.4.15, Turbidity Monitoring in Adjacent Water Bodies), and Mitigation Measure FISH-MM-1, these effects would be reduced to a less-than-significant level.

Effect FISH-2: Adverse Effects on Fish Health and Survival Associated with Potential Discharge of Contaminants during Construction Activities

Based on similarities in project construction, design, and ECs, direct and indirect effects of Alternative 5 on fish resources and aquatic habitat related to the potential release of contaminants are expected to be similar to that of Alternative 1. Therefore, implementation of spill prevention and control procedures as part of the ECs of the project (Chapter 2, Section 2.4.14) are expected to make these potentially significant effects less than significant. No mitigation is necessary.

Effect FISH-3: Loss or Degradation of Riparian and SRA Cover Associated with Levee Breaching

Based on similarities in project construction, design, and assumptions related to application of the USACE levee vegetation policy, direct and indirect effects of Alternative 5 on fish resources and aquatic habitat related to losses of riparian and SRA cover are expected to be similar to that of Alternative 2. Under these assumptions, riparian and SRA cover losses are expected to be substantial, resulting in significant adverse effects on fish resources and aquatic habitat. Implementation of Mitigation Measure FISH-MM-2 would reduce permanent effects on riparian and SRA cover and, over time, substantially reduce long-term deficits in habitat values along the affected shoreline. Additional onsite compensation would likely be achieved through the creation and expansion of riparian and wetland habitat adjacent to the river within the levee breaches (Mitigation Measure FISH-MM-3). However, because of the use of rock slope protection over a substantial portion of the shoreline (further impairing beneficial functions associated with natural shorelines), the requirement to implement offsite mitigation, and the length of time required for newly planted trees to reach mature size, permanent effects on riparian and SRA cover would remain significant and unavoidable.

Effect FISH-4: Adverse Effects on Fish and Aquatic Resources from the Introduction of Aquatic Invasive Species

Based on similarities in construction methods that could allow for the introduction of aquatic invasive species, direct and indirect effects of Alternative 2 on fish and aquatic resources related to potential introductions of aquatic invasive species are expected to be similar to those of Alternative 1. Implementation of the Aquatic Invasive Species Prevention EC (Chapter 2, Section 2.4.22) is expected to reduce these potentially significant effects to less-than-significant levels. No mitigation is necessary.

Effect FISH-5: Contamination of Aquatic Habitat Associated with Excavation and Exposure of Contaminated Borrow Material

Based on similarities in setback levee construction, design, and assumptions, direct and indirect effects of Alternative 5 on fish resources and aquatic habitat related to the potential release of soil contaminants are expected to be similar to that of Alternative 2 (described in Chapter 2). Implementation of the EC described in Section 2.4.18, Soil Hazards Testing and Soil Disposal Plan, would reduce this direct and indirect effect to a less-than-significant level.

Effect FISH-6: Fish Stranding in Offset Area Associated with Floodplain Inundation

Based on similarities in setback levee construction, design, and assumptions, direct effects of Alternative 5 on fish resources and aquatic habitat related to potential stranding of fish on the restored floodplain are expected to be similar to that of Alternative 2. The potential magnitude of fish stranding, while considered significant under both Alternatives, may be lower under Alternative 5 because Bees Lakes would remain hydraulically isolated from the Sacramento River. Implementation of Mitigation Measure FISH-MM-4 would reduce this significant effect to a less-than significant level.

Effect FISH-7: Increases in Aquatic Habitat Associated with Offset Floodplain Area

Based on similarities in setback levee construction, design, and assumptions, the direct beneficial effect of Alternative 5 on fish resources and aquatic habitat related to reconnection and restoration of functional floodplain habitat are expected to be similar to that described for Alternative 2. Although only a single breach would be constructed in each of the north and south offset areas in construction Year 1 followed by construction of the remaining breaches in Year 2, the interim and final design of the offset area will include that same design guidelines and mitigation measures to protect fish from stranding, facilitate ingress and egress during floodplain inundation, and achieve complete drainage and dewatering of the offset area by early summer.

3.10 Wildlife

3.10.1 Affected Environment

This section describes the regulatory and environmental setting for wildlife.

3.10.1.1 Regulatory Framework

Federal

The following Federal regulations related to wildlife apply to implementation of the Southport project.

Federal Endangered Species Act

ESA protects fish and wildlife species and their habitats that have been identified by NMFS or USFWS as threatened or endangered. *Endangered* refers to species, subspecies, or distinct population segments (DPSs) that are in danger of extinction through all or a significant portion of their range. *Threatened* refers to species, subspecies, or DPSs that are likely to become endangered in the near future.

ESA is administered by USFWS and NMFS. In general, NMFS is responsible for protection of ESA-listed marine species and anadromous fish, and USFWS is responsible for other listed species.

Implementation of any project alternative that may result in take of any species protected by ESA would be subject to approval and oversight by USFWS, as relevant, and subject to the terms and conditions of any BO from that agency. A BO has been issued to USACE by USFWS based on Alternative 5, as described in Chapter 5, "Regulatory Framework and Compliance," and appended to this Final EIS as Appendix J-4. Compliance with the terms and conditions of the BOs would further ensure no implemented alternative would jeopardize the continued existence of any threatened or endangered species.

Provisions of Sections 9 and 7 of ESA are relevant to this project and are summarized below.

Section 9: ESA Prohibitions

Section 9 of ESA prohibits the take of any fish or wildlife species listed under ESA as endangered. Take of threatened species also is prohibited under Section 9, unless otherwise authorized by Federal regulations.[1] *Take*, as defined by ESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." *Harm* is defined as "any act that kills or injures the species, including significant habitat modification." In addition, Section 9 prohibits removing, digging up, cutting, and maliciously damaging or destroying Federally listed plants on sites under Federal jurisdiction.

[1] In some cases, exceptions may be made for threatened species under ESA Section 4(d); in such cases, USFWS or NMFS issues a "4(d) rule" describing protections for the threatened species and specifying the circumstances under which take is allowed.

Section 7: ESA Authorization Process for Federal Actions

Section 7 of ESA provides a means for authorizing take of threatened and endangered species by Federal agencies. Under Section 7, the Federal agency conducting, funding, or permitting an action (the lead Federal agency, such as USACE) must consult with NMFS or USFWS, as appropriate, to ensure that the proposed project will not jeopardize endangered or threatened species or destroy or adversely modify designated critical habitat. The Southport project area supports potential habitat for both the Federally listed giant garter snake and valley elderberry longhorn beetle (VELB) that could be affected by implementation of the Southport project. Federally listed fish species are discussed in Chapter 3.9, "Fish and Aquatic Resources."

Critical Habitat

Critical habitat, as defined in ESA Section 3, is the specific area within the geographic area occupied by a species at the time it is listed in accordance with ESA, in which those biological features essential to the conservation of the species are found and which may require special management considerations or protection. Critical habitat also includes specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. The Southport project study area does not contain critical habitat for any wildlife species.

Fish and Wildlife Coordination Act

The FWCA of 1958 requires that all Federal agencies consult with USFWS, NMFS, and the affected state wildlife agency for activities that affect, control, or modify surface waters, including wetlands and other waters.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC 703) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union (now Russia). The MBTA prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase, or barter any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11). EO 13186 (January 10, 2001) directs each Federal agency taking actions that have or may have a negative effect on migratory bird populations to work with USFWS to develop a memorandum of understanding (MOU) that will promote the conservation of migratory bird populations. The Southport project area supports known migratory bird nests and potential nesting habitat that could be affected by implementation of the Southport project.

State

The following state regulations related to wildlife apply to implementation of the Southport project.

California Endangered Species Act

CESA (CFGC Sections 2050–2116) states that all native species or subspecies of a fish, amphibian, reptile, mammal, or plant and their habitats that are threatened with extinction and those experiencing a significant decline that, if not halted, would lead to a threatened or endangered designation will be protected or preserved.

Under Section 2081 of the CFGC, a permit from CDFW is required for projects that could result in the take of a species that is state-listed as threatened or endangered. Under CESA, *take* is defined as an activity that would directly or indirectly kill an individual of a species. The definition does not include *harm* or *harass*, as the definition of take under ESA does. As a result, the threshold for take under CESA is higher than that under ESA. For example, habitat modification is not necessarily considered take under CESA. The potential for state-listed wildlife species to occur in areas that could be affected by the Southport project is discussed below in Section 3.10.2.4, Special-Status Wildlife Species.

Section 2090 of CFGC requires state agencies to comply with endangered species protection and recovery and to promote conservation of these species. CDFW administers the act and authorizes take through CFGC Section 2081 incidental take agreements (except for species designated as fully protected) and Section 2080.1 consistency determinations. If it is determined that the proposed Southport project will result in take of a state-listed species, an incidental take permit or consistency determination will be obtained through consultation with CDFW. The Southport project area supports potential nesting and known foraging habitat for the state listed Swainson's hawk and potential habitat for the state listed giant garter snake that could be affected by implementation of the Southport project.

Section 1600 of the California Fish and Game Code

Sections 1600–1603 of the CFGC state that it is unlawful for any person or agency to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources, or to use any material from the streambeds, without first notifying CDFW. A Lake and Streambed Alteration Agreement (LSA) must be obtained if effects are expected to occur. 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 that supports wildlife, fish, or other aquatic life. This definition includes watercourses having 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 extending to the tops of banks and often including the outer edge of riparian vegetation canopy cover. The Sacramento River and associated riparian habitat within the Southport project area is likely to be within CDFW jurisdiction and subject to Section 1602 of the CFGC.

California Fully Protected Species

CFGC Sections 3511, 3513, 4700, and 5050 pertain to fully protected wildlife species (birds in Sections 3511 and 3513, mammals in Section 4700, and reptiles and amphibians in Section 5050) and strictly prohibit the take of these species. CDFW cannot issue a take permit for fully protected species, except under narrow conditions for scientific research or the protection of livestock, or if a NCCP has been adopted. The Southport project area supports potential nesting and known foraging habitat for the fully protect white-tailed kite that could be affected by implementation of the Southport project.

California Fish and Game Code (3503, 3503.5, 3513)

These CFGC sections protect all native birds, birds of prey, and all nongame birds, including eggs and nests, that are not already listed as fully protected and that occur naturally within the state. Eggs and nests of all birds are protected under Section 3503 while CFGC 3503.5 protects all birds of prey as well as their eggs and nests. Migratory non-game birds are protected under Section 3513. Except for take related to scientific research, take as described above is prohibited. Many bird species potentially could nest in the project area or vicinity. These birds, their nests, and eggs would be protected under these sections of the CFGC. The Southport project area supports known bird nests and potential nesting habitat that could be affected by implementation of the Southport project.

Local

The following local policies related to wildlife apply to implementation of the Southport project.

Yolo County

Yolo County 2030 Countywide General Plan

The Conservation Element of the Yolo County 2030 Countywide General Plan includes policies (Yolo County 2009) to protect wildlife resources in the Southport project area. These policies include preservation and restoration of open space, native vegetation and plant communities, ecological functions in the watershed, wildlife movement corridors, and special-status wildlife species.

Draft Yolo County Natural Heritage Program

The draft Yolo County Natural Heritage Program is a countywide NCCP/HCP to conserve the natural open space and agricultural landscapes that provide habitat for many special-status species in the county (Yolo County Natural Heritage Program 2009). The Yolo County Natural Heritage Program will describe the measures that will be undertaken to conserve important biological resources and obtain permits for urban growth and public infrastructure projects. The Southport project area supports important biological resources to be conserved under the NCCP/HCP that would be affected by implementation of the Southport project.

Yolo County Habitat Conservation Joint Powers Agency

The Yolo County Habitat Conservation Joint Powers Agency (JPA) was formed in August 2002 for the purpose of acquiring habitat conservation easements and to serve as the lead agency for the preparation of a NCCP/HCP for Yolo County and the Cities of Davis, Woodland, Winters, and West Sacramento. The JPA is responsible for the facilitation of mitigation for effects on foraging habitat of the state-threatened Swainson's hawk by assisting in the acquisition of conservation easements. The JPA and CDFW have entered into an Agreement Regarding Mitigation for Impacts to Swainson's Hawk Foraging Habitat in Yolo County (Mitigation Agreement).

The Mitigation Agreement allows for the establishment of a mitigation fee program to fund the acquisition, enhancement, and long-term management of Swainson's hawk foraging habitat conservation lands. As of January 2006, the JPA has issued a Revised Swainson's Hawk Interim Mitigation Fee Program that requires a 1:1 compensation ratio (1 acre of Swainson's hawk foraging habitat preserved for every 1 acre of foraging habitat lost). The fee is currently $8,660 per acre. Projects of fewer than 40 acres could contribute to a fund for purchase of suitable conservation lands. Projects of more than 40 acres would require the developer, in coordination with the JPA, to locate and negotiate a conservation easement on an appropriate property that would contribute to the JPA's preserve design. The Mitigation Agreement does not authorize the incidental take of Swainson's hawk.

City of West Sacramento

City of West Sacramento General Plan

Goals and policies in the City of West Sacramento General Plan (Part II, Section 6) (City of West Sacramento 2004) that apply to wildlife resources in the Southport project area include preservation, enhancement, and no net loss of riparian and wetland habitats, particularly at Bees Lakes, the Sacramento River, and the DWSC; requiring site-specific wildlife surveys; development of setbacks from wetlands and wildlife habitat; maintenance of marsh vegetation along irrigation and drainage canals and the DWSC; and preservation of special-status species populations.

3.10.1.2 Environmental Setting

The following considerations are relevant to wildlife conditions in the proposed Southport project area.

Project Area

The project area is in West Sacramento in Yolo County (Plate 1-5). For the purposes of this section, the Southport project area (encompassing the construction footprint, O&M and utility easements, roadway alignment and potential borrow sites) was expanded to include an additional 250-foot-wide buffer zone to support a full assessment of potential effects on wildlife. The width of the buffer zone was selected to account for indirect effects on vernal pools and Federally listed vernal pool invertebrates (250 feet) and elderberry shrubs (*Sambucus mexicana*) (100 feet) that are the host plant for VELB, Federally listed as threatened.

Field Surveys

Field surveys conducted for wildlife resources in the project area and 250-foot buffer included a reconnaissance-level site visit and elderberry shrub surveys. Prior to field surveys, the most recent CNDDB (2011, 2012, 2013) and USFWS (2011, 2012, 2013) species lists (see Appendix E.3a and E.3c for USFWS and CNDDB species lists, respectively) and aerial photographs for the project area were reviewed.

Reconnaissance-Level Site Visits

An ICF wildlife biologist conducted reconnaissance-level field surveys on April 29, May 3, May 5 (to check a raptor nest), May 13, and May 31, 2011, and March 25–27, 2013 (Swainson's hawk nesting surveys). Another potential borrow site was surveyed on January 4, 2013. During all surveys wildlife habitat uses associated with land cover types were identified, habitats were evaluated for their ability to support special-status wildlife species, and all wildlife species observed were recorded. A list of wildlife species observed during surveys is provided in Appendix E.1. Wildlife occurrences for the project area and larger study area are included on Plate 3.10-1 (revised).

Elderberry Shrub Surveys

Elderberry shrub surveys were conducted during reconnaissance-level surveys described above. Protocol-level surveys were conducted for a number of shrubs on November 27 and 29, 2012, January 4, 16, and 17, 2013, July 25, 2013, September 24, 2013, and October 7, 2013. Elderberry shrub surveys consisted of driving and walking property that was accessible, through the project area and mapping all elderberry shrubs (and shrub clusters) within 100 feet of the proposed construction area in accordance with the USFWS Conservation Guidelines for the VELB (U.S. Fish and Wildlife Service 1999). Information was recorded for each shrub that could be affected by the proposed project, including number of stems between 1 and 3 inches, 3 and 5 inches, and greater than 5 inches in diameter; whether each stem 1 inch or more in diameter is located in a riparian or nonriparian area; and presence of VELB exit holes. A summary table and table for each alternative are provided in Appendix E.2.

Surveys were not conducted for shrubs 31 or 33 because access was limited due to lack of landowner permission. Surveys were not conducted for 28 shrubs because the shrubs occurred in dense riparian vegetation within a thick understory or surrounded by poison oak, which made access for protocol-level surveys difficult, invasive, and potentially damaging to habitat. In addition to the 2012–2013 surveys, elderberry shrub surveys were previously conducted for a portion of the Southport project area for two other projects—River Park and Yarbrough (Jones & Stokes Associates 2006, 2007). The shrub locations from all sources, including the CNDDB and field surveys, are included on Plate 3.10-1 (revised).

Wildlife Habitat—Land Cover Type Associations

This section describes the relationship between land cover types and wildlife habitats, and identifies common and special-status wildlife species associated with each land cover type. Although land cover types emphasize floristic composition, structure, and other physical attributes, each land cover type provides a specific function and value for wildlife species. In some instances, two or more land cover types may provide similar functions and values for wildlife (e.g., cottonwood riparian woodland, valley oak riparian woodland, walnut riparian woodland, and riparian scrub) and are combined below for discussion purposes.

Nonnative Annual Grasslands

Areas mapped as grasslands in the project area are dominated by nonnative annual grasses and nonnative ruderal vegetation and may support stands of noxious weeds (Plate 3.8-1). Grassland generally occurs in disturbed areas, such as levee faces and edges of agricultural fields and roads. Two areas of pasture associated with residences are primarily annual grasses that are grazed by horses and were mapped as nonnative annual grassland. The annual grasslands in the project area contain a relatively large proportion of ruderal species, likely because of substantial disturbance from human activities.

Annual grasslands provide nesting and foraging habitat for several species of songbirds, including savanna sparrow (*Passerculus sandwichensis*), white-crowned sparrow (*Zonotrichia leucophrys*), and western meadowlark (*Sturnella neglecta*); and foraging habitat for several species of raptors, including red-tailed hawk (*Buteo jamaicensis*) and great-horned owl (*Bubo virginianus*). Reptiles found in these habitats include California kingsnake (*Lampropeltis getulus californiae*), gopher snake (*Pituophis catenifer*), and western rattlesnake (*Crotalus viridis*). California ground squirrels commonly occur in annual grassland habitat.

A number of special-status species occur in annual grassland habitat. Annual grasslands provide foraging habitat for numerous bat species and foraging and denning habitat for American badger (*Taxidea taxus*). Bird species for which annual grassland provides primary foraging and nesting habitat include northern harrier (*Circus cyaneus*) and western burrowing owl (*Athene cunicularia hypugaea*). Annual grassland also provides foraging habitat for raptor species, including Swainson's hawk (*Buteo swainsoni*) and white-tailed kite (*Elanus leucurus*) which were both observed during field surveys. These grasslands also serve as primary foraging habitat for loggerhead shrike (*Lanius ludovicianus*), grasshopper sparrow (*Ammodramus savannarum*), purple martin (*Progne subis*), tricolored blackbird (*Agelaius tricolor*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*). Ground squirrel burrows provide important nesting habitat for western burrowing owls. Additionally, annual grassland areas surrounding levees and those adjacent to aquatic habitat may provide potential winter hibernacula for giant garter snake (*Thamnophis gigas*).

Open Water Areas

Open water areas in the project area include the Sacramento River (perennial drainage), Main Drain and agricultural ditches (ditches), and Bees Lakes (ponds) (Plate 3.8-1). Open water provides breeding, foraging, and migration habitat for numerous wildlife species. Mammal species commonly known to use perennial aquatic open water habitats include river otter (*Lontra canadensis*), which uses these areas for foraging and escape cover, and muskrat (*Ondatra zibethicus*), which may use deepwater areas as migration corridors between suitable foraging areas. Open water areas also provide essential foraging habitat for wading birds, including great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and snowy egret (*Egretta thula*); numerous waterfowl species, including mallard (*Anas platyrhynchos*), ruddy duck (*Oxyura jamaicensis*), and bufflehead (*Bucephala albeola*); other water birds, including eared grebe (*Podiceps nigricollis*), double-crested cormorants (*Phalacrocorax auritus*), and American white pelicans (*Pelecanus erythrorhynchos*); and land birds, including black phoebe (*Sayornis nigricans*) and belted kingfisher (*Megaceryle alcyon*). These areas also provide rearing habitat, escape cover, and foraging habitat for reptiles and amphibians, including common garter snake (*Thamnophis sirtalis*), bullfrog (*Rana catesbeiana*), Pacific tree frog (*Hyla regilla*), and western toad (*Bufo boreas*). The vegetated areas below the OHWM provide nesting habitat for numerous songbirds, including red-winged blackbird (*Agelaius phoeniceus*) and marsh wren (*Cistothorus palustris*), and wading birds such as Virginia rail (*Rallus limicola*).

Open water provides habitat for a number of special-status wildlife species, including foraging habitat for western pond turtle (*Actinemys marmorata*) and giant garter snake.

Emergent Wetland

Emergent wetland vegetation occurs in agricultural ditches throughout the project area, including the Main Drain and vegetated unnamed ditches around agricultural fields throughout the project area (Plate 3.8-1).

Emergent wetland provides important wildlife habitat value. This land cover type provides nesting and foraging habitat for several songbirds, including red-winged blackbird, and marsh wren; foraging and nesting habitat for Virginia rail; and foraging and cover habitat for the reptiles and amphibians mentioned above for open water.

Freshwater emergent wetlands provide habitat for special-status species, including giant garter snake, northern harrier, tricolored blackbird, and yellow-headed blackbird.

Riparian Woodland

Riparian habitats in the project area include cottonwood riparian woodland, valley oak riparian woodland, walnut riparian woodland, and riparian scrub (Plate 3.8-1). Riparian habitats are considered to be among the most productive wildlife habitats in California and typically support the most diverse wildlife habitats. In addition to providing important nesting and foraging habitat, riparian habitats function as wildlife movement corridors. Riparian habitat is designated by CDFW as sensitive natural and provides high value to wildlife.

Overstory trees may be used for nesting and roosting by numerous raptors, including red-tailed hawk, red-shouldered hawk (*Buteo lineatus*), great horned owl, and American kestrel (*Falco sparverius*) and the herons and egrets mentioned as foraging in open water areas. Overstory trees also provide suitable habitat for songbirds such as Bullock's oriole (*Icterus bullockii*), yellow-rumped warbler (*Dendroica coronata*), tree swallow (*Tachycineta bicolor*), and western scrub jay (*Aphelocoma californica*). Riparian woodland also provides important foraging habitat for resident, migratory, and wintering songbirds. Understory vegetation of riparian woodlands provides habitat for mammals, including various species of rodents, raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and striped skunk (*Mephitis mephitis*). Areas containing large, dense, shrubby vegetation dominated by willow or blackberry may support nesting tricolored blackbird. Riparian woodlands also provide cover and foraging habitat for reptiles and amphibians, such as terrestrial garter snake (*Thamnophis elegans*), gopher snake, Pacific tree frog, and western toad. Suitable areas in the understory may be used as nesting habitat for western pond turtles.

Riparian woodlands provide habitat for the following special-status wildlife species: VELB, western pond turtle, bank swallow (*Riparia riparia*), Swainson's hawk, white-tailed kite, hoary bat (*Lasiurus cinerius*), pallid bat (*Antrozous pallidus*), and western red bat (*Lasiurus blossevillii*).

Valley Oak and Walnut Woodland

Valley oak woodland and walnut woodland occur in stands ranging in size from a few trees to several acres in proximity to the Sacramento River but outside of the riparian woodland areas (Plate 3.8-1). These cover types are dominated by valley oak or California walnut species and provide wildlife habitat uses similar to those of riparian woodland. Wildlife species that use riparian woodland use valley oak and walnut woodlands. Additionally, yellow-billed magpie (*Pica nuttalli*), acorn woodpecker (*Melanerpes formicivorus*), and northern flicker (*Colaptes auratus*) nest and forage in these habitats. Reptiles, including gopher snake (*Pituophis catenifer*) and California kingsnake, also frequent these habitats.

Special-status wildlife species known to nest in valley oak woodland and walnut woodland habitats include white-tailed kite and Swainson's hawk. Valley oak and walnut woodlands may support the VELB where elderberry shrubs (the host plant for the species) are present.

Agricultural Lands

In the project area, agricultural lands include grain crops, fallow and disked agricultural fields, and orchard (Plate 3.8-1). General farming practices result in monotypic stands of vegetation for the growing season and bare ground in the fall and winter. Irrigation ditches are a part of most of the agricultural fields in the project area. Because the habitat provided by irrigation ditches is different from that of agricultural fields, it is discussed under the open water areas section above.

Agricultural lands provide foraging habitat for many wildlife species that occur in the project area. The value of agricultural lands for wildlife species depends on the crop type and typically varies by season and year, depending on the crop cycle and on the vegetative cover present at the site.

Row and field agricultural lands can provide high value foraging habitat for numerous resident and wintering raptors, songbirds, shorebirds, and wading birds. Agricultural lands also provide foraging habitat for rodents, including deer mouse (*Peromyscus maniculatus*) and California meadow vole

(*Microtus californicus*); other mammals, including coyote (*Canis latrans*), raccoon, Virginia opossum; and reptiles, including gopher snake and terrestrial garter snake.

Orchard crops typically provide less value to wildlife but may be used for nesting or foraging by red-shouldered hawk, American crow (*Corvus brachyrhynchos*), yellow-billed magpie, Brewer's blackbird (*Euphagus cyanocephalus*), brown-headed cowbird (*Molothrus ater*), European starling (*Sturnus vulgaris*), mourning dove (*Zenaida macroura*), and rock dove (*Columba livia*).

Field crops (including grain and hay) support special-status wildlife species, including northern harrier and Swainson's hawks, which often congregate in large numbers to forage on insects, voles, and other prey flushed during harvesting or flood irrigating. Additionally, yellow-headed blackbirds; tricolored blackbirds; Townsend's western big-eared, hoary, western red, and pallid bats; and mountain plover (*Charadrius montanus*) may use plowed fields for foraging.

Developed Lands

Developed lands mapped in the project area include areas in levee roads, railways, roads, buildings, and landscaped areas as well as barren areas that have been disturbed and are not vegetated (Plate 3.8-1). These areas likely support common wildlife species, including house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), European starling, Brewer's blackbird, American crow, mourning dove, rock dove, Virginia opossum, California ground squirrel, and California meadow vole, to name a few. Scattered landscape trees and shrubs associated with this area may provide nesting habitat for the above-listed common birds.

Barren habitats provide primary habitat for the western burrowing owl and western snowy plover, special-status wildlife species. Urban areas support special-status wildlife species, including use as roosting and nesting by white-tailed kite and Swainson's hawk. Purple martin has been documented recently nesting in urban overpasses and elevated freeways in Yolo County and adjacent lands (California Natural Diversity Database 2013).

Special-Status Wildlife Species

Special-status wildlife species are defined as animals that are legally protected under ESA, CESA, or other regulations and species that are considered sufficiently rare by the scientific community to qualify for such listing. Special-status species are defined as:

- Species that are listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.12 for listed plants, 50 CFR 17.11 for listed animals, and various notices in the *Federal Register* for proposed species).
- Species that are candidates for possible future listing as threatened or endangered under ESA (75 FR 69222, November 10, 2010).
- Species listed or proposed for listing by the State of California as threatened or endangered under CESA (14 CCR 670.5).
- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380).
- Animals that are California species of special concern (California Department of Fish and Game 2011; Shuford and Gardali (2008) [birds]; Williams 1986 [mammals]; and Jennings and Hayes 1994 [amphibians and reptiles]).

- Animals fully protected in California (CFGC 3511 [birds], 4700 [mammals], and 5050 [reptiles and amphibians].
- Bat species identified by the Western Bat Working Group as low-, moderate-, or high-priority in its priority matrix for western bat species (Western Bat Working Group 2013). The matrix is intended to provide states and Federal land management agencies, and interested organizations and individuals with a better understanding of the overall status of individual bat species throughout their western North American ranges.

Based on the USFWS (2013) list for West Sacramento quadrangle, a review of CNDDB (2013) occurrences within a 10-mile radius of the project area, and personal observations, 28 special-status wildlife species were identified as having potential to occur in the project area and surrounding region (Table 3.10-1). Of these, 14 were excluded from consideration, either because the project area is outside the species' known range or suitable habitat is minimal to absent. The remaining 14 could occur in the project area and are described in more detail in Appendix E.2. Locations of known or historical special-status wildlife species occurrences in the project area and vicinity are shown on Plate 3.10-1 (revised).

Table 3.10-1. Special-Status Wildlife Species with Potential to Occur in the Project Area

Common and Scientific Names	Status[a] Fed/State/ Other	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Invertebrates				
Conservancy fairy shrimp *Branchinecta conservatio*	E/–/–	Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn Counties	Large, deep vernal pools in annual grasslands	None. Project area is outside of the species' range.
Vernal pool fairy shrimp *Branchinecta lynchi*	T/–/–	Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County; isolated populations also in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools	None. No suitable habitat in the project area.
Vernal pool tadpole shrimp *Lepidurus packardi*	E/–/–	Shasta County south to Merced County	Vernal pools and ephemeral stock ponds	None. No suitable habitat in the project area.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T/–/–	Streamside habitats below 3,000 feet throughout the Central Valley	Riparian and oak savanna habitats with elderberry shrubs; elderberries are the host plant	High. Two CNDDB (2013) occurrences in the project area and approximately 107 shrub locations (potential VELB habitat) found in the project area during field surveys (2005–2013) (Plate 3.10-1 [revised]).
Amphibians				
California red-legged frog *Rana draytonii*	T/SSC/–	Found along the coast and coastal mountain ranges of California from Marin County to San Diego County and in the Sierra Nevada from Tehama County to Fresno County	Permanent and semi-permanent aquatic habitats, such as creeks and coldwater ponds, with emergent and submergent vegetation; may estivate in rodent burrows or cracks during dry periods	None. The project area is outside of this species' current known range. This species is believed to be extirpated from the valley floor.
California tiger salamander *Ambystoma californiense*	T/T/–	Central Valley, including Sierra Nevada foothills, up to approximately 1,500 feet, and coastal region from Butte County south to northeastern San Luis Obispo County	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy	None. No suitable habitat in the project area.

Common and Scientific Names	Status[a] Fed/State/ Other	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Western spadefoot *Scaphiopus hammondii*	–/SSC/–	Sierra Nevada foothills, Central Valley, Coast Ranges, coastal counties in southern California	Shallow streams with riffles and seasonal wetlands, such as vernal pools in annual grasslands and oak woodlands	None. No suitable habitat in the project area.
Reptiles				
Giant garter snake *Thamnophis couchi gigas*	T/T/–	Central Valley from the vicinity of Burrel in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno	Sloughs, canals, low gradient streams and freshwater marsh habitats where there is a prey base of small fish and amphibians; also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter	Low. CNDDB (2013) occurrences within 3 miles of project area, but west of the Deep Water Ship Channel. Suitable habitat in project area shown on Plate 3.10-1 (revised).
Western pond turtle *Actinemys marmorata*	–/SSC/–	Occurs from the Oregon border of Del Norte and Siskiyou Counties south along the coast to San Francisco Bay, inland through the Sacramento Valley, and on the western slope of Sierra Nevada	Occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation in woodlands, grasslands, and open forests	High. Fifteen pond turtles and numerous red-eared sliders observed in both of the Bees Lakes in the project site during 2011–2013 field surveys (Plate 3.10-1 [revised]).
Birds				
Bank swallow *Riparia riparia*	–/T/–	Occurs along the Sacramento River from Shasta County to Sacramento County, along the Feather and lower American Rivers, in the Owens Valley; and in the plains east of the Cascade Range in Modoc, Lassen, and northern Siskiyou Counties; small populations near the coast from San Francisco County to Monterey County	Nests in bluffs or banks, usually adjacent to water, where the soil consists of sand or sandy loam	Low. One nesting record within 5 miles of the project area. Limited suitable nesting habitat along portions of the Sacramento River in the project area.

Common and Scientific Names	Status[a] Fed/State/ Other	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
California black rail *Laterallus jamaicensis coturniculus*	–/T/–	Permanent resident in the San Francisco Bay Area and eastward through the Delta into Sacramento and San Joaquin Counties; small populations in Marin, Santa Cruz, San Luis Obispo, Orange, Riverside, and Imperial Counties	Tidal salt marshes associated with heavy growth of pickleweed; also occurs in brackish marshes or freshwater marshes at low elevations	None. No suitable habitat in project area.
Grasshopper sparrow *Ammodramus savannarum*	–/SSC/–	Summer resident in the foothills of the Sierra Nevada and Coast Ranges from Mendocino and Trinity Counties south to San Diego County	Dry, dense grasslands with a variety of grasses and tall forbs and scattered shrubs	Low. No CNDDB (2013) nesting records within10 miles of the project area. Potential nesting habitat in project area.
Loggerhead shrike *Lanius ludovicianus*	–/SSC/–	Resident and winter visitor in lowlands and foothills throughout California; rare on coastal slope north of Mendocino County, occurring only in winter	Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches	Moderate. No CNDDB (2013) nesting records within 10 miles of the project area. Suitable nesting habitat in project area.
Mountain plover *Charadrius montanus*	-/SSC/–	Does not breed in California; in winter, found in the Central Valley south of Yuba County, along the coast in parts of San Luis Obispo, Santa Barbara, Ventura, and San Diego Counties; parts of Imperial, Riverside, Kern, and Los Angeles Counties	Occupies open plains or rolling hills with short grasses or very sparse vegetation; nearby bodies of water are not needed; may use newly plowed or sprouting grainfields	Low. No CNDDB (2013) occurrences within 10 miles of the project area. Species could winter in agricultural fields in the project area.
Northern harrier *Circus cyaneus*	–/SSC/–	Occurs throughout lowland California. Has been recorded in fall at high elevations	Grasslands, meadows, marshes, and seasonal and agricultural wetlands	Moderate. No CNDDB (2013) nesting records within 10 miles of the project area. Suitable nesting habitat in project area.
Purple martin *Progne subis*	–/SSC/–	Coastal mountains south to San Luis Obispo County, west slope of the Sierra Nevada, and northern Sierra and Cascade ranges; absent from the Central Valley except in Sacramento; isolated, local populations in southern California	Nests in abandoned woodpecker holes in oaks, cottonwoods, and other deciduous trees in a variety of wooded and riparian habitats. Also nests in vertical drainage holes under elevated freeways and highway bridges	Moderate. Ten CNDDB (2013) nesting records within 10 miles of the project area. Suitable nesting habitat in project area.

Common and Scientific Names	Status[a] Fed/State/ Other	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Swainson's hawk *Buteo swainsoni*	–/T/–	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley; highest nesting densities occur near Davis and Woodland, Yolo County	Nests in oaks or cottonwoods in or near riparian habitats. Forages in grasslands, irrigated pastures, and grain fields.	High. Four CNDDB nesting records in the project area with additional nests sites within 0.25 mile (Plate 3.10-1 [revised]). Nesting activity ranges from 1983–2007 (CNDDB 2013).
Tricolored blackbird *Agelaius tricolor*	–/SSC/–	Permanent resident in the Central Valley from Butte County to Kern County; breeds at scattered coastal locations from Marin County south to San Diego County and at scattered locations in Lake, Sonoma, and Solano Counties; rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland sites with blackberries, nettles, thistles, and grain fields; habitat must be large enough to support 50 pairs; probably requires water at or near the nesting colony	Moderate. Thirteen CNDDB (2013) nesting records within 10 miles of the project area. Could nest and forage in suitable habitat in the project area.
Western burrowing owl *Athene cunicularia hypugea*	–/SSC/–	Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Level, open, dry, heavily grazed or low-stature grassland or desert vegetation with available burrows	Moderate. Sixty-eight CNDDB (2013) nesting records within 10 miles of the project area. Could nest in suitable habitat in the project area.
Western snowy plover (inland population) *Charadrius alexandrinus nivosus*	–/SSC/–	Nests at inland lakes throughout northeastern, central, and southern California, including Mono Lake and Salton Sea	Barren to sparsely vegetated ground at alkaline or saline lakes, reservoirs, ponds and riverine sand bars; also along sewage, salt-evaporation, and agricultural wastewater ponds	None. No suitable nesting habitat in the project area
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	PT/E/–	Nests along the upper Sacramento, lower Feather, south fork of the Kern, Amargosa, Santa Ana, and Colorado Rivers	Wide, dense riparian forests with a thick understory of willows for nesting; sites with a dominant cottonwood overstory are preferred for foraging; may avoid valley oak riparian habitats where scrub jays are abundant	None. No suitable nesting habitat in the project area.

Common and Scientific Names	Status[a] Fed/State/ Other	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
White-tailed kite *Elanus leucurus*	–/FP/–	Lowland areas west of Sierra Nevada from the head of the Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging	Moderate. Twenty CNDDB (2013) nesting records within 10 miles of the project area. One observed foraging during field surveys. Suitable nesting habitat in project area.
Least Bell's vireo *Vireo bellii pusillus*	E/E	Small populations remain in southern Inyo, southern San Bernardino, Riverside, San Diego, Orange, Los Angeles, Ventura, and Santa Barbara Counties.	Riparian thickets either near water or in dry portions of river bottoms; nests along margins of bushes and forages low to the ground; may also be found using mesquite and arrow weed in desert canyons.	Low. Historically nested in the Sacramento Valley, but no nesting has been documented north of Santa Barbara County since prior to 1970s. Two recent male sightings have been reported from Putah Creek in Yolo County in 2010 and 2011 but no confirmed nesting (CNDDB 2013). Suitable habitat is present within the project area.
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	–/SSC/–	Locally numerous in the Klamath Basin, Modoc Plateau, Great Basin desert, and large mountain valleys in northeastern California and in the San Joaquin Valley; common breeders in the Colorado River valley, Salton Sink, and the western Mojave Desert; scarce in the Sacramento Valley and along the southern coast in Los Angeles, Riverside, and San Bernardino Counties	Nest in marshes with tall emergent vegetation, such as tules or cattails, generally in open areas and edges over relatively deep water; breeds in marshes often on edges of deep water bodies such as lakes, reservoirs, and or larger ponds	Low. One historical CNDDB (2013) record from1899 reported 4 miles south of the project area. Suitable nesting habitat in project area.

Common and Scientific Names	Status[a] Fed/State/ Other	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area
Mammals				
American badger *Taxidea taxus*	–/SSC/–	In California, badgers occur throughout the state except in humid coastal forests of northwestern California in Del Norte and Humboldt Counties	Badgers occur in a wide variety of open, arid habitats but are most commonly associated with grasslands, savannas, mountain meadows, and open areas of desert scrub; the principal habitat requirements for the species appear to be sufficient food (burrowing rodents), friable soils, and relatively open, uncultivated ground	Low. One historical CNDDB (2013) record from 1938 was reported 8 miles from the project area. Limited suitable habitat in project area.
Hoary bat *Lasurius cinerius*	–/SSC/– WBWG: Moderate priority	Occurs throughout California from sea level to 13,200 feet	Primarily found in forested habitats; also found in riparian areas and in park and garden settings in urban areas; day roosts in foliage of trees	High. Two CNDDB (2013) occurrences within 10 miles of the project area. Suitable roosting and foraging habitat in project area.
Pallid bat *Antrozous pallidus*	–/SSC/– WBWG: High priority	Occurs throughout California except the high Sierra from Shasta to Kern County and the northwest coast, primarily at lower and mid-level elevations	Occurs in a variety of habitats from desert to coniferous forest; most closely associated with oak, yellow pine, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California; relies heavily on trees for roosts	Moderate. One CNDDB (2013) occurrence within 10 miles of the project area. Suitable roosting and foraging habitat in the project area.
Western red bat *Lasiurus blossevillii*	–/SSC/– WBWG: High priority	Scattered throughout much of California at lower elevations	Found primarily in riparian and wooded habitats; occurs at least seasonally in urban areas; day roosts in trees within the foliage; found in fruit orchards and sycamore riparian habitats in the Central Valley	High. Acoustical records during maternity season in riparian habitat along Sacramento River in West Sacramento (ICF International 2011). No CNDDB (2013) occurrences within 10 miles of the project area. Suitable roosting and foraging habitat in the project area.

Common and Scientific Names	Status[a] Fed/State/ Other	Geographic Distribution	Habitat Requirements	Potential Occurrence in Project Area

[a] Status explanations:

Federal

E = listed as endangered under the Federal Endangered Species Act.
T = listed as threatened under the Federal Endangered Species Act.
PT = proposed for listing as threatened under the Federal Endangered Species Act.
– = no listing.

State

E = listed as endangered under the California Endangered Species Act.
T = listed as threatened under the California Endangered Species Act.
FP = fully protected under the California Fish and Game Code.
SSC = species of special concern in California.
– = no listing.

Western Bat Working Group 2013.

High priority = species are imperiled or at high risk of imperilment.
Moderate priority = this designation indicates a level of concern that should warrant closer evaluation, more research, and conservation actions of both the species and possible threats. A lack of meaningful information is a major obstacle in adequately assessing these species' status and should be considered a threat.
Low priority = While there may be localized concerns, the overall status of the species is believed to be secure.

3.10.2 Environmental Consequences

This section describes the environmental consequences relating to wildlife resources for the proposed Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.10.2.1 Assessment Methods

This evaluation of wildlife is based on professional standards and information cited throughout the section.

The key effects were identified and evaluated based on the environmental characteristics of the Southport project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project.

Direct and indirect effects on special-status wildlife species were quantitatively and qualitatively evaluated based on the potential for species occurrence in suitable habitat/land cover type located in the project area. The project footprint was overlaid onto a map of land cover types in the project area using GIS applications. Acreages of direct effects were then calculated for each alternative and are presented below in separate tables. The analysis of potential indirect effects on wildlife is qualitative in nature (i.e., noise disturbance, dust accumulation) and was determined based on the proximity of project activities to know species locations or potential habitat.

For wildlife movement, existing and accessible drainage corridors were qualitatively assessed with respect to their relative function to facilitate wildlife movement through the landscape.

3.10.2.2 Determination of Effects

For this analysis, an environmental effect was considered potentially significant related to wildlife if it would result in any of the effects listed below. These effects are based on NEPA standards and State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

- 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 or the USFWS.
- Substantial interference with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impedance of the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan.
- Contribution to a substantial reduction or elimination of species diversity or abundance.

Effect Assumptions

The following assumptions were made regarding project effects on wildlife resources in the project area.

- All construction activities, including equipment staging and access, would take place only in the project area shown in Plate 1-5.
- For all proposed alternatives, construction of seepage berms would prevent through- and under-seepage from the adjacent levee. As part of the proposed project, the seepage berms would be hydroseeded with native grassland species after construction. Therefore, the seepage berm area would not support wetland hydrology and would comprise upland habitat after construction that would provide habitat for some wildlife species.
- Following construction, seepage berms and the land side of the levee slope would be maintained by regular mowing or other vegetation management activities (i.e., burning).
- Construction of adjacent levees and levee slope flattening would both result in removal of landside and waterside woody riparian vegetation.
- The depth of borrow area excavation may intercept the water table in the project area during construction; following material extraction, borrow areas would be restored to a depth of no greater than 3 feet below grade. Borrow areas would be hydroseeded with native grassland species following the conclusion of every construction season and would thus support upland habitat during and after construction. Following the completion of material extraction, Southport-area borrow sites would be graded to a depth of no greater than 3 feet below grade and returned to preproject drainage and irrigation conditions.
- For the purpose of this analysis, excavation in borrow areas is assumed to avoid sensitive habitats wherever feasible, including riparian woodlands, valley oak and walnut woodlands, emergent wetlands, ditches, ponds, and perennial drainages. Protected trees located outside of woodland habitats would also be avoided or such loss mitigated in accordance with the City's Tree Preservation Ordinance.
- Direct effects from borrow excavation on suitable habitat for special-status wildlife species would be temporary since the habitat would be returned to baseline conditions at the end of each construction season and after construction is complete. Effect acreages described under each alternative for borrow effects represent all habitat acres present within all potential borrow sites. As most land identified as potential borrow will not ultimately be utilized, the actual area of effect will be substantially less pending an analysis on the suitability of borrow materials.
- Hydrology of the Bees Lakes area is supported by groundwater, and pond depth is dependent on water level in the Sacramento River. The agricultural ditch on the west side of the Bees Lakes area is a separate feature from the ponds and shows no evident surface water connection to the ponds.
- Under Alternatives 2 and 5, five breaches of the existing levee would be excavated, and under Alternative 4, two breaches would be excavated. These breaches, which would vary from 600 to 1,500 feet in length, would be at least partially replanted with riparian vegetation following construction.

- Loss of agricultural and annual grassland vegetation would not be considered an adverse effect from a wildlife standpoint if the habitats are being converted to a higher value native habitat, or to an equivalent value habitat. Because these habitats are common and not considered sensitive community types, the impacts may not be significant.
- Alternatives 2, 4, and 5 include potential alignments for extension of Village Parkway.

Effect Mechanisms

Wildlife resources could be directly and indirectly affected by construction, operation of the project alternatives. The following types of activities could cause varying degrees of effects on these resources.

Construction-Related Effects

- Vegetation removal for seepage berm and levee construction, utilization of borrow sites, and recontouring of the existing levee.
- Grading and fill placement during construction of levee alternatives.
- Channel dewatering or installation of temporary water-diversion structures.
- Temporary stockpiling and sidecasting of soil, construction materials, or other construction wastes.
- Short-term construction-related noise (from equipment).
- Soil compaction, dust, and water runoff from the construction site into adjacent areas.
- Runoff of herbicides, fertilizers, diesel fuel, gasoline, oil, raw concrete, or other toxic materials used for levee construction, operations, and maintenance into sensitive biological resource areas (e.g., riparian habitat, wetlands).
- Placement of rock slope protection on the waterside of levees.

Post-Construction Effects

- O&M activities, including removal of weeds, tree and shrub trimming up to four times per year, and reconditioning of levee slopes and road with a bull dozer, as needed.
- Permanent altering of light and noise levels.
- Altering of hydrology.
- Damage caused through toxicity associated with herbicides, insecticides, and rodenticides.
- Introduction of pet and human disturbance (including trash dumping).
- Increase in habitat for native competitors or predators.
- Introduction of invasive nonnative species.

3.10.3 Effects and Mitigation Measures

The mitigation measures described below for potential effects on sensitive wildlife resources have not been developed through formal consultation or coordination with resource agencies (e.g., CDFW, USFWS, NMFS). USACE will contact agencies as part of the environmental compliance process to determine specific conservation measures for effects on state- and Federally listed species and habitats supporting special-status species. Additional measures may be identified as conditions of permits (e.g., a BO, Section 7 Incidental Take Statement, a CESA Incidental Take Permit (ITP) or Consistency Determination, and a Section 1602 Streambed Alteration Agreement from CDFW).

3.10.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the Sacramento River Levee reach in the Southport project area. No flood risk–reduction measures would be implemented. No construction-related effects on wildlife would occur.

As presented in Chapter 2, "Alternatives," the No Action Alternative is characterized by three possible scenarios.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

Under modified application of the ETL as proposed in the ULDC, no vegetation would be added to the levee prism or within 15 feet of the landside and waterside levee toes. Understory vegetation that is less than 4 inches in diameter at breast height or over 12 inches high would be removed, and new volunteer vegetation would not be allowed to grow on the levee. In addition, existing vegetation would be allowed to die out within its natural lifecycle so that, over time, the levee would become covered with only grasses. Understory vegetation maintenance would be similar to current vegetation management activities, such as mowing levee grasses and thinning restoration plantings. Trees and larger shrubs would die out over a course of time, which could take 30 years or more.

Implementation of the No Action Alternative would result in the following effects on wildlife species (Table 3.10-2).

Table 3.10-2. Wildlife Effects for the No Action Alternative

Effect	Scenario	Finding—Direct
WILD-NA-1: Disturbance or Loss of VELBs and their Habitat in Compliance with the USACE Levee Vegetation Policy	No ETL	No effect
	Modified ETL	Significant
	Full ETL	Significant
WILD-NA-2: Loss of Swainson's Hawk Nesting and Foraging Habitat in Compliance with the USACE Levee Vegetation Policy	No ETL	No effect
	Modified ETL	Significant
	Full ETL	Significant
WILD-NA-3: Disturbance or Loss of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors in Compliance with the USACE Levee Vegetation Policy	No ETL	No effect
	Modified ETL	Significant
	Full ETL	Significant
WILD-NA-4: Disturbance or Loss of Bats and Bat Roosts in Compliance with the USACE Levee Vegetation Policy	No ETL	No effect
	Modified ETL	Significant
	Full ETL	Significant

Effect WILD-NA-1: Disturbance or Loss of VELBs and Their Habitat in Compliance with the USACE Levee Vegetation Policy

Under the full application of the ETL, and over many years under the modified ETL as proposed in the ULDC, the only plant species permitted in the vegetation-free zone would be non-irrigated perennial grasses, with preference given to native species that are appropriate to local climate, conditions, and surrounding or adjacent land uses. Implementation of the full ETL could directly remove elderberry shrubs, which are habitat for VELB, a Federally listed species. The modified ETL would not directly remove trees or shrubs but in the long term could result in a loss of all shrubs and trees, including habitat for VELB.

Permanent loss of elderberry shrubs in compliance with either the ETL or modified ETL would have a substantial adverse effect on VELBs and their habitat. These direct effects would be significant. No application of the ETL would have no effect on VELB and their habitat.

Effect WILD-NA-2: Loss of Swainson's Hawk Foraging and Nesting Habitat in Compliance with the USACE Levee Vegetation Policy

The full application of the ETL could directly remove potential or known nesting habitat for Swainson's hawks, a state threatened species. The modified application of the ETL through the application of the ULDC would not directly remove trees but in the long term would result in a loss of all trees, potentially including nesting habitat for Swainson's hawks.

Permanent loss of nesting habitat for Swainson's hawks in compliance with either the ETL or modified ETL would be a significant direct effect, because it could result in a substantial decrease in the local population of Swainson's hawks. No application of the ETL would have no effect on nesting habitat for Swainson's hawks.

Effect WILD-NA-3: Loss or Disturbance of Tree- and Shrub-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors in Compliance with the USACE Levee Vegetation Policy

Full application of the ETL could directly remove potential or known nesting habitat for tree-, and shrub-nesting special-status and non-special-status migratory birds and raptors. The modified application of the ETL through application of the ULDC would not directly remove nesting habitat but in the long term would result in a loss of nesting habitat for special-status and non-special-status birds.

Permanent loss of nesting habitat for protected bird species in compliance with either the ETL or modified ETL would be a direct, significant effect because it could result in a substantial decrease in the local population of species. No application of the ETL would have no effect on nesting habitat for any of these protected bird species.

Effect WILD-NA-4: Loss or Disturbance of Bats and Bat Roosts in Compliance with the USACE Levee Vegetation Policy

Full application of the ETL could directly remove potential or known roosting and maternity habitat for special-status bats species. The modified application of the ETL through application of the ULDC would not directly remove habitat but in the long term would result in a loss of all trees, potentially including habitat for special-status bats.

Permanent loss of potential or known roosting and maternity habitat for special-status bats species in compliance with either the ETL or modified ETL would have a substantial effect on the species. This direct effect would be significant. No application of the ETL would have no effect on potential or known roosting and maternity habitat for special-status bats species.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.10.3.2 Alternative 1

Implementation of Alternative 1 would result in the following direct and indirect effects on wildlife resources (Table 3.10-3). The acreage of habitat loss under each alternative is provided in Table 3.10-4.

Table 3.10-3. Wildlife Effects and Mitigation Measures for Alternative 1

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-1: Establish a Minimum 20-Foot-Wide Buffer around the Elderberry Shrub WILD-MM-2: Transplant Elderberry Shrubs That Cannot Be Avoided or Implement Dust Control Measures during Construction WILD-MM-3: Compensate for Removal and Transplantation of VELB Habitat
WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-4: Conduct a Preconstruction Survey for Western Pond Turtle and Exclude Turtles from Work Area
WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-5: Install and Maintain Construction Barrier Fencing around Suitable Giant Garter Snake Habitat WILD-MM-6: Minimize Potential Effects on Giant Garter Snakes during Construction in Suitable Habitat WILD-MM-7: Compensate for Permanent Loss of Giant Garter Snake Habitat
WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys WILD-MM-9: Compensate for Permanent Removal of Swainson's Hawk Foraging Habitat

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
WILD-5: Disturbance or Loss of Western Burrowing Owl and Their Habitat	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-10: Conduct Preconstruction Surveys for Active Burrowing Owl Burrows and Implement the 2012 California Department of Fish and Game Guidelines for Burrowing Owl Mitigation, If Necessary WILD-MM-11: Coordinate with Resource Agencies and Develop an Appropriate Compensation Plan for Burrowing Owl
WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors	Significant	Significant	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys
WILD-7: Loss or Disturbance of Bats and Bat Roosts	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-12: Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measure
WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats	Less than significant	Less than significant	NA	None
WILD-9: Disruption of Wildlife Movement Corridors	Less than significant	Less than significant	NA	None
WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	No effect	No effect	NA	None

Table 3.10-4. Summary of Potential Effects on Special-Status Wildlife Species Habitats by Project Alternative

Effect Type	GGS Aquatic[1]	GGS Upland[2]	VELB (Number of Shrubs)	BUOW and Swainson's Hawk Foraging Habitat[3]	Swainson's Hawk Nesting Habitat[4]
Alternative 1					
Indirect	No	No	9	No	No
Direct	Temp: 0 Perm: 0	Temp: 0 (143)[5] Perm: 0.3	20	Temp: 200(1,603)[5] Perm: 74	Temp: NA Perm: 44
Alternative 2					
Indirect	No	No	11	No	No
Direct	Temp: 0 Perm: 1.8	Temp: 0 (142)[5] Perm: 1.8	35	Temp: 164 (1,544)[5] Perm: 190	Temp: NA Perm: 58
Alternative 3					
Indirect	No	No	6	No	No
Direct	Temp: 0 Perm: 0.1	Temp: 0 (143)[5] Perm: 1.7	22	Temp: 173 (1,635)[5] Perm: 74	Temp: NA Perm: 51
Alternative 4					
Indirect	No	No	26	No	No
Direct	Temp: 0 Perm: 0	Temp: 0 (143)[5] Perm: 0.3	20	Temp: 193 (1,544)[5] Perm: 114	Temp: NA Perm: 39
Alternative 5					
Indirect	No	No	26	No	No
Direct	Temp: 0 Perm: 0	Temp: 0 (142)[5] Perm: 2.24	19	Temp: 163 (1,603)[5] Perm: 173	Temp: NA Perm: 38

Assumption for special-status wildlife species is that the direct effects from borrow sites would be temporary since conditions would return to baseline after construction.

NA = not applicable

GGS = giant garter snake; VELB = valley elderberry longhorn beetle; BUOW = burrowing owl.

[1] Upland habitat for GGS includes fallow agricultural field and nonnative annual grassland within 200 feet of suitable aquatic habitat.

[2] Aquatic habitat for GGS includes agricultural ditches with emergent wetland vegetation, emergent wetland, and pond.

[3] BUOW foraging and nesting habitat and Swainson's hawk foraging habitat includes cultivated agricultural field, disked agricultural field, fallow agricultural field, and annual grassland.

[4] Swainson's hawk nesting habitat includes riparian woodlands (cottonwood riparian, valley oak riparian, and walnut riparian), valley oak woodland, and walnut woodland.

[5] Acreages shown in parentheses represent the total number of potential habitat acres for all borrow sites. The actual effects of borrow activities would be substantially less. All borrow site effects are considered temporary because conditions would return to baseline after construction.

Acreages calculated using GIS. Construction years 1 and 2 are combined.

Effect WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)

Construction activities (e.g., excavation, grading, recreation trails) associated with Alternative 1 would result in the loss of VELB—a species Federally listed as threatened—and removal or disturbance of a number of elderberry shrubs, the host plant for VELB.

Likely effects include removal or transplantation of VELB habitat within 20 feet of construction activities, dust accumulation on shrubs from ground-disturbing activities occurring within 100 feet of construction activities, and removal of associated woodland species. Tree and shrub removal activities in the project area would be minimized and would involve only the removal of trees and shrubs necessary to construct Alternative 1; however, ground-disturbing activities occurring within 100 feet of an elderberry shrub could cause an accumulation of dust on elderberry shrubs, altering VELB habitat. Excavation and grading in the vicinity of an elderberry shrub could also damage the root system, resulting in death of the shrub.

Up to 20 elderberry shrubs or groupings of shrubs would be affected through removal or transplantation during construction (referred to in Appendix E.2 as a "direct effect") and nine elderberry shrubs could be affected by other construction activity ("indirect effect"). (Appendix E.2).

Removal or disturbance of habitat or loss of individuals of a Federally listed species would violate ESA. Because Alternative 1 could result in take of VELB, a Federally listed species, this direct effect is considered significant. In consultation with USFWS, implementation of Mitigation Measures VEG-MM-3 (described in Section 3.8, Vegetation and Wetlands), WILD-MM-1, WILD-MM-2, and WILD-MM-3 would avoid, minimize, and/or compensate for potential effects on VELBs, thereby reducing the direct effect to a less-than-significant level.

Mitigation Measure WILD-MM-1: Establish a Minimum 20-Foot-Wide Buffer around the Elderberry Shrub

Before any ground-disturbing activities occur, WSAFCA will ensure that a minimum 4-foot-tall, temporary plastic mesh–type construction fence (Tensor Polygrid or equivalent) is installed at least 20 feet from the dripline of the elderberry shrub. This fencing is intended to prevent encroachment by construction vehicles and personnel. The exact location of the fencing will be determined by a qualified biologist, with the goal of protecting sensitive biological resources (habitat for VELB). The fencing will be strung tightly on posts set at a maximum interval of 10 feet. The fencing will be installed in a way that prevents equipment from enlarging the work area beyond what is necessary to complete the work. The fencing will be checked and maintained weekly until all construction is completed. This buffer zone will be marked by a sign stating:

> This is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment.

No construction activity, including grading, will be allowed until this condition is satisfied. The fencing and a note reflecting this condition will be shown on the construction plans.

WSAFCA will ensure that dust control measures are implemented for all ground-disturbing activities in the project area. These measures may include application of water to graded and disturbed areas that are unvegetated. To avoid attracting Argentine ants, at no time will water be sprayed within the driplines of elderberry shrubs.

Mitigation Measure WILD-MM-2: Transplant Elderberry Shrubs That Cannot Be Avoided or Implement Dust Control Measures during Construction

Elderberry shrubs growing within 20 feet of proposed construction areas will require transplanting prior to any ground-disturbing activities. In the event that elderberry shrubs can be retained on site but occur within 20 feet of proposed construction activities, dust control measures will be required to minimize direct effects on these shrubs. Therefore, the applicant will implement one of the following mitigation measures for each elderberry shrub that occurs within 20 feet of proposed construction activities.

- All elderberry shrubs that occur in proposed development areas will be transplanted to a USFWS-approved conservation area in accordance with the *Conservation Guidelines for Valley Elderberry Longhorn Beetle* (U.S. Fish and Wildlife Service 1999). These elderberry shrubs will be transplanted when they are dormant (after they lose their leaves), in the period starting approximately in November and ending in the first 2 weeks of February. A qualified specialist familiar with elderberry shrub transplantation procedures will supervise the transplanting. The location of the conservation area transplantation site will be approved by USFWS before removal of the shrubs.

  OR

- If it is determined that elderberry shrubs can be avoided but that construction activities will occur within 20 feet of the shrubs, the applicant will ensure that dust control measures (e.g., watering) are implemented in the vicinity of the shrub. To further minimize effects associated with dust accumulation, the elderberry shrubs will be covered by a protective cloth (burlap) during all ground-disturbing activities occurring within 20 feet of the shrubs. The cloth will be removed daily and immediately after ground-disturbing activities are completed. In addition, temporary construction fencing will be placed around the dripline of the elderberry shrubs before the start of construction activities to ensure that the shrub is not inadvertently removed.

Mitigation Measure WILD-MM-3: Compensate for Removal and Transplantation of VELB Habitat

In addition to implementation of Mitigation Measure WILD-MM-2, WSAFCA will compensate for direct effects (including transplanting) on all elderberry stems measuring 1 inch or more at ground level (i.e., VELB habitat) that are located within 20 feet of construction activities. Compensation will include planting replacement elderberry seedlings or cuttings and associated native plantings in a USFWS-approved conservation area, at a ratio between 1:1 and 8:1 (ratio = new plantings to affected stems), depending on the diameter of the stem at ground level, the presence or absence of exit holes, and whether the shrub is located in riparian habitat (U.S. Fish and Wildlife Service 1999).

Mitigation credits for VELB can be purchased at a USFWS-approved mitigation bank or an on-site or off-site conservation area can be established and a management plan can be developed according to USFWS *Conservation Guidelines for Valley Elderberry Longhorn Beetle* (U.S. Fish and Wildlife Service 1999). Final compensation requirements and mitigation ratios for the project will be determined through consultation with USFWS before project initiation.

Effect WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat

A large population of western pond turtles is present in the Bees Lakes ponds, and turtles could occur in agricultural ditches throughout the Southport project area.

Direct effects on this species include temporary disturbance to upland nesting or cover habitat and the potential for loss of individual pond turtles. Western pond turtles could be crushed and killed during project construction and post-construction activities that occur in suitable aquatic habitat. In addition, western pond turtles and nests containing hatchlings or eggs could be crushed and killed during the movement of construction equipment in annual grasslands within 1,200 feet of suitable aquatic habitat.

Direct and indirect effects on western pond turtles could also result from altering hydrology, adverse project effects on surface water quality, increasing habitat for native competitors or predators (fish and turtle species), and introducing invasive nonnative species.

Direct and indirect effects on western pond turtles under Alternative 1 would be significant. WSAFCA has adopted the following ECs (Chapter 2, Section 2.4, Environmental Commitments), which would minimize impacts on western pond turtles and their habitat.

- Preparation of a SWPPP.
- Preparation and implementation of a bentonite slurry spill contingency plan.
- Preparation of a spill prevention, control, and countermeasure plan to prevent any discharge of oil into navigable water or adjoining shorelines.
- Turbidity monitoring in the adjacent water bodies.

Use of ECs to protect surface water quality, as well as implementation of Mitigation Measures VEG-MM-3 and WILD-MM-4, would avoid, minimize, and/or compensate for direct and indirect effects on western pond turtles, thereby reducing them to a less-than–significant level.

Mitigation Measure WILD-MM-4: Conduct a Preconstruction Survey for Western Pond Turtle and Exclude Turtles from Work Area

To avoid and minimize effects on western pond turtles, WSAFCA or its contractor will retain a qualified wildlife biologist to conduct a preconstruction survey 2 weeks before and within 48 hours of disturbance in aquatic and riparian habitats. The survey objectives are to determine presence or absence of pond turtles in the construction work area and if necessary to allow time for successful trapping and relocation.

If possible, the surveys will be timed to coincide with the time of day and year when turtles are most likely to be active (during the cooler part of the day 8:00 a.m.–12:00 p.m. during spring, summer, and late summer). Prior to conducting presence/absence surveys, the biologist will locate the microhabitats for turtle basking (logs, rocks, brush thickets) and determine a location to quietly observe turtles.

Each survey will include a 30-minute wait time after arriving on site to allow startled turtles to return to open basking areas. The survey will consist of a minimum 15-minute observation time per area where turtles could be observed.

If turtles are observed during a survey and they cannot be avoided, they will be either hand-captured or trapped and relocated outside the construction area to appropriate aquatic habitat by a biologist with a valid memorandum of understanding from CDFW and as determined during coordination with CDFW.

If turtles are captured and moved up or downstream, exclusion fencing will be installed perpendicular to the irrigation canal or between the construction work area and the aquatic habitat (Bees Lakes) extending upslope an appropriate distance, determined based on topography and site vegetation. If this is determined to be infeasible, a monitor will need to be present during in-water construction (and construction in riparian habitat areas) to ensure that turtles do not move into the construction area.

Effect WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat

Direct effects on giant garter snakes include construction activities that result in the loss of giant garter snakes and the permanent or temporary removal of suitable giant garter snake aquatic and upland habitat. In the project area, suitable giant garter snake aquatic habitat occurs in existing agricultural ditches that support summer water and emergent wetland vegetation, emergent wetlands, and Bees Lakes. Adjacent annual grasslands and agricultural fields located within 200 feet of suitable aquatic habitat provide potential upland basking sites and overwintering habitat for giant garter snakes.

Indirect effects on giant garter snakes are the same as described above for western pond turtles.

Alternative 1 would not result in permanent loss of suitable aquatic habitat for giant garter snakes. A small amount of upland habitat, 0.3 acre, would be permanently removed in the vicinity of Bees Lakes. Acreage calculations for upland habitat were determined using a 200-foot zone around suitable aquatic habitat. Habitat would be removed temporarily during construction of the Southport project primarily from soil extraction in borrow areas. These areas would be restored to preproject conditions within a maximum of two seasons (a season is defined as the calendar year between May 1 and October 1 [U.S. Fish and Wildlife Service 1997]). Fewer than 143 acres of suitable upland are present in the borrow sites, of which only a fraction would be temporarily affected during construction of Alternative 1.

Removal of habitat or loss of individuals of a state and Federally listed species would constitute a significant effect. If implementation of Alternative 1 could result in take of giant garter snakes, a state and Federally listed species, USACE will consult with USFWS to obtain an incidental take authorization under Section 7 of ESA, and WSAFCA will consult with CDFW to obtain an incidental take permit under CFGC Section 2081(b) or a consistency determination under Section 2080.1.

WSAFCA's adoption of the surface water quality ECs described in Effect WILD-2 above, and implementation of Mitigation Measures VEG-MM-3, WILD-MM-5, WILD-MM-6, and WILD-MM-7 would avoid, minimize, and/or compensate for potential effects on giant garter snakes, thereby reducing the direct and indirect effects to a less-than-significant level.

Mitigation Measure WILD-MM-5: Install and Maintain Construction Barrier Fencing around Suitable Giant Garter Snake Habitat

To reduce the likelihood of giant garter snakes entering the construction area, WSAFCA will install erosion control fencing and orange barrier fencing along the portions of the construction area that are within 200 feet of suitable aquatic and upland habitat. The erosion control and barrier fencing will be installed during the active period for giant garter snakes (May 1 to October 1) to reduce the potential for injury and mortality during this activity.

The construction specifications will require that WSAFCA or its contractor retain a qualified biologist to identify the areas that are to be avoided during construction. Areas adjacent to the directly affected area required for construction, including staging and access, will be fenced off to avoid disturbance in these areas. Before construction, the contractor will work with the qualified biologist to identify the locations for the barrier fencing and will place flags or flagging around the areas to be protected to indicate the locations of the barrier fences. The protected area will be clearly identified on the construction specifications. The fencing will be installed the maximum distance practicable from the aquatic habitat areas and will be in place before construction activities are initiated.

The erosion control fencing will consist of 3- to 4-foot-tall erosion fencing buried at least 6 to 8 inches below ground level. The erosion control fencing will exclude giant garter snakes from the construction area and protect suitable upland and aquatic habitat throughout construction. The barrier fencing will be commercial-quality, woven polypropylene, orange in color, and 3 to 4 feet high (Tensor Polygrid or equivalent). The fencing will be tightly strung on posts with a maximum of 10-foot spacing.

Erosion and barrier fences will be inspected as required by USFWS and CDFW by a qualified biological monitor during ground-disturbing activities and weekly after ground-disturbing activities until project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer. The biological monitor will be responsible for ensuring that the contractor maintains the buffer area fences around giant garter snake habitat throughout construction. Biological inspection reports will be provided to the project lead, CDFW, and USFWS.

Mitigation Measure WILD-MM-6: Minimize Potential Effects on Giant Garter Snakes during Construction in Suitable Habitat

To avoid and minimize effects on giant garter snakes, WSAFCA will implement the following surveys and protection measures

- All construction activity in giant garter snake aquatic and upland habitat (upland habitat includes fallow agricultural field and nonnative annual grassland within 200 feet of suitable aquatic habitat, and aquatic habitat includes agricultural ditch, emergent wetland, and pond) will be conducted between May 1 and October 1, the active period for giant garter snake, unless a work window extension is properly requested and granted. This would reduce direct effects on the species because the snakes would be active and respond to construction activities by moving out of the way. Prior to any construction in suitable giant garter snake aquatic habitat (agricultural ditches), the habitat will be dewatered and must remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of dewatered habitat.
- An agency-approved biologist will conduct a preconstruction survey in suitable habitat no more than 24 hours before construction and will be on site during construction activity in suitable aquatic and upland habitat. The construction area will be resurveyed whenever there is a lapse in construction activity of 2 weeks or more.

- To avoid injury or mortality resulting from entrapment of giant garter snakes, all excavated areas more than 1 foot deep will be provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each workday. If escape ramps cannot be provided, holes or trenches will be covered with plywood or other hard material. The biological monitor or construction personnel designated by the contractor will be responsible for thoroughly inspecting trenches for the presence of giant garter snakes at the beginning of each workday. If any individuals have become trapped, the USFWS-permitted personnel will be contacted to relocate the snake, and no work will occur in that area until approved by the biologist.
- If a giant garter snake is encountered in the construction work area, construction activities must cease until the snake moves out of the work area unassisted. Capture and relocation of trapped or injured individuals can be attempted only by USFWS-permitted personnel. WSAFCA or its contractors will notify USFWS within 24 hours and submit a report, including dates, locations, habitat description, and any corrective measures taken to protect the snake(s) encountered. For each giant garter snake encountered, the biologist will submit a completed CNDDB field survey form (or equivalent) to CDFW no more than 90 days after completing the last field visit to the project site.
- Construction personnel will participate in an agency-approved worker environmental awareness program (see Mitigation Measure VEG-MM-3 described in Section 3.8). A qualified biologist will inform all construction personnel about the life history of giant garter snake and the terms and conditions of the BO and CDFW permit, if applicable. Proof of this instruction will be submitted to USFWS Sacramento field office and CDFW.
- To ensure that construction equipment and personnel do not affect giant garter snake aquatic habitat outside the construction work area, orange barrier fencing will be erected to clearly delineate the aquatic habitat to be avoided.
- If construction work must occur outside the snake's active period, WSAFCA will implement the following additional protective measures during time periods when work must occur during the giant garter snake dormant period (October 2 to April 30), when snakes are more vulnerable to injury and mortality.
    - A full-time agency-approved biological monitor will be onsite for the duration of construction activities.
    - All emergent vegetation and vegetation within 200 feet of suitable aquatic habitat will be cleared prior to the giant garter snake hibernation period (i.e., vegetation clearing must be completed by October 1).
    - Exclusion and barrier fencing installed during the snake's active period (May 1 to October 1), as described above in WILD-MM-5, will remain in place. If work during the snake's dormant period will occur in a location not previously fenced, new fencing will be installed during the active period for giant garter snake (May 1 to October 1) to reduce the potential for injury and mortality during fence installation. The USFWS-approved biological monitor will work with the contractor to determine where fencing should be placed and will monitor fence installation similar to that described above for WILD MM-5. The barrier fencing will consist of 3- to 4-foot-tall erosion fencing buried at least 6 to 8 inches below ground level. The barrier fencing will minimize opportunities for giant garter snake hibernation in the adjacent upland area.

- A postconstruction compliance report prepared by a qualified biologist will be forwarded to the chief of the Endangered Species Division of USFWS Sacramento field office and CDFW within 60 days after completion of the project. This report will include dates that construction occurred, pertinent information about WSAFCA's success in implementing project mitigation measures, an explanation of any failures to implement mitigation measures, any known project effects on state or Federally listed species, any occurrences of incidental take of state or Federally listed species, and any other pertinent information.

Mitigation Measure WILD-MM-7: Compensate for Permanent Loss of Giant Garter Snake Habitat

To compensate for the permanent loss of suitable aquatic and upland habitat for giant garter snake, WSAFCA will purchase off-site giant garter snake habitat credits from an agency-approved conservation area servicing the project area in Yolo County. Compensation requirements and mitigation ratios for the project will be determined through consultation with CDFW and USFWS before project initiation.

Effect WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat

Direct effects on Swainson's hawks include the loss of foraging and nesting habitat associated with the conversion of open space. Direct effects on actively nesting Swainson's hawks also could occur if an active nest is present in or near the construction work areas. Effects on habitat are discussed below, and effects on active nests are described under Effect WILD-6 for nesting birds.

Alternative 1 would result in the permanent loss of approximately 74 acres of suitable foraging habitat for Swainson's hawks, temporary loss (restored within 1 year) of 200 acres of foraging habitat from construction and up to 1,603 acres of foraging habitat in borrow sites (only a fraction of which may ultimately be affected). Based on preliminary borrow use data (HDR 2014), borrow excavation would disturb up to 200 acres of potential Swainson's hawk foraging habitat in Year 1 and up to 412 acres of foraging habitat in Year 2. The resulting impact of these borrow activities represents a maximum 13% reduction in available foraging habitat within the project area for Year 1 and a 25% reduction in the available foraging habitat within the project area for Year 2. However, because construction would be performed in segments and borrow would be extracted gradually as needed for construction, it is expected that only a small portion of this estimated area of temporary habitat loss would be affected at any given time during each construction season. Also, disturbance in one area of the parcel used to obtain borrow would not preclude foraging on the remaining habitat. Therefore, it is expected that more than 75% of the existing foraging habitat in the borrow areas would be available for locally nesting Swainson's hawk during construction. Additionally, there is other suitable foraging habitat within the vicinity of the project area, including agricultural lands immediately to the south of the project area. These areas, along with available habitat within the project area, would be sufficient to maintain known Swainson's hawks nests within the project area and within 10 miles of the project area.

CDFW's *Staff Report Regarding Mitigation for Impacts to Swainson's Hawks in the Central Valley of California* (California Department of Fish and Game 1994) identifies permanent loss of foraging habitat within a 10-mile radius of a known Swainson's hawk nest site (active within the previous 5 years) to be a significant effect on Swainson's hawks and their developing young. Swainson's hawks were observed foraging over the project area during the spring 2011 and 2013 field surveys and are known to be nesting in the project area and vicinity.

Temporarily affected habitat would be returned to baseline conditions by reseeding disturbed areas with native grasses immediately upon completion of ground-disturbing activities at the end of each construction season and prior to the start of the rainy season; therefore no compensation is required. The proposed seepage berm and setback levee would be planted with grasses and would provide similar habitat function as the existing agricultural and grassland habitats within the project area; therefore, these areas are considered a temporary effect.

Permanent removal of a large amount of foraging habitat (74 acres) could result in a substantial decrease in the available foraging habitat for locally nesting Swainson's hawks and the subsequent loss of developing young. In addition to foraging habitat losses, Alternative 1 would result in permanent effects on 44 acres of potential Swainson's hawk nesting habitat. There are ten recorded nests in the project area (1991–2007) (Plate 3.10-1 [revised]; Yolo Natural Heritage Program 2007; California Natural Diversity Database 2013) and an additional 203 nests within a 10-mile radius (1983–2007) (California Natural Diversity Database 2013). While this information provides important data on historic habitat use and indicates that there is a high prevalence of nesting Swainson's hawk in the project area and vicinity, it does not provide an indicator of the number of active Swainson's hawk nests within a given year. During 2013 surveys, a total of four active nest sites were identified within the project area; however, this number could change from year to year. WSAFCA is committed to minimizing impacts on nesting Swainson's hawk. During development of the final grading plan, known Swainson's hawk nest trees (depicted on Plate 3.10-1[revised]) and those identified as potential nest trees would be avoided to the extent feasible. However, the loss of foraging and nesting habitat is considered a direct significant effect because it could result in a substantial decrease in the local population of Swainson's hawks.

Implementation of Mitigation Measures VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat and VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel (described in Section 3.8), as well as WILD-MM-8 and WILD-MM-9, would avoid, minimize, and/or compensate for direct effects on Swainson's hawks' foraging and nesting habitat, thereby reducing them to a less-than-significant level.

Mitigation Measure WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys

To avoid and minimize effects on nesting special-status and non–special-status migratory birds and raptors, WSAFCA will implement the appropriate surveys and restrictions.

- To avoid removing or disturbing any active Swainson's hawk nests, other special-status birds' nests, or non–special-status migratory bird nests, tree and shrub removal will be conducted during the nonbreeding season (generally between September 1 and January 31) or after a qualified biologist determines that fledglings have left an active nest. If this is not feasible, it is likely that there will be nesting birds in the project area, which will require a buffer and avoidance during construction until the birds have fledged. This could seriously constrain construction and result in project delays.
- If construction or tree-felling activities will occur during the breeding season (February 1 through August 31), a qualified wildlife biologist (with knowledge of the species to be surveyed) will be retained to conduct surveys for nesting birds for all trees and shrubs and ground-nesting habitat located within 500 feet (0.50 mile for Swainson's hawk) of

construction activities, including grading, vegetation removal, and excavation in borrow sites.

- The following focused nesting surveys will take place prior to the start of construction and in the appropriate habitat:
  - Swainson's hawk surveys will rely on the *Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley* (Swainson's Hawk Technical Advisory Committee 2000), with appropriate modifications based on yearly differences in hawks nesting timing and site conditions.

    For Swainson's hawk, surveys will be conducted within the project area and within 0.50 mile of the project area (where access from public roads is available and where there are no significant barriers, such as the Sacramento River or Deep Water Ship Channel). The guidelines recommend that surveys be completed for at least the two survey periods immediately prior to a project's initiation. The survey dates may be adjusted depending on when birds return to the area. The survey periods include Period I: January–March 20, consisting of one survey to identify potential nest sites; Period II: March 20–April 5, consisting of three surveys to identify nesting territories; Period III: April 5–April 20, consisting of three surveys when active nest locations are most easily identified; Period IV: April 21–June 10, only surveys of known nest sites are recommended during this period when birds are laying and incubating eggs; and Period V: Jun 10–July 30, consisting of surveys to observe post-fledging success at the nests. At least one survey will be conducted no more than 48 hours prior to the start of construction to confirm the absence of nesting.
  - Other bird nest surveys (within 500 feet of construction activities) can be conducted concurrent with Swainson's hawk surveys with at least one survey to be conducted no more than 48 hours from the initiation of project activities to confirm the absence of nesting.
- If the biologist determines that the area surveyed does not contain any active nests, construction activities, including removal or pruning of trees and shrubs, can commence without any further mitigation.
- If an active nest is located in the proposed disturbance area, the wildlife biologist will consult with CDFW to establish a suitable buffer zone. If it is determined the nest is of a listed species, CDFW will be contacted for further avoidance measures. At a minimum, all work within 0.50 mile of the nest will be halted until consultation with the CDFW and/or the USFWS, or the conditions of any issued endangered species permit will be followed. If a non-listed raptor nest is located within 250 feet or a migratory bird nest is located within 100 feet of disturbance, and the disturbance must take place during the breeding season, a buffer zone will be established by the biologist and confirmed by the appropriate resource agency (CDFW and/or USFWS). The buffer area requirements are 250 feet for any active raptor nest and 100 feet for any migratory bird nest or as defined by CDFW and/or USFWS. A qualified wildlife biologist will monitor the nest to determine when the young have fledged and submit bi-weekly reports throughout the nesting season. The biological monitor will have the authority to cease construction if there is any sign of distress to any raptor or migratory bird. Reference to this requirement and the MBTA will be included in the construction specifications.

Mitigation Measure WILD-MM-9: Compensate for Permanent Removal of Swainson's Hawk Foraging Habitat

Cultivated, fallow, and disked agricultural fields, and nonnative annual grasslands in the project area provide suitable foraging habitat for Swainson's hawk. Swainson's hawks were observed foraging over the project area in spring 2011 and 2013 on several occasions. No protocol-level surveys were conducted for active nests, but based on the presence of foraging hawks and the number of CNDDB nesting records within a 1-mile radius, a compensation ratio of 1:1 (1 acre replaced for every 1 acre removed) would be applied and compensation would occur through the interim program described below. CDFW has concerns about the project's potential individual and cumulative effects on Swainson's hawk foraging habitat and recommends that adequate foraging habitat be mitigated in close proximity to the nesting hawks that might be affected by the loss of foraging habitat (Crystal Spurr pers. comm.).

The Yolo County NCCP/HCP JPA administers a program for the County, and the Cities of Davis, Woodland, Winters, and West Sacramento, to implement the agreement with CDFW regarding effects on Swainson's hawk foraging habitat. The JPA reviews applications for development of open land within the NCCP/HCP planning area and collects acreage-based mitigation fees for development of the lands. The mitigation fees are to be sufficient to fund the acquisition, enhancement, and long-term management of 1 acre of Swainson's hawk foraging habitat for every 1 acre of foraging habitat that is lost to urban development. The fee is currently $8,660 per acre. For permanent effects on 40 or more acres of foraging habitat, the JPA requires projects to mitigate through the direct purchase of a conservation easement on suitable foraging habitat lands. The interim program, which is dependent on completion of the Yolo County NCCP/HCP, is limited to providing mitigation for effects on foraging habitat and does not authorize incidental take of Swainson's hawks.

Effect WILD-5: Disturbance or Loss of Western Burrowing Owl and Their Habitat

Direct effects on burrowing owls include the loss of foraging and nesting habitat associated with the conversion of open space and injury or mortality of burrowing owls if they are present in the construction work area. Burrowing owls also could be directly affected as a result of construction noise and disturbance occurring near active nests.

Conversion of the existing habitat associated with Alternative 1 would result in the permanent loss of 74 acres of potential burrowing owl nesting and foraging habitat. Alternative 1 would result in temporary effects on 200 acres of potential burrowing owl nesting and foraging habitat from construction and up to 1,603 acres of potential nesting and foraging habitat in borrow sites. Temporary habitat removal would occur during construction from the establishment and use of temporary staging areas, access roads, and construction work areas that would be restored to preproject conditions within a 1-year period. Borrow sites would be revegetated and are expected to return to similar preproject conditions.

If burrowing owls are nesting in or adjacent to areas where ground disturbance would occur, construction activities could result in the removal of an occupied burrowing owl breeding or wintering burrow site and loss of burrowing owl adults, young, or eggs, which would be a violation of the MBTA and CFGC.

Although no burrowing owls were observed in the project area during field surveys, at least 68 burrowing owl occurrences have been documented within 10 miles of the project area (California

Natural Diversity Database 2013). The project area provides suitable habitat for burrowing owls, and there is potential for burrowing owls to occupy the project area prior to project construction.

Removal of a large amount of potential nesting and foraging habitat could result in a substantial decrease in the available habitat for locally nesting burrowing owls, if present. This direct effect would be significant, but implementation of Mitigation Measures VEG-MM-3, WILD-MM-10, and WILD-MM-11 would avoid, minimize, and/or compensate for direct effects on burrowing owls, thereby reducing them to a less-than-significant level and avoiding violation of the MBTA and CFGC.

Mitigation Measure WILD-MM-10: Conduct Preconstruction Surveys for Active Burrowing Owl Burrows and Implement the 2012 California Department of Fish and Game Guidelines for Burrowing Owl Mitigation, If Necessary

A preconstruction survey for burrowing owl will be completed, in accordance with CDFW guidelines described in the 2012 *Staff Report on Burrowing Owl Mitigation*, prior to the start of construction (including excavation of borrow sites) (California Department of Fish and Game 2012). The appropriate survey area will be determined by a qualified biologist coordinating with WSAFCA and CDFW to cover any project areas where potentially breeding or non-breeding burrowing owls could be disturbed by project activities. Surveys will be conducted during the nonbreeding season (September 1 through January 31) and breeding season (February 1 through August 31). Surveys will be conducted from 2 hours before sunset to 1 hour after, or from 1 hour before or 2 hours after sunrise. At least one survey will occur within 48 hours of the start of construction. If no burrowing owls are located during these surveys, no additional action is warranted. However, if breeding or resident owls are located on or immediately adjacent to the site, the following measures will be implemented.

- No burrowing owls will be evicted from burrows during the breeding season (February 1 through August 31). Eviction outside the breeding season may be permitted pending evaluation of eviction plans and receipt of formal written approval from CDFW authorizing the eviction.
- If owls must be moved away from the project site during the nonbreeding season, passive relocation techniques (e.g., installing one-way doors at burrow entrances) will be used instead of trapping, as described in CDFW guidelines. At least 1 week will be necessary to complete passive relocation and allow owls to acclimate to alternate burrows.
- When destruction of occupied burrows is unavoidable during the nonbreeding season (September 1–February 1), unsuitable burrows will be enhanced (enlarged or cleared of debris) or new burrows created (by installing artificial burrows) at a ratio of 2:1 on protected lands approved by CDFW. Newly created burrows will follow guidelines established by CDFW.
- A no-disturbance buffer, within which no new activity would be permissible, will be maintained between project activities and nesting burrowing owls. Buffers will be determined by a qualified biologist, coordinating with CDFW, and will depend on one or more of the following factors: season of activity, level of noise or construction activity, level of ambient noise in the vicinity, and line-of-sight. This protected area will remain in effect until September 1, or at CDFW's discretion and based on monitoring evidence, until the young owls are foraging independently.

- If accidental disturbance, injury, or death of owls occurs, the CDFW will be notified immediately.

Mitigation Measure WILD-MM-11: Coordinate with Resource Agencies and Develop an Appropriate Compensation Plan for Burrowing Owl

If a preconstruction survey finds that burrowing owls occupy a project area, and occupied habitat will be converted to unsuitable habitat, habitat compensation will be implemented.

Effect WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors

Construction activities associated with Alternative 1 could result in the removal or disturbance (e.g., trimming) of trees and shrubs that provide potential nesting habitat for special-status birds and raptors, including Swainson's hawk (state-listed species under CESA), loggerhead shrike (species of special concern under CESA), and white-tailed kite (fully protected under CFGC Section 3511). Trees and shrubs in the project area also can provide nesting habitat for several common migratory birds and raptors, including western bluebird, western kingbird, Anna's hummingbird, lesser goldfinch, American goldfinch, red-shouldered hawk, and red-tailed hawk. An active red-tailed hawk nest, black phoebe nest, and swallow nests were observed during the 2011 field surveys (Plate 3.10-1 [revised]). None of these nests are in the project area.

In addition, fallow agricultural fields and nonnative annual grasslands provide potential nesting habitat for ground-nesting birds, such as state species of special concern northern harrier, and non-special-status birds, such as mallard, red-winged blackbird, and ring-necked pheasant. If construction occurs during the breeding season (generally between February 1 and August 31), construction activities (e.g., tree and shrub removal, excavation, grading) in the project area could disturb or remove occupied nests of the species noted above.

These disturbances could cause nest abandonment and subsequent loss of eggs or developing young at active nests located in the project area. All migratory birds and raptors are protected under the MBTA and CFGC Sections 3503 and 3503.5.

These direct and indirect effects would be significant, but implementation of Mitigation Measures VEG-MM-1, VEG-MM-3, and WILD-MM-8 would avoid and minimize effects on nesting birds and raptors, thereby reducing them to a less-than-significant level and avoiding violation of the MBTA and CFGC.

Effect WILD-7: Loss or Disturbance of Bats and Bat Roosts

Special-status bats with potential to occur in the project area employ varied roost strategies, from solitary roosting in foliage of trees to colonial roosting in trees and artificial structures, such as buildings and bridges. Various roost strategies could include night roosts, maternity roosts, migration stopover, or hibernation. The habitat types used to assess effects for special-status bats roosting habitat include riparian woodland, valley oak woodlands, developed lands, and landscaped trees, including eucalyptus, palms and orchards. Potential foraging habitat includes all riparian habitat types, cultivated lands, developed lands, grasslands, and wetlands.

Bat roosts of special-status species and non- special-status species are highly sensitive to disturbance and are considered a sensitive resource by CDFW. Construction activities, such as tree removal and trimming or construction noise, could result in direct effects on roosting bats, including the destruction of active roosts, the loss of individuals, or roost failure. In addition, nighttime construction activities could disturb bats emerging from nearby roosts, directly resulting in the disruption of foraging activities. These direct effects would be significant because the subsequent population decline could affect the viability of the local bat populations. Implementation of Mitigation Measures VEG-MM-1, VEG-MM-3, and WILD-MM-12for Alternative 1 would reduce this direct effect to a less-than-significant level.

Mitigation Measure WILD-MM-12: Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measures

To avoid and minimize effects on roosting special-status and non–special-status bats, WSAFCA will implement the following surveys and restrictions, as appropriate based on the location (bridges versus trees) and timing of activities.

- Identify potential roosting habitat within project area.
- Conduct daytime search for bats and bat sign in and around identified habitat.
- Conduct evening emergence surveys at potential day-roost sites, using night-vision goggles and/or active full-spectrum acoustic monitoring where species identification is sought.
- Conduct passive full-spectrum acoustic monitoring and analysis to detect bat use of the area from dusk to dawn over multiple nights.
- Conduct additional onsite night surveys as needed following passive acoustic detection of special-status bats to determine nature of bat use of the structure in question (e.g., use of structure as night roost between foraging bouts).
- Retain qualified biologists with knowledge of the natural history of the species that could occur in the study area and experience using full-spectrum acoustic equipment. During surveys, biologists will avoid unnecessary disturbance of occupied roosts.

Preconstruction Bridges and Other Structure Surveys

Before work begins on or near a bridge/structure, qualified biologists will conduct a daytime search for bat sign and evening emergence surveys to determine whether the bridge/structure is being used as a roost. Biologists conducting daytime surveys will listen for audible bat calls and use naked eye, binoculars, and a high-powered spotlight to inspect expansion joints, weep holes, and other bridge features that could house bats. Bridge surfaces and the ground around the bridge/structure will be surveyed for bat sign, such as guano, staining, and prey remains.

Evening emergence surveys will consist of at least one biologist stationed on each side of the bridge/structure watching for emerging bats from a half hour before sunset to 1–2 hours after sunset for a minimum of two nights within the season that construction would be taking place. Night-vision goggles and/or full-spectrum acoustic detectors will be used during emergence surveys to assist in species identification. All emergence surveys will be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted).

Additionally, passive monitoring with full-spectrum bat detectors will be used to assist in determining species present. A minimum of four nights of acoustic monitoring surveys will be conducted within the season that the construction would be taking place. If site security allows, detectors should be set to record bat calls for the duration of each night. To the extent possible, all monitoring will be conducted during favorable weather conditions (calm nights with temperatures conducive to bat activity and no precipitation predicted). The biologists will analyze the bat call data using appropriate software and prepare a report with the results of the surveys. If acoustic data suggest that bats may be using the bridge/structure as a night roost, biologists will conduct a night survey from 1–2 hours past sunset up to 6 hours past sunset to determine if the bridge is serving as a colonial night roost.

If suitable roost structures would be removed, additional surveys may be required to determine how the structure is used by bats, whether it is as a night roost, maternity roosts, migration stopover, or for hibernation.

Preconstruction Tree Surveys

If tree removal or trimming is necessary, qualified biologists will examine trees to be removed or trimmed for suitable bat roosting habitat. High-quality habitat features (large tree cavities, basal hollows, loose or peeling bark, larger snags, palm trees with intact thatch, etc.) will be identified and the area around these features searched for bats and bat sign (guano, culled insect parts, staining, etc.). Riparian woodland, orchards, and stands of mature broadleaf trees will be considered potential habitat for solitary foliage roosting bat species.

If bat sign is detected, biologists will conduct evening visual emergence survey of the source habitat feature, from a half hour before sunset to 1–2 hours after sunset for a minimum of two nights within the season that construction would be taking place. Methodology will follow that described above for the bridge emergence survey.

Additionally, if suitable tree roosting habitat is present, acoustic monitoring with a bat detector will be used to assist in determining species present. These surveys will be conducted in coordination with the acoustic monitoring conducted for the bridge/structure.

Protective Measures for Bats using Bridges/Structures and Trees

Avoidance and minimization measures may be necessary if it is determined bats are using onsite structures or trees as roost sites or sensitive bats species are detected during acoustic monitoring. Appropriate measures will be determined in coordination with CDFW and may include any combination of the measures listed below.

- If a maternity roost is located, whether solitary or colonial, disturbance of the roost will be avoided between April 15 and September 15 (the maternity period), or until a qualified biologist has determined the roost is no longer active, to avoid impacts on reproductively active females and dependent young.
- If a non-maternity roost is found, that roost will be avoided and an appropriate buffer established in consultation with CDFW. If the roost cannot be avoided, eviction will be attempted and procedures designed in consultation with CDFW to reduce the likelihood of mortality of evicted bats.
- Exclusion devices will be installed from March 1 through April 14 or September 15 through October 30 to preclude bats from occupying onsite structures likely to be inhabited during construction. Exclusionary devices will only be installed by or under the supervision of an experienced bat biologist.

- Trees will be removed in pieces, rather than felling the entire tree. All tree removal will be conducted between September 15 and October 30, which corresponds to a time period when bats would not likely have entered winter hibernation and would not be caring for flightless young. If weather conditions remain conducive to regular bat activity beyond October 30th, later tree removal may be considered in consultation with CDFW.

Effect WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats

The project area contains both natural and human-influenced habitats that support numerous common wildlife species, including terrestrial and aquatic mammals, amphibians, reptiles, and invertebrates. Individuals of these species could be affected by project construction, but direct and indirect effects would be less than significant because these species are not afforded protection under applicable laws, regulations, and policies described in the regulatory section. However, measures prescribed for special-status species generally would serve to protect common species, resulting in a less-than-significant direct effect. No mitigation is required.

Effect WILD-9: Disruption of Wildlife Movement Corridors

In the project area, riparian woodland habitats adjacent to the Sacramento River are considered to be a major wildlife movement corridor. Alternative 1 would not result in the creation of permanent barriers to wildlife movement. However, during construction of flood risk–reduction measures, wildlife movements through the project area would be temporarily impeded by the placement of physical barriers (fencing) used to protect resources outside the construction footprint, but movement would be restored to the preproject condition following construction. Therefore, disruption of movement through the project area is considered a less than significant direct and indirect effect. No mitigation is required.

Effect WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan

In the Alternative 1 project region, there are three plans under development in the region or project area that are not yet formally adopted and one adopted plan. The plans under development are the Yolo County NCCP/HCP, the South Sacramento HCP, and the Bay Delta HCP/NCCP. To the north of the project site, the adopted Natomas Basin HCP/NCCP applies to a 53,537-acre area in the northern portion of Sacramento County and the southern portion of Sutter County. The Yolo County HCP/NCCP, which is the only one of these plans that would apply to the project area, is in the planning stages at the time of this writing, and no public draft is available. The Administrative Draft Yolo HCP/NCCP was completed in July 2013, and the Second Administrative Draft is underway. Therefore, no adopted or approved plan is available for the project area, and there would be no direct or indirect effect. No mitigation is required.

3.10.3.3 Alternative 2

Implementation of Alternative 2 would result in the following direct and indirect effects on wildlife resources (Table 3.10-5). The acreage of habitat loss under each alternative is provided in Table 3.10-4.

Table 3.10-5. Wildlife Effects and Mitigation Measures for Alternative 2

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-1: Establish a Minimum 20-Foot-Wide Buffer around the Elderberry Shrub WILD-MM-2: Transplant Elderberry Shrubs That Cannot Be Avoided or Implement Dust Control Measures during Construction WILD-MM-3: Compensate for Removal and Transplantation of VELB Habitat
WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-4: Conduct a Preconstruction Survey for Western Pond Turtle and Exclude Turtles from Work Area WILD-MM-13: Prepare and Implement Capture and Relocation Plan for Western Pond Turtles in Bees Lakes
WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-5: Install and Maintain Construction Barrier Fencing around Suitable Giant Garter Snake Habitat WILD-MM-6: Minimize Potential Effects on Giant Garter Snakes during Construction in Suitable Habitat WILD-MM-7: Compensate for Permanent Loss of Giant Garter Snake Habitat
WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys WILD-MM-9: Compensate for Permanent Removal of Swainson's Hawk Foraging Habitat

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
WILD-5: Disturbance or Loss of Western Burrowing Owl and Their Habitat	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-10: Conduct Preconstruction Surveys for Active Burrowing Owl Burrows and Implement the 2012 California Department of Fish and Game Guidelines for Burrowing Owl Mitigation, If Necessary WILD-MM-11: Coordinate with Resource Agencies and Develop an Appropriate Compensation Plan for Burrowing Owl
WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors	Significant	Significant	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys
WILD-7: Loss or Disturbance of Bats and Bat Roosts	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-12: Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measure
WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats	Less than significant	Less than significant	NA	None
WILD-9: Disruption of Wildlife Movement Corridors	Less than significant	Less than significant	NA	None
WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	No effect	No effect	NA	None

Effect WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)

Direct effects on VELBs and their habitat from implementation of Alternative 2 are similar to those described above for Alternative 1. Under Alternative 2, up to 35 elderberry shrubs or groupings of shrubs would be affected through removal and transplantation during construction and 11 elderberry shrubs could be affected by other construction activity. (Appendix E.2). Implementation of Mitigation Measures VEG-MM-3, WILD-MM-1, WILD-MM-2, and WILD-MM-3 for Alternative 2 would reduce this significant direct effect on VELBs to a less-than–significant level.

Effect WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat

Alternative 2 would result in permanent direct and indirect effects on western pond turtles in agricultural ditches similar to those described for Alternative 1. Additionally, Alternative 2 is the only alternative that would open the Bees Lakes area in Segment E to seasonal flow, hydraulically connecting it to the Sacramento River. As a result, under Alternative 2, breaches in the existing levee would result in the loss of aquatic habitat in Bees Lakes, as the Sacramento River would flow through the area and predators such as large fish would have access to the area. Faster and high flows, coupled with the introduction of large predators, would reduce the habitat suitability and turtles would not be expected to persist in Bees Lakes.

Alternative 2 also would temporarily disturb upland nesting or cover habitat, which could result in the direct loss of individuals. In addition, there would be a complete loss of the turtle population now inhabiting Bees Lakes. Direct and indirect effects on western pond turtles under Alternative 2 would be significant. WSAFCA has adopted the following ECs (Chapter 2, Section 2.4, Environmental Commitments), which would reduce impacts on western pond turtles and their habitat.

- Preparation of a SWPPP.
- Preparation and implementation of a bentonite slurry spill contingency plan.
- Preparation of a spill prevention, control, and countermeasure plan to prevent any discharge of oil into navigable water or adjoining shorelines.
- Turbidity monitoring in the adjacent water bodies.

Use of ECs to protect surface water quality, as well as implementation of Mitigation Measures VEG-MM-3, WILD-MM-4, and WILD-MM-13would avoid, minimize, and/or compensate for direct and indirect effects on western pond turtles, thereby reducing them to a less-than–significant level.

Mitigation Measure WILD-MM-13: Prepare and Implement Capture and Relocation Plan for Western Pond Turtles in Bees Lakes

WSAFCA will prepare and implement a capture and relocation plan for western pond turtles in coordination with CDFW prior to inundation of Bees Lakes. Prior to capture/relocation activities, a memorandum of understanding will be obtained from CDFW. All captured pond turtles will be handled by a CDFW-approved biologist and relocated outside the construction area to a predetermined location containing appropriate aquatic and upland habitat.

Effect WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat

Alternative 2 would result in direct and indirect effects on giant garter snake habitat at Bees Lakes similar to those described for Alternative 1. However, under Alternative 2, breaches in the existing levee would directly result in the loss of aquatic habitat in Bees Lakes as described in Effect WILD-2 above.

Alternative 2 would result in the permanent loss of approximately 1.8 acres of suitable aquatic habitat and 1.8 acres of suitable upland habitat for giant garter snake in the vicinity of Bees Lakes. Alternative 2 would result in no temporary effects on habitat for giant garter snakes in the project footprint, including or staging areas. Fewer than 142 acres of suitable upland are present in the borrow sites, of which only a fraction would be temporarily affected during construction of Alternative 2.

WSAFCA's adoption of the surface water quality ECs described in Alternative 1, and implementation of Mitigation Measures VEG-MM-3, WILD-MM-5, WILD-MM-6, and WILD-MM-7 would avoid, minimize, and/or compensate for potential effects on giant garter snakes, thereby reducing the direct and indirect effects to a less-than-significant level.

Effect WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat

Alternative 2 would result in direct effects on Swainson's hawk foraging habitat similar to those described for Alternative 1. Under Alternative 2, project implementation would result in the permanent loss of 190 acres of suitable Swainson's hawk foraging habitat and temporary loss (restored within 1 year) of 164 acres of suitable foraging habitat from construction and up to 1,544 acres of foraging habitat in borrow sites. In addition to foraging habitat losses, Alternative 2 would result in permanent effects on 58 acres of known and potential Swainson's hawk nesting habitat.

Based on preliminary borrow use data (HDR 2014), borrow excavation would disturb up to 198 acres of potential Swainson's hawk foraging habitat in Year 1 and up to 390 acres of foraging habitat in Year 2. The resulting impact of these borrow activities represents a maximum 13% reduction in available foraging habitat within the project area for Year 1 and a 25% reduction in the available foraging habitat within the project area for Year 2. However, because construction would be performed in segments and borrow would be extracted gradually as needed for construction, it is expected that only a small portion of this estimated area of temporary habitat loss would be affected at any given time during each construction season. Also, disturbance in one area of the parcel used to obtain borrow would not preclude foraging on the remaining habitat. Therefore, it is expected that more than 75% of the existing foraging habitat in the borrow areas would be available for locally nesting Swainson's hawk during construction. Additionally, there is other suitable foraging habitat within the vicinity of the project area, including agricultural lands immediately to the south of the project area. These areas, along with available habitat within the project area, would be sufficient to maintain known Swainson's hawks nests within the project area and within 10 miles of the project area.

Under Alternative 2, the offset mitigation and restoration area would provide long-term benefits to Swainson's hawk through the establishment of riparian habitat that could provide suitable nest trees buffered from nearby development.

The permanent loss of foraging and nesting habitat is considered a direct significant effect because it could result in a substantial decrease in the local population of Swainson's hawks. Implementation of Mitigation Measures VEG-MM-1 and VEG-MM-3 (described in Section 3.8, Vegetation and Wetlands), as well as WILD-MM-8 and WILD-MM-9, would avoid, minimize, and/or compensate for direct effects on Swainson's hawks' foraging and nesting habitat, thereby reducing them to a less-than-significant level.

Effect WILD-5: Disturbance or Loss of Western Burrowing Owls and Their Habitat

Alternative 2 would result in direct effects on burrowing owls similar to those described for Alternative 1. Conversion of the existing habitat associated with Alternative 2 would result in the permanent loss of 190 acres of potential burrowing owl nesting and foraging habitat. Alternative 2 also would result in temporary effects on 164 acres of suitable foraging and nesting habitat from construction and up to 1,544 acres of suitable habitat in borrow sites.

Removal of a large amount of potential nesting and foraging habitat could result in a substantial decrease in the available habitat for locally nesting burrowing owls, if present. This direct effect would be significant, but implementation of Mitigation Measures VEG-MM-3, WILD-MM-10, and WILD-MM-11 would avoid, minimize, and/or compensate for direct effects on burrowing owls, thereby reducing them to a less-than-significant level and avoiding violation of the MBTA and CFGC.

Effect WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors

Alternative 2 would result in direct and indirect effects on migratory bird and raptor nesting habitat as described for Alternative 1. These direct and indirect effects would be significant, but implementation of Mitigation Measures VEG-MM-1, VEG-MM-3, and WILD-MM-8 would avoid and minimize effects on nesting birds and raptors, thereby reducing them to a less-than-significant level and avoiding violation of the MBTA and CFGC.

Effect Wild-7: Loss or Disturbance of Bats and Bat Roosts

Alternative 2 would result in direct effects on roosting bats, as described for Alternative 1. These direct effects would be significant because the subsequent population decline could affect the viability of the local bat populations. Implementation of Mitigation Measures VEG-MM-1, VEG-MM-3, and WILD-MM-12 for Alternative 2 would reduce this direct effect to a less than significant level.

Effect WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats

Alternative 2 would result in direct and indirect effects on common wildlife species' individuals, as described for Alternative 1. No mitigation is required.

Effect WILD-9: Disruption of Wildlife Movement Corridors

Alternative 2 would result in temporary effects on wildlife movements similar to those described for Alternative 1. However, under Alternative 2, five breaches in the existing levee would result in the loss of riparian woodland habitat along multiple segments of the existing levee. Although woodland habitat would be lost, restoring the floodplain between the existing levee and the proposed setback levee would create additional wetland and riparian habitat that would continue to provide a wildlife movement corridor along the Sacramento River for a variety of wildlife species. Therefore, disruption of movement through the project area is a less than significant direct and indirect. No mitigation is required.

Effect WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or other Approved Local, Regional or State Habitat Conservation Plan

As described for Alternative 1, there is no adopted HCP/NCCP applicable to the project area. Therefore, implementation of Alternative 2 would not conflict with provisions of an adopted HCP/NCCP. Therefore, no adopted or approved plan is available for the project area, and there would be no direct or indirect effect.

3.10.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on wildlife resources (Table 3.10-6). The acreage of habitat loss under each alternative is provided in Table 3.10-4.

Table 3.10-6. Wildlife Effects and Mitigation Measures for Alternative 3

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-1: Establish a Minimum 20-Foot-Wide Buffer around the Elderberry Shrub WILD-MM-2: Transplant Elderberry Shrubs That Cannot Be Avoided or Implement Dust Control Measures during Construction WILD-MM-3: Compensate for Removal and Transplantation of VELB Habitat
WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-4: Conduct a Preconstruction Survey for Western Pond Turtle and Exclude Turtles from Work Area
WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-5: Install and Maintain Construction Barrier Fencing around Suitable Giant Garter Snake Habitat WILD-MM-6: Minimize Potential Effects on Giant Garter Snakes during Construction in Suitable Habitat WILD-MM-7: Compensate for Permanent Loss of Giant Garter Snake Habitat
WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys WILD-MM-9: Compensate for Permanent Removal of Swainson's Hawk Foraging Habitat

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
WILD-5: Disturbance or Loss of Western Burrowing Owl and Their Habitat	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-10: Conduct Preconstruction Surveys for Active Burrowing Owl Burrows and Implement the 2012 California Department of Fish and Game Guidelines for Burrowing Owl Mitigation, If Necessary WILD-MM-11: Coordinate with Resource Agencies and Develop an Appropriate Compensation Plan for Burrowing Owl
WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors	Significant	Significant	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys
WILD-7: Loss or Disturbance of Bats and Bat Roosts	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-12: Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measure
WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats	Less than significant	Less than significant	NA	None
WILD-9: Disruption of Wildlife Movement Corridors	Less than significant	Less than significant	NA	None
WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	No effect	No effect	NA	None

Effect WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)

Direct effects on VELBs and their habitat from implementation of Alternative 3 are similar to those described above for Alternative 1. Under Alternative 3, up to 22 elderberry shrubs would be directly affected by removal and transplantation, and up to six elderberry shrubs would be indirectly affected by other construction activities (Appendix E.2). Implementation of Mitigation Measures VEG-MM-3, WILD-MM-1, WILD-MM-2, and WILD-MM-3 for Alternative 3 would reduce potential effects on VELBs to less than significant.

Effect WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat

Alternative 3 would result in permanent and temporary direct and indirect effects on western pond turtles, as described for Alternative 1. Implementation of Mitigation Measures VEG-MM-3 and WILD-MM-4 for Alternative 3 would reduce potential effects on western pond turtles to less than significant.

Effect WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat

Alternative 3 would result in permanent and temporary direct and indirect effects on giant garter snakes similar to those described for Alternative 1. Alternative 3 would result in the permanent loss of approximately 0.0.1 acre of suitable aquatic habitat and 1.8 acres of suitable upland habitat for giant garter snake in the vicinity of Bees Lakes. Alternative 3 would result in no temporary effects on habitat for giant garter snake within the project footprint, including staging areas. Fewer than 143 acres of suitable upland are present in the borrow sites, of which only a portion would be temporarily affected during construction of Alternative 3. Implementation of Mitigation Measures VEG-MM-3, WILD-MM-5, WILD-MM-6, and WILD-MM-7 for Alternative 3 would reduce potential effects on giant garter snakes to less than significant.

Effect WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat

Alternative 3 would result in direct effects on Swainson's hawk foraging habitat similar to those described for Alternative 1. Under Alternative 3, project implementation would result in the permanent loss of 74 acres of suitable Swainson's hawk foraging habitat and temporary loss (restored within 1 year) of 173 acres of suitable foraging habitat from construction and up to 1,635 acres of foraging habitat from borrow sites. In addition to foraging habitat losses, Alternative 3 would result in permanent effects on 51 acres of known and potential Swainson's hawk nesting habitat.

Based on preliminary borrow use data (HDR 2014), borrow excavation would disturb up to 111 acres of potential Swainson's hawk foraging habitat in Year 1 and up to 228 acres of foraging habitat in Year 2. The resulting impact of these borrow activities represents a maximum 7% reduction in available foraging habitat within the project area for Year 1 and a 14% reduction in the available foraging habitat within the project area for Year 2. However, because construction would be performed in segments and borrow would be extracted gradually as needed for construction, it is expected that only a small portion of this estimated area of temporary habitat loss would be affected at any given time during each construction season. Also, disturbance in one area of the parcel used to obtain borrow would not preclude foraging on the remaining habitat. Therefore, it is expected that more than 86% of the existing foraging habitat in the borrow areas would be available for locally nesting Swainson's hawk during construction. Additionally, there is other suitable foraging habitat within the vicinity of the project area, including agricultural lands immediately to the south of the project area. These areas, along with available habitat within the project area, would be sufficient to maintain known Swainson's hawks nests within the project area and within 10 miles of the project area.

The permanent loss of foraging and nesting habitat is considered a direct significant effect because it could result in a substantial decrease in the local population of Swainson's hawks. Implementation of Mitigation Measures VEG-MM-1 and VEG-MM-3 (described in Section 3.8, Vegetation and Wetlands), as well as WILD-MM-8 and WILD-MM-9, would avoid, minimize, and/or compensate for direct effects on Swainson's hawks' foraging and nesting habitat, thereby reducing them to a less-than-significant level.

Effect WILD-5: Disturbance or Loss of Western Burrowing Owls and Their Habitat

Alternative 3 would result in direct effects on burrowing owls, as described for Alternative 1. Conversion of the existing habitat associated with Alternative 3 would result in the permanent loss of 74 acres of potential burrowing owl nesting and foraging habitat. Alternative 3 also would result in temporary effects on 173 acres of potential burrowing owl nesting and foraging habitat from construction and up to 1,635 acres of potential habitat from borrow sites.

Removal of a large amount of potential nesting and foraging habitat could result in a substantial decrease in the available habitat for locally nesting burrowing owls, if present. This direct effect would be significant, but implementation of Mitigation Measures VEG-MM-3, WILD-MM-10, and WILD-MM-11 would avoid, minimize, and/or compensate for direct effects on burrowing owls, thereby reducing them to a less-than-significant level and avoiding violation of the MBTA and CFGC.

Effect WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors

Alternative 3 would result in direct and indirect effects on migratory bird and raptor nesting habitat, as described for Alternative 1. These direct and indirect effects would be significant, but implementation of Mitigation Measures VEG-MM-1, VEG-MM-3, and WILD-MM-8 would avoid and minimize effects on nesting birds and raptors, thereby reducing them to a less-than-significant level and avoiding violation of the MBTA and CFGC.

Effect Wild-7: Loss or Disturbance of Bats and Bat Roosts

Alternative 3 would result in direct effects on roosting bats, as described for Alternative 1. These direct effects would be significant because the subsequent population decline could affect the viability of the local bat populations. Implementation of Mitigation Measures VEG-MM-1, VEG-MM-3, and WILD-MM-12 for Alternative 3 would reduce this direct effect to a less than significant level.

Effect WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats

Alternative 3 would result in direct and indirect effects on common wildlife species' individuals, as described for Alternative 1. No mitigation is required.

Effect WILD-9: Disruption of Wildlife Movement Corridors

Alternative 3 would result in temporary direct and indirect effects on wildlife movements, as described for Alternative 1. Disruption of movement through the project area is a less than significant direct and indirect effect. No mitigation is required.

Effect WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or other Approved Local, Regional or State Habitat Conservation Plan

As described for Alternative 1, there is no adopted HCP/NCCP applicable to the project area. Implementation of Alternative 3 would not conflict with provisions of an adopted HCP/NCCP. There would be no direct or indirect effect.

3.10.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on wildlife resources (Table 3.10-7). The acreage of habitat loss under each alternative is provided in Table 3.10-4.

Table 3.10-7. Wildlife Effects and Mitigation Measures for Alternative 4

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-1: Establish a Minimum 20-Foot-Wide Buffer around the Elderberry Shrub WILD-MM-2: Transplant Elderberry Shrubs That Cannot Be Avoided or Implement Dust Control Measures during Construction WILD-MM-3: Compensate for Removal and Transplantation of VELB Habitat
WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-4: Conduct a Preconstruction Survey for Western Pond Turtle and Exclude Turtles from Work Area
WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-5: Install and Maintain Construction Barrier Fencing around Suitable Giant Garter Snake Habitat WILD-MM-6: Minimize Potential Effects on Giant Garter Snakes during Construction in Suitable Habitat WILD-MM-7: Compensate for Permanent Loss of Giant Garter Snake Habitat
WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys WILD-MM-9: Compensate for Permanent Removal of Swainson's Hawk Foraging Habitat

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
WILD-5: Disturbance or Loss of Western Burrowing Owl and Their Habitat	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-10: Conduct Preconstruction Surveys for Active Burrowing Owl Burrows and Implement the 2012 California Department of Fish and Game Guidelines for Burrowing Owl Mitigation, If Necessary WILD-MM-11: Coordinate with Resource Agencies and Develop an Appropriate Compensation Plan for Burrowing Owl
WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors	Significant	Significant	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys
WILD-7: Loss or Disturbance of Bats and Bat Roosts	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-12: Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measure
WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats	Less than significant	Less than significant	NA	None
WILD-9: Disruption of Wildlife Movement Corridors	Less than significant	Less than significant	NA	None
WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	No effect	No effect	NA	None

Effect WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)

Direct effects on VELBs and their habitat from implementation of Alternative 4 are similar to those described above for Alternative 1. Under Alternative 4, up to 20 elderberry shrubs would be directly affected and up to 26 elderberry shrubs would be indirectly affected (Appendix E.2). Implementation of the Mitigation Measures VEG-MM-3, WILD-MM-1, WILD-MM-2, and WILD-MM-3 for Alternative 4 would reduce potential effects on VELBs to less than significant.

Effect WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat

Alternative 4 would result in permanent and temporary direct and indirect effects on western pond turtles as described for Alternative 1. Implementation of Mitigation Measures VEG-MM-3 and WILD-MM-4 for Alternative 4 would reduce potential effects on western pond turtles to less than significant.

Effect WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat

Alternative 4 would result in permanent and temporary direct and indirect effects on giant garter snakes similar to those described for Alternative 1. Alternative 4 would not result in the permanent loss of suitable aquatic habitat for giant garter snake. A small amount of upland habitat, 0.3 acre, would be permanently removed in the vicinity of Bees Lake. Alternative 4 would result in no temporary effects on habitat for giant garter snake in the construction footprint, including staging areas. Fewer than 143 acres of suitable upland are present in the borrow sites, of which only a fraction would be temporarily affected during construction of Alternative 4.

Implementation of Mitigation Measures VEG-MM-3, WILD-MM-5, WILD-MM-6, and WILD-MM-7 for Alternative 4 would reduce potential effects on giant garter snakes to less than significant.

Effect WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat

Alternative 4 would result in direct effects on Swainson's hawk foraging habitat similar to those described for Alternative 1. Under Alternative 4, project implementation would result in the permanent loss of 114 acres of suitable Swainson's hawk foraging habitat and temporary loss (restored within 1 year) of 193 acres of suitable foraging habitat from construction and up to 1,544 acres of suitable foraging habitat from borrow sites. In addition to foraging habitat losses, Alternative 4 would result in permanent effects on 39 acres of known and potential Swainson's hawk nesting habitat.

Based on preliminary borrow use data (HDR 2014), borrow excavation would disturb up to 209 acres of potential Swainson's hawk foraging habitat in Year 1 and up to 372 acres of foraging habitat in Year 2. The resulting impact of these borrow activities represents a maximum 14% reduction in available foraging habitat within the project area for Year 1 and a 24% reduction in the available foraging habitat within the project area for Year 2. However, because construction would be performed in segments and borrow would be extracted gradually as needed for construction, it is expected that only a small portion of this estimated area of temporary habitat loss would be affected at any given time during each construction season. Also, disturbance in one area of the parcel used to obtain borrow would not preclude foraging on the remaining habitat. Therefore, it is expected that more than 76% of the existing foraging habitat in the borrow areas would be available for locally nesting Swainson's hawk during construction. Additionally, there is other suitable foraging habitat within the vicinity of the project area, including agricultural lands immediately to the south of the project area. These areas, along with available habitat within the project area, would be sufficient to maintain known Swainson's hawks nests within the project area and within 10 miles of the project area.

Under Alternative 4, the offset mitigation and restoration area would provide long-term benefits to Swainson's hawk through the establishment of riparian habitat that could provide suitable nest trees buffered from nearby development.

The permanent loss of foraging and nesting habitat is considered a direct significant effect because it could result in a substantial decrease in the local population of Swainson's hawks. Implementation of Mitigation Measures VEG-MM-1 and VEG-MM-3 (described in Section 3.8, Vegetation and Wetlands), as well as WILD-MM-8 and WILD-MM-9, would avoid, minimize, and/or compensate for direct effects on Swainson's hawks' foraging and nesting habitat, thereby reducing them to a less-than-significant level.

Effect WILD-5: Disturbance or Loss of Western Burrowing Owls and Their Habitat

Alternative 4 would result in direct effects on burrowing owls similar to those described for Alternative 1. Conversion of the existing habitat associated with Alternative 4 would result in the permanent loss of 114 acres of potential burrowing owl nesting and foraging habitat. Alternative 4 also would result in temporary effects on 193 acres of potential burrowing owl nesting and foraging habitat from construction and up to 1,544 acres of potential habitat from borrow sites.

Removal of a large amount of potential nesting and foraging habitat could result in a substantial decrease in the available habitat for locally nesting burrowing owls, if present. This direct effect would be significant, but implementation of Mitigation Measures VEG-MM-3, WILD-MM-10, and WILD-MM-11 would avoid, minimize, and/or compensate for direct effects on burrowing owls, thereby reducing them to a less-than-significant level and avoiding violation of the MBTA and CFGC.

Effect WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors

Alternative 4 would result in direct and indirect effects on migratory bird and raptor nesting habitat, as described for Alternative 1. These direct and indirect effects would be significant, but implementation of Mitigation Measures VEG-MM-1, VEG-MM-3, and WILD-MM-8 would avoid and minimize effects on nesting birds and raptors, thereby reducing them to a less-than-significant level and avoiding violation of the MBTA and CFGC.

Effect Wild-7: Loss or Disturbance of Bats and Bat Roosts

Alternative 4 would result in direct effects on roosting bats, as described for Alternative 1. These direct effects would be significant because the subsequent population decline could affect the viability of the local bat populations. Implementation of Mitigation Measures VEG-MM-1, VEG-MM-3, and WILD-MM-12 for Alternative 4 would reduce potential effects on roosting bats to a less-than-significant level.

Effect WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats

Alternative 4 would result in direct and indirect effects on common wildlife species' individuals, as described for Alternative 1. No mitigation is required.

Effect WILD-9: Disruption of Wildlife Movement Corridors

Alternative 4 would result in temporary direct and indirect effects on wildlife movements similar to those described for Alternative 2. However, under Alternative 4, two breaches in the existing levee would result in the loss of riparian woodland habitat along the existing levee. Although woodland habitat would be lost, restoring the floodplain between the existing levee and the proposed setback levee would create additional wetland and riparian habitat that would continue to provide a wildlife movement corridor along the Sacramento River for a variety of wildlife species. Therefore, disruption of movement through the project area is considered a less than significant direct and indirect effect. No mitigation is required.

Effect WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or other Approved Local, Regional, or State Habitat Conservation Plan

As described for Alternative 1, there is no adopted HCP/NCCP applicable to the project area. Therefore, implementation of Alternative 4 would not conflict with provisions of an adopted HCP/NCCP. There would be no direct or indirect effect.

3.10.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on wildlife resources (Table 3.10-8). The acreage of habitat loss under each alternative is provided in Table 3.10-4.

Table 3.10-8. Wildlife Effects and Mitigation Measures for Alternative 5

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-1: Establish a Minimum 20-Foot-Wide Buffer around the Elderberry Shrub WILD-MM-2: Transplant Elderberry Shrubs That Cannot Be Avoided or Implement Dust Control Measures during Construction WILD-MM-3: Compensate for Removal and Transplantation of VELB Habitat
WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-4: Conduct a Preconstruction Survey for Western Pond Turtle and Exclude Turtles from Work Area
WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat	Significant	Significant	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-5: Install and Maintain Construction Barrier Fencing around Suitable Giant Garter Snake Habitat WILD-MM-6: Minimize Potential Effects on Giant Garter Snakes during Construction in Suitable Habitat WILD-MM-7: Compensate for Permanent Loss of Giant Garter Snake Habitat

Effect	Finding		With	Mitigation Measure
	Direct	Indirect	Mitigation	
WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys WILD-MM-9: Compensate for Permanent Removal of Swainson's Hawk Foraging Habitat
WILD-5: Disturbance or Loss of Western Burrowing Owl and Their Habitat	Significant	No effect	Less than significant	VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-10: Conduct Preconstruction Surveys for Active Burrowing Owl Burrows and Implement the 2012 California Department of Fish and Game Guidelines for Burrowing Owl Mitigation, If Necessary WILD-MM-11: Coordinate with Resource Agencies and Develop an Appropriate Compensation Plan for Burrowing Owl
WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors	Significant	Significant	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-8: Avoid Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors and Conduct Preconstruction Nesting Bird Surveys
WILD-7: Loss or Disturbance of Bats and Bat Roosts	Significant	No effect	Less than significant	VEG-MM-1: Compensate for the Loss of Woody Riparian Habitat VEG-MM-3: Conduct Mandatory Contractor/Worker Awareness Training for Construction Personnel WILD-MM-12: Conduct Preconstruction Surveys for Roosting Bats and Implement Protective Measure
WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats	Less than significant	Less than significant	NA	None
WILD-9: Disruption of Wildlife Movement Corridors	Less than significant	Less than significant	NA	None
WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or Other Approved Local, Regional, or State Habitat Conservation Plan	No effect	No effect	NA	None

Effect WILD-1: Disturbance or Loss of VELBs and Their Habitat (Elderberry Shrub)

Direct effects on VELBs and their habitat from implementation of Alternative 5 are similar to those described above for Alternative 2. Under Alternative 5, up to 19 elderberry shrubs would be removed or transplanted, and up to 26 elderberry shrubs would be affected by other construction activity (Appendix E.2). Implementation of Mitigation Measures VEG-MM-3, WILD-MM-1, WILD-MM-2, and WILD-MM-3 for Alternative 5 would reduce potential effects on VELBs to less than significant.

Effect WILD-2: Disturbance or Loss of Western Pond Turtles and Their Habitat

Alternative 5 would result in temporary and permanent direct and indirect effects on western pond turtles in agricultural ditches, as described for Alternative 1.

Effects on western pond turtles would be significant. Implementation of Mitigation Measures VEG-MM-3 and WILD-MM-4 for Alternative 5 would reduce potential effects on western pond turtles to less than significant.

Effect WILD-3: Disturbance or Loss of Giant Garter Snakes and Their Habitat during Construction

Alternative 5 would result in direct and indirect effects on giant garter snakes in agricultural ditches similar to those described for Alternative 1.

Alternative 5 would not result in the permanent loss of suitable aquatic habitat. Approximately 2.24 acres of suitable upland habitat would be permanently removed around Bees Lake. Alternative 5 would result in no temporary effects on habitat for giant garter snakes in the construction footprint, including staging areas. Fewer than 142 acres of suitable upland are present in the borrow sites, of which only a fraction would be temporarily affected during construction of Alternative 5.

Implementation of Mitigation Measures VEG-MM-3, WILD-MM-5, WILD-MM-6, and WILD-MM-7 for Alternative 5 would reduce potential effects on giant garter snakes to less than significant.

Effect WILD-4: Loss of Swainson's Hawk Foraging and Nesting Habitat

Alternative 5 would result in direct effects on Swainson's hawk foraging habitat similar to those described for Alternative 2. Under Alternative 5, project implementation would result in the permanent loss of 173 acres of suitable Swainson's hawk foraging habitat and temporary loss (restored within 1 year) of 163 acres of suitable foraging habitat. In addition to foraging habitat losses, Alternative 5 would result in permanent effects on 38 acres of known and potential Swainson's hawk nesting habitat.

Based on preliminary borrow use data (HDR 2014), borrow excavation would disturb up to 233 acres of potential Swainson's hawk foraging habitat in Year 1 and up to 399 acres of foraging habitat in Year 2. The resulting impact of these borrow activities represents a maximum 15% reduction in available foraging habitat within the project area for Year 1 and a 25% reduction in the available foraging habitat within the project area for Year 2. However, because construction would be performed in segments and borrow would be extracted gradually as needed for construction, it is expected that only a small portion of this estimated area of temporary habitat loss would be affected at any given time during each construction season. Also, disturbance in one area of the parcel used to obtain borrow would not preclude foraging on the remaining habitat. Therefore, it is expected that more than 75% of the existing foraging habitat in the borrow areas would be available for locally nesting Swainson's hawk during construction. Additionally, there is other suitable foraging habitat within the vicinity of the project area, including agricultural lands immediately to the south of the project area. These areas, along with available habitat within the project area, would be sufficient to maintain known Swainson's hawks nests within the project area and within 10 miles of the project area.

Under Alternative 5, the offset mitigation and restoration area would provide long-term benefits to Swainson's hawk through the establishment of riparian habitat that could provide suitable nest trees buffered from nearby development.

The permanent loss of foraging and nesting habitat is considered a direct significant effect because it could result in a substantial decrease in the local population of Swainson's hawks. Implementation of Mitigation Measures VEG-MM-1 and VEG-MM-3 (described in Section 3.8, Vegetation and Wetlands), as well as WILD-MM-8 and WILD-MM-9, would avoid, minimize, and/or compensate for direct effects on Swainson's hawks' foraging and nesting habitat, thereby reducing them to a less-than-significant level.

Effect WILD-5: Disturbance or Loss of Western Burrowing Owls and Their Habitat

Alternative 5 would result in direct effects on burrowing owls similar to those described for Alternative 2. Conversion of the existing habitat associated with Alternative 5 would result in the permanent loss of 173 acres of potential burrowing owl nesting and foraging habitat. Alternative 5 also would result in temporary effects on 163 acres of potential burrowing owl nesting and foraging habitat from construction and up to 603 acres of potential habitat from borrow sites.

Removal of a large amount of potential nesting and foraging habitat could result in a substantial decrease in the available habitat for locally nesting burrowing owls, if present. This direct effect would be significant, but implementation of Mitigation Measures VEG-MM-3, WILD-MM-10, and WILD-MM-11 would avoid and minimize direct effects on burrowing owls, thereby reducing them to a less-than-significant level and avoiding violation of the MBTA and CFGC.

Effect WILD-6: Loss or Disturbance of Tree-, Shrub-, and Ground-Nesting Special-Status and Non-Special-Status Migratory Birds and Raptors

Alternative 5 would result in direct and indirect effects on migratory bird and raptor nesting habitat as described for Alternative 1. These direct and indirect effects would be significant, but implementation of Mitigation Measures VEG-MM-1, VEG-MM-3, and WILD-MM-8 would avoid and minimize effects on nesting birds and raptors, thereby reducing them to a less-than-significant level and avoiding violation of the MBTA and CFGC.

Effect Wild-7: Loss or Disturbance of Bats and Bat Roosts

Alternative 5 would result in direct effects on roosting bats similar to those described for Alternative 2. These direct effects would be significant because the subsequent population decline could affect the viability of the local bat populations. Implementation of Mitigation Measures VEG-MM-1, VEG-MM-3, and WILD-MM-12 for Alternative 5 would reduce this direct effect to a less than significant level.

Effect WILD-8: Disturbance to or Loss of Common Wildlife Species' Individuals and Their Habitats

Alternative 5 would result in direct and indirect effects on common wildlife species' individuals, as described for Alternative 1. No mitigation is required.

Effect WILD-9: Disruption of Wildlife Movement Corridors

Alternative 5 would result in temporary direct and indirect effects on wildlife movements similar to those described for Alternative 2. Disruption of movement through the project area is considered a less than significant direct and indirect effect. No mitigation is required.

Effect WILD-10: Conflict with Provisions of an Adopted HCP/NCCP or other Approved Local, Regional or State Habitat Conservation Plan

As described for Alternative 1, there is no adopted HCP/NCCP applicable to the project area. Therefore, implementation of Alternative 5 would not conflict with provisions of an adopted HCP/NCCP. There would be no direct or indirect effect.

3.11 Land Use and Agriculture

3.11.1 Affected Environment

This section describes the affected environment for land use and agriculture in the Southport project area.

3.11.1.1 Regulatory Framework

Federal

The following Federal regulations related to land use and agriculture may apply to implementation of the Southport project.

Farmland Protection Policy Act

The purpose of the Farmland Protection Policy Act (FPPA) is to minimize the extent to which Federal projects and programs contribute to the irreversible conversion of farmland to non-agricultural uses, and to ensure that Federal programs are administered in a manner that will be compatible with state, local, Federal, and private programs and policies to protect farmland. For the purpose of the FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. The FPPA requires Federal agencies to identify the amount of farmland converted by Federal programs to nonagricultural use, assess the potential effects of a proposed project on prime and unique farmland, and consider alternative actions that would lessen such effects.

State

The following state regulations related to land use and agriculture may apply to implementation of the Southport project.

Farmland Mapping and Monitoring Program

The Farmland Mapping and Monitoring Program (FMMP) rates agricultural land according to soil quality and irrigation status and updates maps every 2 years. Farmland designations include prime farmland, unique farmland, and farmland of statewide importance.

Williamson Act

The Williamson Act enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agriculture or related open space use. The legislation prohibits the annexation of land enrolled in a 10- to 20-year contract to a city, or a special district that provides non-agricultural services, or for use as a public school site.

Local

The following local policies related to land use and agriculture may apply to implementation of the Southport project.

Yolo County General Plan

The Yolo County General Plan Land Use Element contains goals and policies that are designed to preserve farmland and ensure a strong local agricultural economy while preventing encroachment of urban uses (Yolo County 2009). General Plan goals are also meant to manage growth and to preserve and enhance Yolo County's agriculture and rural setting. The Agriculture and Economic Development Element also contains goals and policies that are meant to preserve agriculture as fundamental to the identity of Yolo County, as well as protect the natural resources needed to ensure agriculture remains an essential part of the County's future. The general plan also contains the land use map for unincorporated portions of the county.

City of West Sacramento General Plan

Land use and development in the project area are guided primarily by the Southport Framework Plan (discussed below), which is a component of the City of West Sacramento General Plan (City of West Sacramento 2004). The general plan defines land use and zoning categories for the incorporated areas and provides an inventory of existing land uses in the city. Policies and goals in the general plan include providing for well-planned growth, as well as promoting the economic viability of agriculture while discouraging premature development of agricultural land with non-agricultural uses. The Southport Framework Plan establishes more specific land use and conservation policies for the area south of the Ship Channel.

Southport Framework Plan

The Southport Framework Plan is the long-range plan for the urbanization of the Southport area. It divides Southport into four villages (i.e., Northwest, Northeast, Southeast, and Southwest), each with its own neighborhood center and parks. The project would directly affect lands within the Northeast, Southeast, and Southwest Villages. The land use designations for the project site include community park, neighborhood park, open space, rural residential, low density residential, medium density residential, high density residential, mixed use, neighborhood commercial, water-related commercial, and agriculture-cluster. The project is located solely on lands designated agriculture-cluster within the Southeast Village. The EIR (Willdan Associates 1994) prepared for the Southwest Framework Plan acknowledged that urban development in the Southport area would eventually result in the conversion of prime farmland to non-agricultural uses, and that the City's General Plan states that the loss of agricultural lands would be a significant adverse effect. The City adopted a statement of overriding considerations, which stated that urban development was of greater benefit to the City than the preservation of agricultural land within those portions of Southport designated for non-agricultural use. Conversion of prime farmland is discussed below for each alternative under Effect LU-3, Loss of Important Farmland and Agricultural Production Value, in Section 3.11.3, Effects and Mitigation Measures, as well as a cumulative effect in Chapter 4, Section 4.2.4.10, Land Use and Agriculture.

Delta Protection Commission

The Commission's goal is to guide orderly, balanced conservation and development of land resources in the Delta, and to reduce flood risk. The Commission divided the Delta area into a primary zone and a secondary zone. The city of West Sacramento is within the secondary zone. While no standards affect the secondary zone, development in these areas is coordinated with and monitored by the Delta Protection Commission.

3.11.1.2 Environmental Setting

The following considerations are relevant to land use and agriculture conditions in the Southport project area.

West Sacramento lies in eastern Yolo County between the Sacramento River on the east and the east levee of the Yolo Bypass on the west. It lies directly across the Sacramento River from downtown Sacramento and is approximately 85 miles east of San Francisco. The city of West Sacramento comprises approximately 14,912 acres (23.3 square miles) and is a mix of residential, agricultural, industrial, open space, and commercial lands.

The project site is largely undeveloped, but adjoins residential uses at its northern end. Although much of the land is vacant, the Southport Framework Plan has designated the lands within the project site as open space, various densities of residential, mixed use, commercial, community and neighborhood parks, and agriculture-cluster (Plate 3.11-1) (City of West Sacramento 2010, Yolo County 2009). Lands designated for agriculture are located near the southern portion of the project area along the Sacramento River south of where Gregory Road meets South River Road. Two small sections of the project area are classified as water related commercial (Sherwood Harbor Marina and the Sacramento Yacht Club), and two other small sections of land are designated as neighborhood commercial and rural estates. A breakdown of land use designation acreages in the project area is provided in Table 3.11-1, below.

Table 3.11-1. Project Area Land Use Acreages

Land Use Designation	Acreage
Low Density Residential	516
Agriculture	352
Recreation and Parks	280
Medium Density Residential	361
Open Space	230
Rural Residential	157
High Density Residential	117
River Mixed Used	72
Public/Quasi Public	45
Neighborhood Commercial	14
Water Related Commercial	5
Rural Estates	5

Sources: City of West Sacramento 2010, Yolo County 2009.

Yolo County has a long history of agricultural production, and the California Department of Conservation (CDOC) inventoried 390,250 acres of designated important farmland in the county in 2006, out of a total county area of 653,451 acres. Of these, 257,893 acres were designated as prime farmland, 16,989 acres as farmland of statewide importance, 50,197 acres as unique farmland, and 43,213 acres as farmland of local importance (California Department of Conservation 2011).

The city has several areas designated as important farmland, all located in the Southport area of the city. The potential borrow area at the southern end of the project area is in unincorporated Yolo County and is almost entirely comprised of important farmland. The project area contains approximately 500 acres of prime farmland, which are located west of Bees Lakes along the Sacramento River in the southern portion of the project area, near Jefferson Boulevard north of the South Cross Levee, and in the unincorporated area at the southern end of the project (Plate 3.11-2) (California Department of Conservation 2011). There is less than 1 acre of unique farmland in the project area, located along the southern border of the project area near the South Cross Levee. There is approximately 12 acres of farmland of statewide importance located in the unincorporated area at the southern end of the project. The project area also contains 611 acres of farmland of local importance and 848 acres of farmland of local potential. There are no Williamson Act lands in the project area (California Department of Conservation 2008).

Principal crops produced in the city are dryland grains, hay, alfalfa, safflower, and walnuts (City of West Sacramento 2000). The crop acreages and approximate values for agricultural lands in the project area are shown in Table 3.11-2, below. These numbers are an approximation based on crop values from Yolo County's 2011crop report, as well as crop types surveyed by the DWR in 2008. Value per acre for melons, squash, and cucumbers was determined by using the values for miscellaneous vegetable crops as melons, squash, and cucumbers are grouped into that category. Based on the data in the table below, total crop production value in the project area for 2008 was $446,918. However, these values fluctuate from year to year, and crop types grown on agricultural land can vary greatly from year to year.

Table 3.11-2. Project Area Crop Acreages and Values

Crop	Crop Acreage	Value per Acre[1]	Total Crop Value
Walnuts	12.16	$2,878.67	$35,005
Safflower	56.12	$505.09	$28,346
Grain and Hay	870.71	$350.75	$305,402
Alfalfa	61.65	$1,119.75	$69,033
Melons, squash, cucumbers	2.3	$3,970.48	$9,132
Idle[2]	762.36	NA	None

Sources: California Department of Water Resources 2008; Yolo County Department of Agriculture 2011.

[1] Value per acre calculated using tonnage per acre and value per ton.

[2] Land not cropped the current or previous crop season, but cropped within the past 3 years.

3.11.2 Environmental Consequences

This section describes the environmental consequences relating to land use and agriculture for the proposed Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.11.2.1 Assessment Methods

This evaluation of land use and agriculture is based on professional standards and information cited throughout the section.

The key effects were identified and evaluated based on the environmental characteristics of the Southport project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project.

3.11.2.2 Determination of Effects

For this analysis, an environmental effect was considered significant related to land use and agriculture if it would result in any of the effects listed below. These effects are based on NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

Land Use

For the purposes of this analysis, effects on land use are considered significant if implementation of the project would:

- Physically divide an established community.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect.
- Conflict with any applicable HCP or NCCP.

Agriculture

For the purposes of this analysis, effects on agriculture are considered significant if implementation of the project would:

- Convert prime farmland, unique farmland, or farmland of statewide importance.
- Conflict with existing zoning for agricultural use, or a Williamson Act contract.
- Involve other changes in the existing environment that, because of their location or nature, could result in conversion of farmland to nonagricultural use.

The project would be considered to have a significant effect on important farmland (i.e., prime farmland, unique farmland, farmland of statewide importance) if it would result in an irretrievable conversion of such land. An irretrievable conversion is one that involves the conversion of land to uses that would cause serious degradation of the quality of soils and/or result in expenditures of substantial development costs that likely would preclude the practicality of future conversion back to agriculture. Important farmland conversions were quantified by comparing the existing important farmland in the project area to the individual alternative construction footprints (Plates 2-2a through 2-6b [2-3a, 2-3b, 2-5a, 2-5b, 2-6a. 2-6b are revised]).

None of the project alternatives would physically divide an established community, and there would be no conflict with any applicable HCP or NCCP, as none covers areas in the project area. Additionally, there would be no conflict with a Williamson Act contract because no Williamson Act lands are located in the project area. Therefore, the first, third, and fifth criteria do not apply to the project and are not considered further. Effects related to recreational land uses are discussed in Section 3.14, Recreation.

3.11.3 Effects and Mitigation Measures

3.11.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be implemented, so no construction-related effects relating to land use and agriculture such as agricultural land conversion would occur. Therefore, there would be no effect on land use and agriculture attributable to the implementation of the No Action Alternative. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

Specific to vegetation, as presented in Chapter 2, "Alternatives," the No Action Alternative is characterized by three possible future scenarios.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

Agricultural lands in the project area do not have crops within 15 feet of the levee toe, and therefore there would be no effect on agricultural resources by implementation of the No Action Alternative and any of its three vegetation management scenarios.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.11.3.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on land use and agriculture (Table 3.11-3). No indirect effects on land use and agriculture would result from implementation of the Southport project alternatives.

Table 3.11-3. Land Use and Agriculture Effects and Mitigation Measures for Alternative 1

	Finding		With	
Effect	**Direct**	**Indirect**	**Mitigation**	**Mitigation Measure**
LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials	Less than significant	No effect	NA	None
LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction	Significant	No effect	Significant and unavoidable	None feasible
LU-3: Loss of Important Farmland and Agricultural Production Value	Significant	No effect	Significant and unavoidable	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan LU-MM-1: Provide Compensatory Agricultural Land Protection LU-MM-2: Avoid Important Farmland in Borrow Areas

Effect LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials

During levee construction, three staging areas to house offices, stockpiling areas to store soils, and staging areas to park equipment such as bulldozers, compactors, drill rigs, and excavators would be necessary. These staging areas are located on the landside of the levee at Segments B, C, and F and would occupy approximately 3.4, 61.7, and 17.5 acres, respectively (Plate 2-2a). Temporary construction roads and ramps also could be built on site. Lands used for construction staging and stockpiling would be agricultural, vacant, or undeveloped, and these lands would be returned to their original use following the completion of construction. Any agricultural lands required for long-term temporary staging and construction activities would resume agricultural production following the completion of construction activities. Thus, this direct effect is less than significant. No mitigation is required.

Effect LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction

Implementation of Alternative 1 may require WSAFCA to acquire a permanent right-of-way in areas adjacent to the levee through fee title or easement interest within the footprint of the flood risk–reduction measures to prevent residential or utility encroachments into the flood management system, as well as to accommodate the expanded levee footprint. The expansion of the levee footprint, including the setback levee at Bees Lakes, and the permanent right-of-way acquisition would conflict with existing park, residential, and mixed use land use designations under the

Southport Framework Plan. The existing levee is designated as open space on the Plan, so the expanded levee is assumed to be consistent with that designation. The agriculture-cluster designation allows public and quasi-public uses, so the project would also be consistent with that land use designation. The new levee and associated lands would likely be designated as either open space or public/quasi-public should the City amend the Southport Framework Plan to reflect project implementation. The project would reduce the capacity of the Northeast and Southeast Villages to accommodate future development in the city. Therefore, this direct effect is considered significant.

There is a finite amount of land available within the boundaries of the Southport Framework Plan. Occupying a portion of the land identified for park, residential, and mixed use with the project would eliminate the potential for this land to be put to its planned uses. The alternative has been designed to provide the requisite flood risk–reduction measures and its footprint cannot be reduced. As a result of these factors, there is no feasible mitigation. This effect is, therefore, significant and unavoidable.

Effect LU-3: Loss of Important Farmland and Agricultural Production Value

It is anticipated that several staging areas and temporary-access haul roads would be developed on agricultural lands in the project area during program construction. Land at construction staging areas and haul roads classified as important farmland could be temporarily taken out of production for the duration of the construction period to accommodate preconstruction and construction activities. These areas would be returned to preproject conditions, and agricultural uses could resume once construction is completed. Therefore, there would be no direct conversion of important farmland to nonagricultural uses in construction staging areas.

Construction of Alternative 1 flood risk–reduction measures would result in a permanent loss of approximately 24 acres of prime farmland within the construction footprint (Plate 3.11-3). Conversion of land used for agricultural purposes under Alternative 1 would also result in a loss of agricultural production in the city of West Sacramento and Yolo County, which based on the 2008 DWR crop data and the Yolo County 2011 Crop Report would be approximately $56,000. However, crops and their values can vary greatly, and therefore the monetary value of lost agricultural production would depend on market conditions at the time of project implementation.

Up to 476 acres of prime farmland and up to 12 acres of farmland of statewide importance in potential borrow areas could be converted due to the extraction of borrow material. However, the top 12 inches of topsoil would be carefully set aside and replaced once extraction is complete. Borrow pits would be graded to a depth of no greater than 3 feet and returned to preproject drainage and irrigation conditions. The implementation of these measures would ensure that the important farmland used for borrow material would only be temporarily affected, provided the measures are implemented within 3 years of the initial excavation at each borrow parcel (Meraz pers. comm. 2012; Penberth pers. comm. 2012). Borrow parcel lands that are not graded to a minimum depth of 3 feet within 3 years would be considered permanently affected, in addition to the permanent loss resulting from Alternative 1 construction.

Although conversion of a portion of the site has been previously planned for by the City in the Southport Framework Plan, the project would substantially increase the amount of prime farmland in the construction area that would be converted to non-agricultural uses and no longer available for agricultural production. Prime farmland is recognized as a finite resource, and it is found throughout the Southport area, such that the City has little choice but to convert 24 acres of prime farmland in order to implement the proposed project. As such, this direct effect is significant and unavoidable.

Implementation of Mitigation Measures GEO-MM-1, discussed in Section 3.3, Geology, Seismicity, Soils, and Mineral Resources, LU-MM-1, and LU-MM-2 would help to offset and avoid the conversion of agricultural lands in the county but would not reduce the project's effects to a less-than-significant level.

Mitigation Measure LU-MM-1: Provide Compensatory Agricultural Land Protection

In order to minimize the loss of 24 acres of prime farmland shown in Plate 3.11-3, the City will provide a minimum 1:1 conservation of prime farmland of similar production value in the West Sacramento area of Yolo County. *Conservation* will consist of the purchase of development rights and establishment of a conservation easement pursuant to Civil Code Section 815 et seq. for one or more parcels of land. The amount of conservation necessary will be determined by the assessment of the change in soil characteristics described in Mitigation Measure GEO-MM-1. The land may consist of one parcel or contiguous parcels, or parcels that are contiguous to existing conservation easements. The easement will be dedicated to the Yolo Land Trust, or a similar entity that meets the requirements of Civil Code Section 815.3.

If feasible and agreeable to CDFW, this may be coupled with lands conserved for Swainson's hawk mitigation.

Mitigation Measure LU-MM-2: Avoid Important Farmland in Borrow Areas

The use of important farmland for borrow material may permanently alter the quality and character of the remaining soil to the point where it would be considered a permanent loss of important farmland. During construction, potential areas of borrow that are classified as important farmland will be avoided to the extent feasible to minimize the conversion and loss of important farmland.

3.11.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on land use and agriculture (Table 3.11-4).

Table 3.11-4. Land Use and Agriculture Effects and Mitigation Measures for Alternative 2

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials	Less than significant	No effect	NA	None
LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction	Significant	No effect	Significant and unavoidable	None feasible
LU-3: Loss of Important Farmland and Agricultural Production Value	Significant	No effect	Significant and unavoidable	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan LU-MM-1: Provide Compensatory Agricultural Land Protection LU-MM-2: Avoid Important Farmland in Borrow Areas

Effect LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials

This direct effect would be the same as described above under Alternative 1, except the staging areas would occupy 3.2, 11.0, and 13.1 acres, respectively (Plate 2-3a [revised]). This effect is considered less than significant. No mitigation is required.

Effect LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction

Alternative 2 would occupy a more extensive area on the dry side of the existing levee than Alternative 1. This area would include a substantial portion of a site designated as a future community park in the Southport Framework Plan. Therefore, its direct effect would be more extensive than described under Alternative 1. This effect is considered significant and unavoidable. As discussed under Alternative 1, no mitigation is feasible.

Effect LU-3: Loss of Important Farmland and Agricultural Production Value

This direct effect would be the same in type as described above under Alternative 1. However, implementation of Alternative 2 would result in the permanent loss of approximately 35 acres of prime farmland in the construction area (Plate 3.11-4 [revised[), and up to 474 acres of prime farmland and 12 acres of farmland of statewide importance in potential borrow areas could be temporarily affected. In addition, construction of Alternative 2 would result in a loss of approximately $63,000 in agricultural production value as a result of permanent conversion of agricultural lands in the construction area, which includes the area between the proposed setback levee and the Sacramento River. This effect is significant and unavoidable because of the irretrievable conversion of 35 acres of prime farmland. Implementation of Mitigation Measures GEO-MM-1, discussed in Section 3.3, Geology, Seismicity, Soils, and Mineral Resources, LU-MM-1, and LU-MM-2 would help to offset and avoid the conversion of prime farmland in the county but would not reduce the project's effects to a less-than-significant level.

3.11.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on land use and agriculture (Table 3.11-5).

Table 3.11-5. Land Use and Agriculture Effects and Mitigation Measures for Alternative 3

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials	Less than significant	No effect	NA	None
LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction	Significant	No effect	Significant and unavoidable	None feasible
LU-3: Loss of Important Farmland and Agricultural Production Value	Significant	No effect	Significant and unavoidable	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan LU-MM-1: Provide Compensatory Agricultural Land Protection LU-MM-2: Avoid Important Farmland in Borrow Areas

Effect LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials

This direct effect would be the same as described above under Alternative 1, except the staging areas would occupy 3.3, 62.6, and 23.4 acres, respectively (Plate 2-4a). This effect is considered less than significant. No mitigation is required.

Effect LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction

Alternative 3 would permanently affect a somewhat smaller area than Alternative 1. Therefore, this direct effect would be less extensive than the effect described under Alternative 1. However, this effect is considered significant and unavoidable. As discussed under Alternative 1, no mitigation is feasible.

Effect LU-3: Loss of Important Farmland and Agricultural Production Value

This direct effect would be the same in type as described above under Alternative 1. However, implementation of Alternative 3 would result in the permanent loss of approximately 21 acres of prime farmland in the construction area, and up to 479 acres of prime farmland and 12 acres of farmland of statewide importance in potential borrow areas could be temporarily affected. In addition, construction of Alternative 3 would result in a loss of approximately $54,000 in agricultural production value as a result of permanent conversion of agricultural lands in the construction area. This effect is significant and unavoidable because of the irretrievable conversion of 21 acres of prime farmland. Implementation of Mitigation Measures GEO-MM-1, discussed in Section 3.3, LU-MM-1, and LU-MM-2 would help to offset and avoid the conversion of prime farmland in the county but would not reduce the project's effects to a less-than-significant level.

3.11.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on land use and agriculture (Table 3.11-6).

Table 3.11-6. Land Use and Agriculture Effects and Mitigation Measures for Alternative 4

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials	Less than significant	No effect	NA	None
LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction	Significant	No effect	Significant and unavoidable	None feasible
LU-3: Loss of Important Farmland and Agricultural Production Value	Significant	No effect	Significant and unavoidable	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan LU-MM-1: Provide Compensatory Agricultural Land Protection LU-MM-2: Avoid Important Farmland in Borrow Areas

Effect LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials

This direct effect would be the same as described above under Alternative 1, except the staging areas would occupy 3.2, 11.0, and 11.7 acres, respectively (Plate 2-5a [revised]). This effect is considered less than significant. No mitigation is required.

Effect LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction

Alternative 4 would occupy a more extensive area on the dry side of the existing levee than Alternative 1. This would include a substantial portion of a site designated as a future community park in the Southport Framework Plan. Therefore, its direct effect would be more extensive than described above under Alternative 1. This effect is considered significant. As discussed under Alternative 1, no mitigation is feasible.

Effect LU-3: Loss of Important Farmland and Agricultural Production Value

This direct effect would be the same in type as described above under Alternative 1. However, implementation of Alternative 4 would result in the permanent loss of approximately 34 acres of prime farmland in the construction area (Plate 3.11-6 [revised]), and up to 476 acres of prime farmland and 12 acres of farmland of statewide importance in potential borrow areas could be temporarily affected. In addition, construction of Alternative 4 would result in a loss of approximately $59,000 in agricultural production value as a result of permanent conversion of agricultural lands in the construction area, which includes the area between the proposed setback levee and the Sacramento River. This effect is significant and unavoidable because of the irretrievable conversion of 34 acres of prime farmland. Implementation of Mitigation Measures GEO-MM-1, discussed in Section 3.3, LU-MM-1, and LU-MM-2 would help to offset and avoid the conversion of prime farmland in the county but would not reduce the project's effects to a less-than-significant level.

3.11.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on land use and agriculture (Table 3.11-7).

Table 3.11-7. Land Use and Agriculture Effects and Mitigation Measures for Alternative 5

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials	Less than significant	No effect	NA	None
LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction	Significant	No effect	Significant and unavoidable	None feasible
LU-3: Loss of Important Farmland and Agricultural Production Value	Significant	No effect	Significant and unavoidable	GEO-MM-1: Implement the Reclamation Actions of a Project-Specific Reclamation Plan LU-MM-1: Provide Compensatory Agricultural Land Protection LU-MM-2: Avoid Important Farmland in Borrow Areas

Effect LU-1: Temporary Changes in Land Uses to Accommodate Staging, Haul Routes, and Stockpiling of Soil Materials

This direct effect would be the same as described above under Alternative 1, except the staging areas would occupy 3.2, 11.0, and 13.1 acres, respectively (Plate 2-6a [revised]). This effect is considered less than significant. No mitigation is required.

Effect LU-2: Change in Land Use Designations or Potential to Conflict with Local Land Use Designations as a Result of Construction

Alternative 5 would occupy a more extensive area on the dry side of the existing levee than Alternative 1. This area would include a substantial portion of a site designated as a future community park in the Southport Framework Plan. Therefore, its direct effect would be more extensive than described above under Alternative 1. This effect is considered significant. As discussed under Alternative 1, no mitigation is feasible.

Effect LU-3: Loss of Important Farmland and Agricultural Production Value

This direct effect would be the same in type as described above under Alternative 1. However, implementation of Alternative 5 would result in the permanent loss of approximately 34 acres of prime farmland in the construction area (Plate 3.11-7 [revised]), and up to 476 acres of prime farmland and 12 acres of farmland of statewide importance in potential borrow areas could be temporarily affected. In addition, construction of Alternative 5 would result in a loss of approximately $63,000 in agricultural production value as a result of permanent conversion of agricultural lands in the construction area, which includes the area between the proposed setback levee and the Sacramento River. This effect is significant and unavoidable because of the irretrievable conversion of 34 acres of prime farmland. Implementation of Mitigation Measures GEO-MM-1, discussed in Section 3.3, LU-MM-1, and LU-MM-2 would help to offset and avoid the conversion of prime farmland in the county but would not reduce the project's effects to a less-than-significant level.

3.12 Environmental Justice, Socioeconomic, and Community Effects

3.12.1 Affected Environment

This section describes the affected environment for environmental justice, socioeconomic, and community effects in the Southport project area.

3.12.1.1 Regulatory Framework

The assessment of socioeconomic resources is guided primarily by Federal laws and policies, while state and local plans and policies, including local general plan housing elements, typically promote economic development and diversity, public health and safety, housing, and other concerns of the communities and residents within their jurisdictions. Environmental justice issues are mandated and regulated primarily at the Federal level. The major regulations concerning socioeconomic resources and environmental justice that are relevant to the proposed action are described below.

Federal

The following Federal regulations related to environmental justice, socioeconomic, and community effects may apply to implementation of the Southport project.

Executive Order 12898: Environmental Justice

Federal Executive Order 12898, Environmental Justice, requires that, to the greatest extent practical and permitted by law,

> each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

Executive Order 12898 charges each cabinet department to "make achieving environmental justice part of its mission," with the EPA responsible for implementation of Executive Order 12898. The CEQ has oversight of the Federal government's compliance with Executive Order 12898 and NEPA.

State

The following state regulations related to environmental justice, socioeconomic, and community may apply to implementation of the Southport project.

General Plans

State law requires each city and county to adopt a general plan for its future growth. This plan must include a housing element that identifies housing needs for all economic segments and provides opportunities for housing development to meet those needs. At the state level, the Housing and Community Development Department estimates the relative share of California's projected population growth that will occur in each county presented by the California Department of Finance's demographic research unit.

Each city and county must update its general plan housing element on a regular basis (usually every 5 years). Among other things, the housing element must incorporate policies and identify potential sites that would accommodate the city's and county's share of the regional housing need. Prior to adopting a general plan update for housing, the city or county must submit the draft to the Housing and Community Development Department for its review. The Housing and Community Development Department will take action to advise the local jurisdiction whether its housing element complies with provisions of California Housing Element Law. Yolo County's Housing Element was adopted in 2003. The City's current housing element—*2013 Housing Element Update* (City of West Sacramento 2008), was adopted by the City Council in October 2008.

Environmental Justice

Following the lead of Executive Order 12898, the State of California passed a series of environmental justice regulations in 2001. These laws define environmental justice as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies."

Local

The following local policies related to environmental justice, socioeconomic, and community effects may apply to implementation of the Southport project.

Yolo Countywide General Plan

The Housing Element was added to the Yolo County General Plan in 2003. This element of the Yolo County General Plan identifies housing needs and inventories resources and constraints that are relevant to meeting these needs. Those needs that were analyzed were the community profile, housing profile, affordable housing needs, governmental and non-governmental constraints, identification of assisted units "at risk" of conversion, and a residential land resources inventory. The housing element also identifies the community's goals and policies relative to the maintenance, improvement, and development of housing. (Yolo County 2009.)

City of West Sacramento General Plan

The City of West Sacramento General Plan was adopted by the City in 1990 and amended in 2004 (City of West Sacramento 2004). The City's general plan is in the process of being updated. This update will create a blueprint for city growth and development through the year 2030 and beyond. As previously described, the Housing Element was updated in 2008 and contains the City's goals, policies, and implementation programs for housing and supportive services. Issues covered under these goals, policies, and programs include adequate land for a balanced range of housing; maintenance, improvement, and rehabilitation of housing; energy efficiency; balance of employment and housing; adequate services for residential development; and equal housing opportunity. These goals, policies, and programs contained in the Housing Element have been designed for consistency with the City's Affordable Housing Strategy.

3.12.1.2 Environmental Setting

The following considerations are relevant to environmental justice, socioeconomic, and community effects conditions in the Southport project area.

The project area is in the city of West Sacramento, in Yolo County, and falls within the boundaries of Census Tracts 103.02 and 104.02. In the following sections, for comparison, the same demographic and income information presented for Census Tract 103.02 and 104.02 is also presented for West Sacramento, Yolo County, and the State of California (Plate 3.12-1).

Census Tracts 103.02 and 104.02

Demographics

The Federal government considers race and Hispanic origin to be two separate and distinct concepts. The Federal Office of Management and Budget's (OMB) standards for data on race generally reflect social definition recognized in this country, and do not conform to any biological, anthropological, or genetic criteria. According to the revised OMB standards, race is considered a separate concept from Hispanic origin (ethnicity). For Census 2010, the questions on race and Hispanic origin were asked of every individual living in the United States. People who identify their origin as Spanish, Hispanic, or Latino may be of any race.

In 2010, Whites and Asians made up the two largest populations in Census Tracts 103.02 and 104.02, similar to West Sacramento, Yolo County, and the state. People of Hispanic origin made up 19.9% of the study area's population in 2010 (U.S. Census Bureau 2012a), which was 11.5% and 10.4% less than the Hispanic populations in West Sacramento and Yolo County, respectively (Table 3.12-1).

Income and Poverty

Based on 2010 Census data, the median household income for Census Tracts 103.02 and 104.02 was $87,413, and the median income for nonfamily households in the same area was $65,969 (U.S. Census Bureau 2012b)

As of the 2010 Census, the percentage of individuals and families below the poverty level in Census Tracts 103.02 and 104.02, 9.2% and 7.7%, respectively, was significantly lower than the city of West Sacramento, Yolo County, and the state values (U.S. Census Bureau 2012b) (Table 3.12-2).

Table 3.12-1. Race/Origin Characteristics by Census Tract /City/County/State, 2010

	2010			
Race/Origin	**Census Tracts 103.02 and 104.02 (%)**	**West Sacramento (%)**	**Yolo County (%)**	**California (%)**
Race				
White	58.4	60.6	63.2	57.6
Black or African American	6.3	4.8	2.6	6.2
American Indian and Alaska Native	0.8	1.6	1.1	1.0
Asian	18.5	10.5	13.0	13.0
Native Hawaiian, other Pacific Islander	1.8	1.1	0.5	0.4
Some Other Race	6.0	13.8	13.9	17.0
Two or more races	8.2	7.7	5.8	4.9
Origin				
Hispanic	19.9	31.4	30.3	37.6

Source: U.S. Census Bureau 2012a, 2012b, 2012c, 2012d.

Table 3.12-2. Poverty Status by Census Tract/City/County/State, 2010 (%)

Poverty Status	Census Tract 103.00	West Sacramento	Yolo County	California
Individuals below poverty level	9.2	16.6	17.1	13.7
Families below poverty level	7.7	12.3	9.0	10.2

Source: U.S. Census Bureau 2012a, 2012b, 2012c, 2012d, 2012f.

Yolo County

Demographics

In 2010, Whites and Asians made up the largest two race populations in Yolo County, accounting for 63.2 % and 13%, respectively, while 13.9% of respondents claimed “other race.” People of Hispanic origin made up 30.3% of Yolo County in 2010 (U.S. Census Bureau 2012d) (Table 3.12-1).

Employment, Income and Poverty

With its supply of affordable housing and developable land and its easy access to highway, rail, water, and air transportation, Yolo County has an attractive business climate. The primary business sectors are government; professional and business services; transportation, warehousing, and utilities; and agriculture (LSA Associates 2009). The five largest employers in the county are the University of California, Davis; Cache Creek Casino Resort; the State of California; the U.S. Postal Service; and Yolo County (City of West Sacramento 2008). Total retail taxable sales in the county in 2008 were $3,347,287,000 (California Employment Development Department 2011a).

Yolo County has an estimated population of 201,759 (California Department of Finance 2011a). As of May 2011, the labor force is 95,500, with 84,200 people employed and 11,300 unemployed; the county has an unemployment rate of 11.8%, compared to a rate of 11.1% for the state (California

Employment Development Department 2011a). Based on 2009 data, the median household income was approximately $56,120 and the per capita income was $26,761—up from $51,623 and $19,365, respectively, in 1999 (U.S. Census Bureau 2012c, 2012d). As of the 2010 Census, 17.1% and 9.0% of Yolo County individuals and families, respectively, were below the poverty line, compared to 13.7% and 10.2%, respectively, for the state (U.S. Census Bureau 2012c, 2012d) (Table 3.12-2).

West Sacramento

Population

The city of West Sacramento is the third largest city in Yolo County and is currently experiencing strong, steady growth (City of West Sacramento 2008). The city incorporated in 1987, combining the former communities of Bryte, Broderick, West Sacramento, and Southport. Southport is home to newer residences and Bryte and Broderick have higher percentages of pre-WWII homes. According to the California Department of Finance the estimated population of residents in West Sacramento in January 2011 was 49,160, a 1.2% increase over 2010 (California Department of Finance 2011a).

As a point of reference for the city, information about population in Yolo County is presented here. Yolo County's estimated population in January 2011 was 201,759, an increase of 0.6% over the previous year (California Department of Finance 2011a).

Demographics

In 2010, Whites and Asians made up the largest two populations in West Sacramento, similar to the county and the state. People of Hispanic origin made up 31.4% of the city's population in 2010 (U.S. Census Bureau 2012e, 2012f) (Table 3.12-1).

Employment, Income and Poverty

The unemployment rate for the city is 18.1% (California Employment Development Department 2011b). As of the 2010 Census, the percentage of individuals and families below the poverty level in West Sacramento, 16.6% and 12.3%, respectively, was similar to both the county and state values (U.S. Census Bureau 2012f) (Table 3.12-2). Based on data from the 2010 U.S. Census, the median household income and per capita income are $61,979 and $24,695, respectively (U.S. Census Bureau 2012f).

West Sacramento attracts business with an accessible and cooperative government; access to multi-modal transportation (highway, rail, and port); a regional workforce of more than 1 million people; and low business costs (City of West Sacramento Economic Development 2011). The city's economy is moving from a climate that historically was focused on the transportation and warehouse sectors toward newer industries such as biotech, green energy, and green technology (Mintier & Associates 2008). West Sacramento had an 89% employment growth rate between 1990 and 1999, which is the third highest growth rate of any city in the Sacramento region (City of West Sacramento Economic Development 2011).

The City is targeting the following industries in its City of West Sacramento General Plan Update (Mintier & Associates 2008):

- Biotechnology/life sciences
- Clean energy and green technology

- Food processing
- Manufacturing
- Retail
- Small business

The city's retail business greatly expanded over the last few years with the store openings of IKEA, Wal-Mart, Target, Home Depot, Lowe's, and Nugget Market. Although the major big box expansion in the city is over, three to five more medium/large format stores are expected within the near future (Mintier & Associates 2008).

Sacramento Area Council of Governments (SACOG) envisions that West Sacramento will be the fastest growing city in the region because of its proximity to Sacramento's urban core and many opportunities for reinvestment. Major job growth will be in the retail and office sectors, with less growth in the industrial sector than in the past (Sacramento Area Council of Governments 2004.)

Housing

As the population of West Sacramento grows, the city's housing stock is growing as well. According to the California Department of Finance estimates for 2010, there were approximately 18,667 total housing units in the city, an increase of approximately 54% over the number of housing units in 2000; the 2010 estimated vacancy rate was approximately 6% (California Department of Finance 2011b).

As a point of reference for the city, information about housing in Yolo County is presented here. According to the California Department of Finance estimates for 2010, there were approximately 74,224 housing units in Yolo County, an increase of approximately 21% over 2000 levels (California Department of Finance 2011b).

3.12.2 Environmental Consequences

This section describes the environmental consequences relating to environmental justice, socioeconomic and community effects for the Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.12.2.1 Assessment Methods

This evaluation of environmental justice, socioeconomic and community effects is based on professional standards and information cited throughout the section. NEPA and CEQA requirements for the analysis of social and economic effects are somewhat different. NEPA requires that social and economic effects be considered if they are related to effects on the natural or physical environment, and the NEPA definition of effects includes social and economic factors (40 CFR 1508.8, 1508.14). CEQA requires analysis of a proposed project's potential impacts on population growth and housing supply, but social and economic changes are not considered environmental impacts in and of themselves. CEQA, however, does allow discussion of social and economic changes that would result from a change in the physical environment and could in turn lead to additional changes in the physical environment (CEQA Guidelines Sec. 15064[f]).

The key effects were identified and evaluated based on the environmental characteristics of the Southport project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project.

3.12.2.2 Determination of Effects

For this analysis, an environmental effect was considered significant related to environmental justice and socioeconomic and community effects if it would result in any of the following effects listed below. These effects are based on NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

- Result in a disproportionate effect on minority or low-income communities.
- Substantial change in employment.
- Inducement of substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure).
- Displacement of substantial numbers of existing housing or people, necessitating the construction of replacement housing elsewhere.

There are no minority or low-income populations located in or adjacent to the project area. Therefore, effects to these communities are not discussed further in this section. Effects related to the temporary disruption and permanent loss of agricultural production is discussed in Section 3.11, Land Use and Agriculture.

3.12.3 Effects and Mitigation Measures

3.12.3.1 No Action Alternative

In general, the No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be made. No construction-related effects relating to socioeconomic and community effects, such as temporary disruption of farming during construction or displacement of residents, would occur. Therefore, there would be no effect on socioeconomic and community effects attributable to the implementation of the No Action Alternative. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

As discussed in Chapter 2, "Alternatives," there are three possible scenarios related to the levee vegetation policy under the No Action Alternative.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning

trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

However, there would be no effect on environmental justice or socioeconomics by the implementation of any of the three vegetation management No Action scenarios.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.12.3.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on socioeconomic and community effects (Table 3.12-3).

Table 3.12-3. Socioeconomic and Community Effects and Mitigation Measures for Alternative 1

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
EJSOC-1: Temporary Increase in Regional Economic Activity during Construction	No effect	Beneficial	NA	None
EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction	Significant and unavoidable	Significant and unavoidable	NA	None

Effect EJSOC-1: Temporary Increase in Regional Economic Activity during Construction

Construction activities associated with implementation of Alternative 1 would temporarily increase employment and personal income in the local area. Preliminary cost estimates anticipate that total construction-related expenditures associated with each project alternative, including Alternative 1, would be approximately $150 million to $200 million (Larsen pers. comm. 2012). This is an estimate of direct costs only, and does not include indirect/induced changes in employment and personal income resulting from project construction. Project construction would benefit the local economy by temporarily increasing employment and personal income. Although the increase in employment is not considered substantial when compared to total employment in the region, this indirect effect on regional economic activity would be beneficial.

Effect EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction

Implementation of Alternative 1 would require land acquisition and removal or relocation of residences to accommodate flood risk–reduction measures under Alternative 1. In addition, sufficient land would need to be acquired to establish an appropriate O&M and utility corridor at the landside toes of all modified levees. As described in Chapter 2, Section 2.2.4.2 Alternative 1 would require the demolition of 7 residences in Segment A, 10 residences in Segment B, 1 residence in Segment D, 3 residences in Segment F, and 1 residence in Segment G (22 total residences), resulting in the permanent displacement of Southport residents from their homes.

Additionally, the permanent removal of 15 residences associated with Alternative 1 may also alter the community cohesion of the neighborhood in Segment B, the segment most affected by residence removals. Many residents in or near the project area have lived in Southport for many years and have developed a closely-knit, rural community. Though the project would not physically divide the community, it would permanently displace a number of residents. The loss of these relationships may ultimately degrade the experience of living in the local neighborhood for residents who are not displaced, resulting in an indirect adverse effect.

Permanent acquisition, relocation, and compensation services would be conducted in compliance with Federal and state relocation laws, which are the Uniform Act of 1970 (42 USC 4601 et seq.) and implementing regulation, 49 CFR Part 24; and California Government Code Section 7267 et seq., as described in the Property Acquisition Compensation and Temporary Resident Relocation Plan EC in Section 2.4.5. These laws require that appropriate compensation be provided to displaced landowners and tenants, and that residents be relocated to comparable replacement housing.

In some cases, construction of flood risk–reduction measures may result in temporary disruption of utilities (water, telephone, electricity, gas, and sanitary sewer); loss of vehicle or pedestrian access for durations too lengthy for convenient day-to-day living, as well as construction-related noise outside City daytime and nighttime ordinance limits. During some periods of time, construction activities may be directly adjacent to homes. In these cases, WSAFCA would provide assistance for residents to temporarily relocate during construction activities and provide compensation to residents for reasonable rent and living expenses incurred because of relocation. As described above, as part of the Relocation Plan EC, WSAFCA would commit to providing temporary relocation services and compensation. The Relocation Plan will, at a minimum, serve the following functions.

- Outline the process for providing notice of relocation.
- Provide guidelines for relocation services and compensation.
- Ensure that 24-hour security for vacated homes is provided.
- Provide for temporary occasional access of vacated homes by residents (for long-duration construction periods.
- Ensure all compensation and relocation activities are conducted in compliance with Federal and state relocation laws, which are identified above.

These direct and indirect effects on residents are considered significant and unavoidable. The Relocation Plan will ensure all compensation and relocation activities are conducted in compliance with Federal and state relocation laws and will reduce the severity of this effect. However, because of the inconvenience to displaced residents and the overall community effects, these effects would remain significant and unavoidable.

3.12.3.3 Alternative 2

Implementation of Alternative 2 would result in the following socioeconomic and community effects (Table 3.12-4).

Table 3.12-4. Socioeconomic and Community Effects and Mitigation Measures for Alternative 2

	Finding		With	Mitigation
Effect	**Direct**	**Indirect**	**Mitigation**	**Measure**
EJSOC-1: Temporary Increase in Regional Economic Activity during Construction	No effect	Beneficial	NA	None
EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction	Significant and unavoidable	Significant and unavoidable	NA	None

Effect EJSOC-1: Temporary Increase in Employment in the Region during Construction

This effect would be the same as described above under Alternative 1. This indirect effect on regional economic activity would be beneficial.

Effect EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction

As described in Chapter 2, Section 2.2.5.2 Alternative 2 would require the demolition of 3 residences in Segment A, 10 residences in Segment B, 1 residence in Segment D, 5 residences in Segment F, and 1 residence in Segment G (20 total residences). Two fewer residences would be demolished under this alternative compared to Alternative 1. Appropriate compensation would be provided to displaced landowners and tenants, and residents would be relocated to comparable replacement housing. These overall direct and indirect effects on residents and the community would be similar to the effects described in Alternative 1 and would be significant and unavoidable.

3.12.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on socioeconomic and community effects (Table 3.12-5).

Table 3.12-5. Socioeconomic and Community Effects and Mitigation Measures for Alternative 3

	Finding		With	Mitigation
Effect	**Direct**	**Indirect**	**Mitigation**	**Measure**
EJSOC-1: Temporary Increase in Regional Economic Activity during Construction	No effect	Beneficial	NA	None
EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction	Significant and unavoidable	Significant and unavoidable	NA	None

Effect EJSOC-1: Temporary Increase in Employment in the Region during Construction

This effect would be the same as described above under Alternative 1. This indirect effect on regional economic activity would be beneficial.

Effect EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction

As described in Chapter 2, Section 2.2.6.2, Alternative 3 would require the demolition of 8 residences in Segment A, 10 residences in Segment B, 1 residence in Segment D, 2 residences in Segment F, and 1 residence in Segment G (22 total residences). The same number of residences would be demolished under this alternative compared to Alternative 1. Appropriate compensation would be provided to displaced landowners and tenants, and residents would be relocated to comparable replacement housing. These overall direct and indirect effects on residents and the community would be similar to those described under Alternative 1 and would be significant and unavoidable.

3.12.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on socioeconomic and community effects (Table 3.12-6).

Table 3.12-6. Socioeconomic and Community Effects and Mitigation Measures for Alternative 4

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
EJSOC-1: Temporary Increase in Regional Economic Activity during Construction	No effect	Beneficial	NA	None
EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction	Significant and unavoidable	Significant and unavoidable	NA	None

Effect EJSOC-1: Temporary Increase in Employment in the Region during Construction

This effect would be the same as described above under Alternative 1. This indirect effect on regional economic activity would be beneficial.

Effect EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction

As described in Chapter 2, Section 2.2.7.2, Alternative 4 would require the demolition of 3 residences in Segment A, 10 residences in Segment B, 1 residence in Segment D, 2 residences in Segment F, and 1 residence in Segment G (17 total residences). Five fewer residences would be demolished under this alternative compared to Alternative 1. Appropriate compensation would be provided to displaced landowners and tenants, and residents would be relocated to comparable replacement housing. These overall direct and indirect effects on residents and the community would be the same as those described under Alternative 1 and would be significant and unavoidable.

3.12.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on socioeconomic and community effects (Table 3.12-7).

Table 3.12-7. Socioeconomic and Community Effects and Mitigation Measures for Alternative 5

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
EJSOC-1: Temporary Increase in Regional Economic Activity during Construction	No effect	Beneficial	NA	None
EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction	Significant and unavoidable	Significant and unavoidable	NA	None

Effect EJSOC-1: Temporary Increase in Employment in the Region during Construction

This effect would be the same as described above under Alternative 1. This indirect effect on regional economic activity would be beneficial.

Effect EJSOC-2: Temporary or Permanent Displacement of Residents due to Project Construction

As described in Chapter 2, Section 2.2.8.2, Alternative 5 would require the demolition of 3 residences in Segment A, 10 residences in Segment B, 1 residence in Segment D, 5 residences in Segment F, and 1 residence in Segment G (20 total residences). Two fewer residences would be demolished under this alternative when compared to Alternative 1. Appropriate compensation would be provided to displaced landowners and tenants, and residents would be relocated to comparable replacement housing. These overall direct and indirect effects on residents and the community would be the same as those described under Alternative 1 and would be significant and unavoidable.

3.13 Visual Resources

3.13.1 Affected Environment

This section describes the affected environment for visual resources in the Southport project area.

3.13.1.1 Regulatory Framework

Federal and State

There are no roadways in or near the project vicinity that are designated in state or Federal plans as scenic highways worthy of protection for maintaining and enhancing scenic viewsheds. Therefore, there are no Federal or state regulations related to visual resources that apply to the implementation of the Southport project.

Local

The following local policies related to visual resources may apply to implementation of the Southport project.

Yolo County General Plan

The Yolo County General Plan (Yolo County 2009) identifies goals and policies in the Land Use and Community Character Element that apply to the implementation plan. Goals and policies seek to protect and enhance the rural landscape and night sky, important site features (e.g., watercourses, rock outcroppings), and scenic views, and to minimize the aesthetic impact of infrastructure and utility facilities. The general plan Policy CC-1.13 designates local scenic roadways, including South River Road, which parallels the west bank of the Sacramento River from the West Sacramento city limits to the Sacramento County line, and the general plan contains other policies pertaining to the protection of visual resources along this route.

City of West Sacramento General Plan

The City of West Sacramento General Plan (City of West Sacramento 2004) identifies goals and policies in the Land Use, Transportation and Circulation, Public Facilities and Services, Recreation and Cultural Resources, Natural Resources, and Urban Structure and Design elements that apply to the implementation plan. These goals and policies pertain to preserving the city's traditional neighborhood character and qualities and making public facilities blend into these environments; accommodating bicycle and pedestrian pathways in open space areas, areas adjacent to waterways, and within utility rights-of-way; undergrounding new utility lines; reducing light pollution; using drought-tolerant and drought-resistant landscaping in the development of City landscape; providing landscape buffers between various land use types; preserving and promoting the use of native plants; promoting the use of street trees; and developing and preserving important visual and scenic areas along the riverfront.

3.13.1.2 Environmental Setting

The following considerations are relevant to visual resources conditions in the Southport project area.

Concepts and Terminology

Identifying a study area's visual resources and conditions involves three steps.

- Objective identification of the visual features (visual resources) of the landscape.
- Assessment of the character and quality of those resources relative to overall regional visual character.
- Determination of a view's importance to people, or viewer *sensitivity* to views of visual resources in the landscape.

Because evaluating visual effects is inherently subjective, Federal and professional standards of visual assessment methodology have been used to determine potential effects on aesthetic values of the project area (see Section 3.13.2, Environmental Consequences, below). The aesthetic value of an area is a measure of its visual character and quality combined with the viewer response to the area (Federal Highway Administration 1988: 26–27, 37–43, 63–72). Visual character is the appearance of a landscape in terms of its variety of features and the dominance of those features. Visual quality can best be described as the overall impression that an individual viewer retains after driving through, walking through, or flying over an area (U.S. Bureau of Land Management 1980: 2–3). Viewer response is a combination of viewer exposure and viewer sensitivity. Viewer exposure is a function of the number of viewers, number of views seen, distance of the viewers, and viewing duration. Viewer sensitivity relates to the extent of the public's concern for a particular viewshed. These terms and concepts are described in detail below.

Visual Character

Natural and artificial landscape features contribute to the visual character of an area or view. Visual character is influenced by geologic, hydrologic, botanical, wildlife, recreational, and urban features. Urban features include those associated with landscape settlements and development, including roads, utilities, structures, earthworks, and the results of other human activities. The perception of visual character can vary significantly seasonally, even hourly, as weather, light, shadow, and physical elements that compose the viewshed change. The basic components used to describe visual character for most visual assessments are the elements of form, line, color, and texture of the landscape features (USDA Forest Service 1995: 28–34, 1-2–1-15; Federal Highway Administration 1988: 37–43). The appearance of the landscape is described in terms of the dominance of each of these components.

Visual Quality

Visual quality is evaluated using the well-established approach to visual analysis adopted by Federal Highway Administration, employing the concepts of vividness, intactness, and unity (Federal Highway Administration 1988: 46–59; Jones et al. 1975 682–713), which are described below.

- *Vividness* is the visual power of landscape components or how memorable they are as they combine in striking and distinctive visual patterns.

- *Intactness* is the visual integrity of the natural and human-built landscape and its freedom from encroaching elements; this factor can be present in well-kept urban and rural landscapes and in natural settings.
- *Unity* is the visual coherence and compositional harmony of the landscape considered as a whole; it frequently attests to the careful design of individual components in the landscape.

Visual quality is evaluated based on the relative degree of vividness, intactness, and unity, as modified by the visual sensitivity of the viewers. High-quality views are highly vivid, relatively intact, and exhibit a high degree of visual unity. Low-quality views lack vividness, are not visually intact, and possess a low degree of visual unity.

Viewer Sensitivity

The measure of a view's quality must be tempered by the overall sensitivity of the viewer. Viewer sensitivity is based on the visibility of the resource in the landscape, proximity of viewers to the visual resource, elevation of viewers relative to the visual resource, frequency and duration of views, number of viewers, and type and expectations of individuals and viewer groups.

The importance of a view is related in part to the position (e.g., distance, elevation) of the viewer relative to the resource; therefore, visibility and visual dominance of landscape elements depend on their placement within the viewshed. A viewshed is defined as all of the surface area visible from a particular location (e.g., an overlook) or sequence of locations (e.g., a roadway or trail) (Federal Highway Administration 1988: 26–27). To identify the importance of a view, a viewshed must be broken into distance zones of foreground, middleground, and background. Generally, the closer a resource is to the viewer, the more dominant it is and the greater its importance to the viewer. Although distance zones in a viewshed may vary between different geographic regions or types of terrain, the standard foreground zone is 0.25–0.5 mile from the viewer, the middleground zone is from the foreground zone to 3–5 miles from the viewer, and the background zone is from the middleground to infinity (Jones et al. 1975: 688).

Visual sensitivity depends on the number and type of viewers and the frequency and duration of views (exposure). Visual sensitivity also is modified by viewer activity, awareness, and visual expectations in relation to the number of viewers and viewing duration. For example, people driving for pleasure; people engaging in recreational activities such as hiking, biking, or camping; and homeowners generally have higher visual sensitivity to views. Sensitivity tends to be lower for people driving to and from work or as part of their work (USDA Forest Service 1995: 3-3–3-13, Federal Highway Administration 1988: 63–72; U.S. Soil Conservation Service 1978: 3, 9, 12). Commuters and nonrecreational travelers typically have fleeting views and tend to focus on commute traffic, not on surrounding scenery; therefore, they generally are considered to have low visual sensitivity. Residential viewers typically have extended viewing periods and are concerned about changes in the views from their homes; therefore, they generally are considered to have high visual sensitivity. Viewers using recreation trails and areas, scenic highways, and scenic overlooks are usually assessed as having high visual sensitivity.

Evaluating visual quality and viewer response must also be based on a regional frame of reference (U.S. Soil Conservation Service 1978: 3). The same visual resource appearing in different geographic areas could have a different degree of visual quality and associated viewer sensitivity in each setting. For example, a small hill may be a significant visual element on a flat landscape but have very little significance in mountainous terrain.

Viewer Groups and Viewer Responses

The primary viewer groups in the project area are persons living or conducting business near levees; travelers using the interstates, highways, and smaller local roads (including those on levee crowns); and recreationists (boaters, beachgoers, and anglers using canals, creeks, and rivers; trail users; equestrians; bicyclists; joggers; and others). All viewer groups have direct views of the project area described below in Section 3.13.1.3, Southport Project Area.

Residents

Suburban and rural residents are located directly adjacent to levees or are separated from them by local streets or similar corridors. Suburban residences mostly are oriented inward toward the housing developments, and only residences on the outer edge of the developments have middleground and background views of levees. The separation and orientation of rural residences allow inhabitants direct views over agricultural fields toward levees. Both suburban and rural residents are likely to have a high sense of ownership over their adjacent waterways, the open space that surrounds them, the recreational opportunities these resources provide, and the inherent scenic quality of these resources. Because residents live within a short distance relative to the project area, have potential exposure to levee views, and have a sense of ownership over nearby visual resources, these residents are considered to have high sensitivity to changes in the viewshed.

Businesses

Viewers from industrial, commercial, government, and educational facilities situated throughout the project area have semipermanent views that range from views limited by the levees to sweeping views that extend out to the background. Employees and users of these facilities are likely to be occupied with their work activities. However, some of these facilities depend on the waterways in the project area as a destination spot and source of income (e.g., Sherwood Harbor Marina). Also, people using these facilities often travel to and from work and spend leisure time on the waterways and levees. Because of their wide-ranging views, their focus on tasks at hand (i.e., limited viewing times), and their current use of the levees, these viewers are considered to have moderate sensitivity to changes in the viewshed.

Roadway Users

Roadway users' vantages differ based on the roadway they are traveling and elevation of that roadway. The majority of views are mostly limited to the foreground by suburban, commercial, and industrial development; vegetation; and the levees themselves. Views of the middleground and background are present but are limited to areas where structures that otherwise would conceal background views from the roadway are set back. However, if the vantage is elevated, as on the levee road (South River Road), most views of the surrounding mountain ranges (Vaca Mountains, Coast Range, and Sierra Nevada), waterways (Sacramento River), downtown areas (West Sacramento and Sacramento), and open space areas (agriculture, parkways) are only partially obstructed by the rooflines and mature vegetation in the area.

Travelers use roadways at varying speeds; normal highway and roadway speeds differ based on the traveler's familiarity with the route and roadway conditions (e.g., presence/absence of rain). Single views typically are of short duration, except on straighter stretches where views last slightly longer. Viewers who travel these routes frequently generally possess moderate visual sensitivity to their surroundings. The passing landscape becomes familiar to these viewers, and their attention typically is not focused on the passing views but on the roadway, roadway signs, and surrounding traffic. Viewers who travel local routes for their scenic quality generally possess a higher visual sensitivity to their surroundings because they are likely to respond to the natural environment with a high regard and as a holistic visual experience. Furthermore, there are scenic stretches of roadway passing through the project areas that offer sweeping views of the surrounding area that are of interest to motorists, especially when traveling on levee tops. For these reasons, viewer sensitivity is moderate among most roadway travelers.

Recreationists

Recreational users view the project areas from parks, waterways, roadways, trails, and the levees themselves. Recreational uses consist of boating and fishing, birding, walking, running, jogging, and bicycling along trails, levee crowns, and local roads. In addition to using the waterways as a resource, users of the waterways are likely to seek out natural areas within the corridor, such as sand and gravel bars and beaches. Waterway users have differing views based on their location in the landscape and are accustomed to variations in the level of industrial, commercial, suburban, and recreational activities occurring in the project area. The amount of vegetation present along the levees creates a softened, natural edge that is enjoyed by all recreationists. Local recreationists also have a high sense of ownership over the waterways and corridors they use for recreation, and these areas are highly valued throughout the greater Sacramento area. Viewer sensitivity is high among recreationists using the project areas because they are more likely to value the natural environment highly, appreciate the visual experience, have a strong sense of ownership, and be more sensitive to changes in views.

3.13.1.3 Southport Project Area

The Southport project area is at the southern end of the city of West Sacramento boundary, directly west of and adjacent to the Sacramento River. The area is composed mostly of suburban development and agricultural open space and has some light commercial and industrial development, educational facilities, and riparian corridors. Key viewpoints representative of the Southport project area's visual character are shown on Plate 3.13-1. Plate 3.13-2 includes the photographs for these viewpoints.

Newer development built in the last decade and older, low-density rural development make up a large portion of Southport project area. Homes in newer communities are one and two-story structures with small lots and have not been designed to meld with the older communities of Bryte and Broderick with respect to layout, architectural style, and streetscaping, yet newer development is speckled with mature oaks and other trees that were left to remain growing on certain properties. Newer developments adjacent to the levee are separated from the project area by only a small piece of open space (Plate 3.13-2, Photo 1).

Rural development is commonly older, small, one-story residences and newer, larger, two-story residences that are scattered off of Jefferson Boulevard and small, one-lane, rural roadways, such as Bevan Road, Burrows Avenue, and Gregory Avenue. These homes are often at a lower density than newer developments. Rural residences in the project area typically are surrounded by fencing and mature landscaping, including tall native and nonnative trees. This landscaping distinguishes the residential areas from the surrounding open space agricultural fields and horse grazing lands. Barns and corrals are common on land where owners keep horses. Additionally, pockets of shrubs, trees, and riparian vegetation located in swales and drainages throughout these rural residential lands create a noticeable contrast to the surrounding, predominantly low-lying, grassland and agricultural vegetation (Plate 3.13-2, Photo 2).

At the street level, viewers have foreground views of the levee and mature riparian trees, with little to no middleground and background views. From atop the levee, foreground views extend toward background views of the downtown Sacramento skyline (Plate 3.13-2, Photo 3) and the Vaca Mountains (Plate 3.13-2, Photo 4). Looking due east and west from atop the levee, viewers have foreground views of only the levee crown with riparian vegetation lining the levee. The Sacramento River corridor creates a noticeable contrast to the surrounding, predominantly suburban area. Most views from the project area are limited to the foreground by bends in the river, vegetation, and development.

The largely pastoral landscape that is common to the region, available visual access to the Sacramento skyline and to and from the river, and the presence of development and utility infrastructure result in a project area that is moderate in vividness, intactness, and unity and, therefore, moderate in overall visual quality.

3.13.2 Environmental Consequences

This section describes the environmental consequences relating to visual resources for the Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with and without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.13.2.1 Assessment Methods

This evaluation of visual resources is based on professional standards and information cited throughout the section.

The key effects were identified and evaluated based on the environmental characteristics of the Southport project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project. Using the concepts and terminology described in Section 3.13.1.2, Environmental Setting, and criteria for determining effects described below, analysis of the project's visual effects are also based on:

- Direct field observation from vantage points, including neighboring buildings, properties, and roadways (June 15, 2011).
- Photographic documentation of key views of and from the project site.
- Review of the project description.
- Review of the project in regard to compliance with state and local ordinances and regulations and professional standards pertaining to visual quality.

3.13.2.2 Determination of Effects

For this analysis, an environmental effect was considered significant related to visual resources if it would result in any of the effects listed below. These effects are based on NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

- Have a substantial adverse effect on a scenic vista.
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway.
- Substantially degrade the existing visual character or quality of the site and its surroundings.
- Create a new source of substantial light or glare that would adversely affect day or nighttime public views.

Professional Standards

According to professional standards, a project may be considered to have an adverse effect if it would significantly:

- Conflict with local guidelines or goals related to visual quality.
- Alter the existing natural viewsheds, including changes in natural terrain.
- Alter the existing visual quality of the region or eliminate visual resources.
- Increase light and glare in the project vicinity.
- Result in backscatter light into the nighttime sky.
- Result in a reduction of sunlight or introduction of shadows in community areas.
- Obstruct or permanently reduce visually important features.
- Result in long-term (persisting for 2 years or more) adverse visual changes or contrasts to the existing landscape as viewed from areas with high visual sensitivity.

3.13.3 Effects and Mitigation Measures

There are no roadways within or near the project area that are designated in Federal, state, or local plans as scenic highways worthy of protection for maintaining and enhancing scenic viewsheds. Therefore, there would be no adverse effects on a state scenic highway, and this is not analyzed further.

3.13.3.1 No Action Alternative

The No Action Alternative would be the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures that alter the levee prism would be implemented, thus there would be no construction-related effects relating to visual resources, such as displacement of development or construction of a new levee and landside seepage berms. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

Specific to vegetation, as presented in Chapter 2, "Alternatives," the No Action Alternative is characterized by three possible future scenarios.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).

- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

While full compliance with the USACE ETL would open up additional vistas from the levees, it would constitute a drastic visual change at these locations. Vegetation beyond 15 feet would be allowed to remain, but the majority of levees in the project area do not have vegetated areas beyond this distance, so complete vegetation removal at these sites would result. Under modified application of the ETL as proposed in the ULDC, understory vegetation that is less than 4 inches in diameter at breast height or over 12 inches high would be removed, and new volunteer vegetation would not be allowed to grow on the levee. In addition, existing vegetation would be allowed to die out within its natural lifecycle so that, over time, the levee would become covered with only grasses. Understory vegetation maintenance would be similar to current vegetation management activities, such as mowing levee grasses and thinning restoration plantings. Trees and larger shrubs would die out over a course of time, which could take 30 years or more.

Implementation of the No Action Alternative would result in the following effects on vegetation (Table 3.13-1).

Table 3.13-1. Visual Resource Effects for the No Action Alternative

Effect	Scenario	Finding—Direct
VIS-NA-1: Degrade the Visual Character and Quality of the Levee Corridor in Compliance with the USACE Levee Vegetation Policy	No ETL	No effect
	Modified ETL	Less than significant
	Full ETL	Significant

Effect VIS-NA-1: Degrade the Visual Character and Quality of the Levee Corridor in Compliance with the USACE Levee Vegetation Policy

Full Application of U.S. Army Corps of Engineers Levee Vegetation Policy

Full compliance with the USACE ETL vegetation prohibition guidelines would require permanent removal of all woody vegetation on the levee prism and within 15 feet of the landside and waterside levee toes. While removal would open up additional vistas from the levees, it would constitute a drastic visual change at these locations. Vegetation beyond 15 feet would be allowed to remain, but the majority of levees in the project area do not have vegetated areas beyond this distance, so complete vegetation removal at these sites would result. This complete removal would create a grassy landscape, a sharp contrast to the existing large trees and shrubs, which would change the visual character and degrade the overall visual quality. Segment E is a wider segment that would not be as greatly affected, but vegetation removal even in this segment would greatly alter the existing visual character and degrade the quality of views. These changes in views would be perceived by all viewer groups. Therefore, this option would have a significant and unavoidable effect on the existing visual character and quality of the site and its surroundings.

Removal of vegetation also would increase glare by removing trees that are green in the spring and summer (when grass is brown) and remove shade that helps decrease glare on levee, roadway, and water surfaces. During winter months, when deciduous trees have lost their leaves, days are shorter, and the sun is at a lower angle and less intense, the effect on glare of removing woody vegetation would be less. Trunks and branches of bare trees, however, along with existing evergreen trees, screen glare to some degree year-round under current vegetation management.

No Application of U.S. Army Corps of Engineers Levee Vegetation Policy

If no vegetation is removed on the levees, the levees would be maintained as they are now. There would be no visual effects resulting from this vegetation management measure.

Modified Application of the ETL (ULDC)

Under modified application of the ETL as proposed in the ULDC, no vegetation would be added to the levee prism and within 15 feet of the landside and waterside levee toes. Understory vegetation that is less than 4 inches in diameter at breast height or over 12 inches high would be removed, and new volunteer vegetation would not be allowed to grow on the levee. In addition, existing vegetation would be allowed to die out within its natural life cycle so that, over time, the levee would become covered with only grasses. Understory vegetation maintenance would be similar to current vegetation management activities, such as mowing levee grasses and thinning restoration plantings. Trees and larger shrubs would die out over a course of time, which could take 30 years or more. This would result in less-than-significant visual effects because the change would be so gradual that most viewers would become accustomed to, or unaware of, the gradual visual shift.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.13.3.2 Alternative 1

Implementation of Alternative 1 would result in the following direct effects on visual resources (Table 3.13-2). There are no indirect effects on visual resources under Alternative 1.

Table 3.13-2. Visual Resources Effects and Mitigation Measures for Alternative 1

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
VIS-1: Result in Temporary Visual Effects from Construction	Significant	No effect	Significant and unavoidable	VIS-MM-1: Use Native Wildflower Species in Erosion Control Grassland Seed Mix VIS-MM-2: Develop a Soil Borrow Strategy and Site Reclamation Plan VIS-MM-3: Limit Construction near Residences to Daylight Hours
VIS-2: Adversely Affect a Scenic Vista	Significant and unavoidable	No effect	NA	None
VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings	Significant and unavoidable	No effect	NA	None
VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views	Significant and unavoidable	No effect	NA	None

Effect VIS-1: Result in Temporary Visual Effects from Construction

Construction would likely occur over two years, with construction of Segments C, D, E, F, and G preceding Segments A and B. Flood risk-reduction measure construction activities would take place primarily over two typical construction seasons (April 15–October 31), although extension of the CVFPB encroachment permit may be sought if weather conditions permit. All construction activities, including, but not limited to, structure and vegetation removal, roadway removal and replacement, revegetation activities, and utility removal and replacement, that may occur outside the primary construction season would be subject to the conditions of environmental and encroachment permits and authorizations to be issued by CDFW, Regional Water Board, CVFPB, USACE, USFWS, NMFS and others. As noted in Section 3.7, Noise, daytime hours for the city of West Sacramento are 7 a.m.–10 p.m. Construction would primarily take place Monday through Saturday, but slurry cutoff wall construction could take place 7 days per week. During both construction years, the sun will rise before 7 a.m. (Sunrise Sunset Calendar 2011). However, the sun will set before 10 p.m. during both years and, most often, it will set between the hours of 7:30 p.m. and 8:30 p.m. Therefore, if construction occurs past sunset, high-powered lighting would be required for construction operations, and this would adversely affect nearby residents who may be inside their homes or outside in their yards during the spring and summer months. In general, construction operations and traffic, soil borrow sites, and staging areas would be visible in the foreground and middleground to all viewer groups.

Construction of the project would require temporary facilities, such as staging areas, and introduce heavy equipment, including excavators, graders, dozers, sheepsfoot rollers, dump trucks, and end loaders, in addition to support pickups and water trucks. The construction would introduce this considerable heavy equipment, associated vehicles, and resulting potential dust clouds into foreground views from the rural residences and South River, Davis, and Linden Roads; the southern half of Village Parkway; and the eastern end of Lake Washington Boulevard. Dust control would be implemented during construction to reduce the potential for slowly moving dust clouds that would attract attention from visual receptors and reduce the availability of short-range views. Viewers are accustomed to seeing heavy machinery associated with agricultural operations, but viewers would not be accustomed to seeing intense and isolated construction activities, because levee construction of this scale is not common in this portion of the project area.

This alternative would require constructing the setback levee 150 feet west of the existing levee centerline in Segment E; adjacent levees 35 feet west of the existing levee centerline and rock slope protection in Segments A, B, C, D, F, and G; 300-foot-wide landside seepage berms in Segments B, C, E, and F; slurry cutoff walls in Segments A, D, E, and G; and relocating South River Road to the landside of the adjacent levee in Segment A.

Construction of an adjacent levee using the existing levee would displace agricultural fields, residences, and small businesses. While many structures are already set back from the levee, a number are not. This is most common in Segments A and B where there are residences right along South River Road or within the project footprint. This would require the demolition of some of these residences and businesses. Displacement would heighten sensitivity among select residence and business viewer groups by physically removing these viewers from their existing vantage points and relocating them. This displacement and physical demolition could heighten the negative perceptions the remaining neighboring viewers have of the project because of the finality of the action and the eventual replacement of their views with a levee in all segments and landside seepage berm in affected segments.

The South River Roadway alignment would need to be altered in Segment A to accommodate the adjacent levee, which would have a centerline 35 feet back from the existing levee centerline, because the roadway is on the landside toe of the existing levee and not on the top. The cutoff wall would be installed during construction of the adjacent levee and would not appear to be a visually separate feature during construction, except if constructed during nighttime hours. However, construction of the landside seepage berm would require clearing, introduction of fill material, and grading activities from up to 300 feet away from the adjacent levee centerline. Implementation of Mitigation Measure VIS-MM-1 would help mitigate the effect of new earthen surfaces for all viewers by improving seasonal interest, but effects still would be adverse. This effect is significant and unavoidable.

For material taken from dredged material stockpiled along the western bank of the DWSC, an area that is visually disturbed from dredge spoil placement, the primary viewers of the DWSC are recreationists using the east levee. Using this area as a borrow site would result in less-than-significant visual effects because the site is not highly visible and already sustains construction activities and visual disturbance. Borrow from various Southport sites would be obtained only from certain parcels (Plate 1-5). Sites/parcels that are used would be graded to different depths for material and then restored to a depth no more than 3 feet below existing grade, reseeded, and returned to pre-use vegetated conditions. Where feasible, excess embankment fill material that was deemed unsuitable for reuse would be placed in the borrow site pits, compacted, and the top soil replaced, returning the site to its original elevation. In addition to these measures, implementation of Mitigation Measure VIS-MM-2 would help mitigate visual effects resulting from borrow sites. The combined measures would help to reduce visual effects, but because specific sites that would be used are unknown and borrow sites could result in permanent changes in the existing visual character, effects still could be adverse. Therefore, because sites other than the DWSC location are likely to be used, direct effects would be significant and unavoidable.

While construction would be spread out over 2 years, construction activity would proceed along the 5.6-mile construction footprint, not visible over an extended period of time within each local vista, resulting in visual changes that are short term and temporary. However, direct visual effects would be adverse because of the construction's proximity to residential viewers who are highly sensitive, the displacement of residents, and the major construction, which is not a common visual element. Implementation of Mitigation Measure VIS-MM-3 and the Property Acquisition Compensation and Temporary Resident Relocation Plan environmental commitment described in Chapter 2 would help mitigate the direct effect of nighttime construction on residential viewers, but effects still would be adverse. This direct effect is significant and unavoidable.

Mitigation Measure VIS-MM-1: Use Native Wildflower Species in Erosion Control Grassland Seed Mix

The project proponent will require construction contractors to use wildflower seed in erosion control measures. Only native wildflower species will be incorporated into the seed mix and applied to all exposed slopes. Wildflowers will provide seasonal interest to areas where trees and shrubs are removed. Species will be chosen that are native to the area and for their appropriateness to the surrounding habitat. For example, upland wildflower species will be chosen for drier, upland areas, and wetter species will be chosen for areas that will receive more moisture. If not appropriate to the surrounding habitat, wildflowers should not be included in the seed mix. Under no circumstances will invasive plant species be used in any erosion control measures.

Mitigation Measure VIS-MM-2: Develop a Soil Borrow Strategy and Site Reclamation Plan

This plan will help prioritize borrow sites to lessen effects on biological and visual resources. For example, using dredged material from along the western bank of the DWSC prior to using Southport-area borrow sites will reduce visual changes to Southport areas that are seen by a larger number of viewers and on lands that are less disturbed. This plan will develop measures to remediate exposed soil and terrain to make it suitable for planned development, agriculture, or reuse as a natural habitat and to mitigate visual effects. The reclamation plan could incorporate recreational or mixed uses; however, the majority of the sites will be evaluated for restoration to native habitat because of the amount of terrain alteration and vegetation and habitat loss resulting from the proposed project. All plantings will be native and indigenous to the area, and no invasive plant species will be used under any conditions. In areas to be used for agriculture, the reclamation grading plan will mimic the preexisting landform pattern to the highest degree possible, given geotechnical constraints. In areas of habitat restoration, the terrain will be designed and graded to be undulating, avoiding large, flat-sloped areas. In areas of proposed development, a combination of terrains may be implemented to encourage visual variety.

All terrain will be designed and graded to be rounded, avoiding sharp angles and steep and abrupt grade breaks. Special attention will be paid to the transition from undisturbed to disturbed terrains to ensure a natural, organic appearance. Before any vegetation removal, the site will be surveyed visually for the presence of rock outcroppings, downed trees, or similar features. Features such as live and downed trees salvaged during site preparation and excavation will be placed during reclamation to mimic natural patterns, restoring habitat value and providing visual congruity once revegetation plantings mature.

Mitigation Measure VIS-MM-3: Limit Construction near Residences to Daylight Hours

Construction activities scheduled to occur between 7 a.m. and 6 p.m. will not take place before or past daylight hours (which vary according to season). This will eliminate the need to introduce high-wattage lighting sources near residences.

Effect VIS-2: Adversely Affect a Scenic Vista

The Sacramento River and South River Road through the project area act as gateways that offer unique scenic vistas of the contrasting landscape features. Development and the high-rise buildings of West Sacramento and Sacramento that tower over agricultural fields are softened by the lush riparian corridors that line the waterways. Vistas from the river would be affected by vegetation removal; however, removal of vegetation would act to create new vistas available from South River Road.

Overall, vistas would be adversely affected by displaced agricultural fields, development, and removal of trees and shrubs necessary to construct the project. A new levee adjacent to the existing levee would introduce a large mass into foreground views, and the landside seepage berm would introduce a wide swath of grassland area that was once somewhat developed and had trees and shrubs. Also, depending on the reuse and restored nature of borrow sites, permanent landscape scars or otherwise denuded and altered terrain could result, which would adversely affect visual quality.

This direct effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in adverse effects.

Effect VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings

This alternative would introduce a new adjacent levee into the viewshed of all viewer groups. South River Road is aligned on the existing levee top, except in Segment A, and has immediate views of the project area. Residential and commercial development also often has direct views of the project area. If the project is constructed, these viewers would see a soil borrow area or levee where residences, businesses, agricultural fields, or vegetation once existed, resulting in a negative shift in visual character. Permanent landscape scars or alteration of the existing visual character could result at soil borrow sites, depending on the reuse and restored nature of those sites, resulting in direct adverse visual effects.

The lush riparian corridors that line the waterways provide shade and areas for recreationists to enjoy and soften the appearance of existing development and the high-rise buildings of West Sacramento and Sacramento that tower over agricultural fields. These corridors and the sometimes dense vegetation on the landside of the levee would be removed within 15 feet of the levee toe to comply with USACE levee vegetation guidance and for the construction of the landside seepage berms, and these areas would be vegetated with grasses. While vegetation beyond the 15-foot vegetation-free zone (VFZ) would be allowed to remain, the majority of riverbank does not have such areas and would sustain complete vegetation removal along the river's edge. The landside seepage berm would introduce a wide swath of grassland in Segments B, C, E, and F, areas that were once somewhat developed and had trees and shrubs up to 300 feet away from the adjacent levee centerline and 35 feet back from the existing levee centerline.

Removal of this vegetation would constitute a drastic visual change along the waterways and would alter the visual character from a view that is vegetated with grasses, large trees, and shrubs to one that is vegetated only with grasses and rocked for bank slope protection in affected segments. This would degrade the overall visual quality.

These changes in views would be perceived by all viewer groups. Therefore, the project would have a direct adverse effect on the existing visual character and quality of the site and its surroundings, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in adverse effects.

Effect VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views

A new adjacent levee next to the existing levee would introduce a new visual feature in the environment and likely displace agricultural fields or development. This effect would be heightened by the landside seepage berm. While this could reduce nighttime light to a small degree, it would introduce a large surface of grass and rock that would increase glare for all viewer groups because there no longer would be trees and shrubs to help absorb sunlight and provide shade. Especially in the summer, there no longer would be green from trees and shrubs in leaf; instead, there would be only light brown grass. There would be a similar effect on soil borrow sites if trees and shrubs were removed. Lack of vegetation along the river would increase glare from the water's surface because there no longer would be any shaded areas of water. It would cause a notable effect on fishermen, for example, who often seek out shaded areas to enjoy. This effect would be adverse, and there is no available mitigation. This direct effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

3.13.3.3 Alternative 2

Implementation of Alternative 2 would result in the following direct effects on visual resources (Table 3.13-3). There are no indirect effects on visual resources under Alternative 2.

Table 3.13-3. Visual Resources Effects and Mitigation Measures for Alternative 2

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
VIS-1: Result in Temporary Visual Effects from Construction	Significant	No effect	Significant and unavoidable	VIS-MM-1: Use Native Wildflower Species in Erosion Control Grassland Seed Mix VIS-MM-2: Develop a Soil Borrow Strategy and Site Reclamation Plan VIS-MM-3: Limit Construction near Residences to Daylight Hours
VIS-2: Adversely Affect a Scenic Vista	Significant and unavoidable	No effect	NA	None
VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings	Significant and unavoidable	No effect	NA	None
VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views	Significant and unavoidable	No effect	NA	None

Effect VIS-1: Result in Temporary Visual Effects from Construction

The construction schedule would proceed as described under Alternative 1. As addressed under Alternative 1, construction occurring past sunset would adversely affect residential viewers. In general, construction operations and traffic, soil borrow sites, and staging areas would be visible in the foreground and middleground to all viewer groups.

Similar to Alternative 1, construction of this alternative would require staging areas, require substantial grading, has the potential to create dust clouds, and would introduce considerable heavy equipment and associated vehicles into foreground views from the rural residences and South River, Davis, and Linden Roads; the southern half of Village Parkway; and the eastern end of Lake Washington Boulevard. Dust control would be implemented during construction to reduce the potential for slowly moving dust clouds that would attract attention from visual receptors and reduce the availability of short-range views. Viewers are accustomed to seeing heavy machinery associated with agricultural operations but not accustomed to seeing intense and isolated construction activities because levee construction of this scale is not common in this portion of the project area.

This alternative would require the greatest amount of construction, and over the largest area, because it would require constructing the setback levees 400 feet west of the existing levee centerline in Segments B, C, D, E, and F; adjacent levees 35 feet west of the existing levee centerline in Segments A, B, and G; 300-foot-wide landside seepage berms in Segments B, C, E, and F; slurry cutoff walls in all segments; rock slope protection in Segments A, B, and G; relocating South River Road to the landside of the setback levee into the future Village Parkway alignment; lowering the floodplain in offset areas in Segments B, C, and F; and removing portions of the existing levees in Segments B, C, and F to provide inlet areas to allow for floodplain inundation in Segments B, C, D, E (Bees Lakes area), and F. Construction of the setback levee would displace more agricultural fields, residences, and small businesses than Alternative 1, resulting in greater adverse effects through displacement.

Implementation of Mitigation Measure VIS-MM-1 would help mitigate the direct effect of new earthen surfaces for all viewers by improving seasonal interest, but effects still would be adverse.

As described under Alternative 1, for material taken from dredged material stockpiled along the western bank of the DWSC, an area that is visually disturbed from dredge spoil placement, the primary viewers of the DWSC are recreationists using the east levee. Using this area as a borrow site would result in less-than-significant visual effects because the site is not highly visible and already sustains construction activities and visual disturbance. Borrow from various Southport sites would be obtained only from certain parcels (Plate 1-5). Sites/parcels that are used would be graded to different depths for material and then restored to a depth no more than 3 feet below existing grade, reseeded, and returned to pre-use vegetated conditions. Where feasible, excess embankment fill material that is deemed unsuitable for reuse could be placed in the borrow site pits, compacted, and the top soil replaced, returning the site to its original elevation. In addition to these measures, implementation of Mitigation Measure VIS-MM-2 would help mitigate direct visual effects resulting from borrow sites. The combined measures would help to reduce visual effects, but Alternative 2 would require the greatest amount of borrow, which would result in the largest visual effects because more lands would be used for borrow. Because specific sites that would be used are unknown and because borrow sites could result in permanent changes in the existing visual character, effects still could be adverse. Therefore, because sites other than the DWSC location are likely to be used, direct effects would be significant and unavoidable.

Under Alternative 2, a majority of South River Road traffic would be relocated to the landside of the setback levee through extension of Village Parkway. At the project's northern extent, South River Road would continue in its current alignment on the existing levee at Segment G, but would be then directed off the levee crown to connect with Village Parkway to allow for breach of the existing levee structure in the setback area beginning in Segment F. This would directly eliminate available views from the existing South River Road because traffic would be rerouted once construction begins and create views of new roadway construction.

Village Parkway would intersect with Linden Road and Davis Road and wind south through agricultural lands and Segments B and C where it would connect to Bevan Road and Antioch Avenue. It would also provide dead end access to properties that are along and west of the existing levee and required access via South River Road to properties that are south of the proposed Village Parkway alignment. The portion of the existing South River Road just east of its intersection with Gregory Avenue would be maintained through a dead end roadway. North of Davis Road, Village Parkway would be located close to the western edge of the seepage berm from Segments D through F. The overhead utility line would also be relocated during construction and be located along the western edge of the new adjacent levee in Segment A and along the new Village Parkway and dead-end access roads for Segments B through F. These construction activities would be most readily visible to adjacent residences and viewers on nearby local roadways. As under Alternative 1, the cutoff wall would be installed during construction of the adjacent levee and would not appear to be a visually separate feature during construction, except if constructed during nighttime hours. Construction of the landside seepage berm, however, would appear separate and have adverse effects because of the potential size of the berms. Landside soil borrow areas excavated during construction could result in permanent landscape scars or direct alteration of the existing visual character.

While construction would be spread out over 2 years, construction activity would proceed along the 5.6-mile construction footprint, not visible over an extended period of time within each local vista, resulting in visual changes that are short term and temporary. However, as under Alternative 1, the construction's proximity to residential viewers who are highly sensitive and the displacement of residents would result in direct adverse effects. Effects would also be adverse because major construction is not a common visual element. Alternative 2, like Alternatives 4 and 5, would result in the most substantial adverse effect compared to Alternatives 1 and 3. Implementation of Mitigation Measure VIS-MM-3 and the Property Acquisition Compensation and Temporary Resident Relocation Plan environmental commitment described in Chapter 2 would help mitigate the direct effect of nighttime construction on residential viewers, but effects still would be adverse. This effect is significant and unavoidable.

Effect VIS-2: Adversely Affect a Scenic Vista

The Sacramento River and South River Road through the project area act as gateways that offer unique scenic vistas of the contrasting landscape features. Development and the high-rise buildings of West Sacramento and Sacramento that tower over agricultural fields are softened by the lush riparian corridors that line the waterways. Vistas from the river would be directly affected by vegetation removal where it occurs within the VFZ. Under Alternative 2, vistas from the river would not be as greatly affected in B, C, D, and F where some vegetation would remain on the waterside of the breached levees.

Vistas from the proposed South River Road realignment to the planned Village Parkway with bike lanes would be greatly reduced and limited to ground-level views over agricultural lands to the west instead of views of the river to the east and multidirectional views of the surrounding landscape from the existing elevated roadway corridor. Instead, a large mass would be introduced that blocks views of the waterways and surrounding landscape, affecting vistas from all vantages.

Under this alternative, breaching of the existing levee and a restored floodplain would be beneficial in providing improved views from vista locations. These views may be provided by unofficial recreational access provided by the O&M corridor on the setback levee and by official recreational access provided by new features or facilities that may be constructed nearby. Unofficial and official recreational access may allow for high-quality vistas. This could include vista views that would show Bees Lakes when they are hydraulically connected to the river during high flows. During these times, the lakes would not appear to be an isolated water body but would appear to be an area that is inundated with water that has vegetation rising above the water surface. This would be visible from the river and could be visible from land-based recreational views. However, the extent to which restoration would occur and recreation opportunities would be provided that would allow such views is unknown and cannot be qualitatively assessed. Even with such measures implemented, direct effects on vistas still would be adverse.

Overall, vistas would be adversely affected by displaced agricultural fields and development and removal of trees and shrubs necessary to construct the project. A new setback levee would introduce a large mass into foreground views, and the landside seepage berm would introduce a wide swath of grassland area that was once somewhat developed and had trees and shrubs. Also, depending on the reuse and restored nature of borrow sites, permanent landscape scars or otherwise denuded and altered terrain could result, which would adversely affect visual quality.

Alternative 2, like Alternatives 4 and 5, would result in the most substantial adverse effect compared to Alternatives 1 and 3. This direct effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

Effect VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings

This alternative would introduce a new setback levee into the viewshed of all viewer groups. Residential and commercial development often has direct views of the project area. As under Alternative 1, after construction of the project, these viewers would see a levee, seepage berm, or soil borrow area where residences, businesses, agricultural fields, or vegetation once existed, resulting in a negative shift in visual character. These areas would be vegetated with grasses. Permanent landscape scars or alteration of the existing visual character could result at soil borrow sites, depending on the reuse and restored nature of those sites, resulting in adverse visual effects. These sites may be hydroseeded, or they could be converted from agriculture to residential and commercial development, which could involve regrading of the terrain to incorporate detention basins or lakes. Depending on the reuse of these sites, there is potential to directly affect the visual character because of the denuded and altered terrain.

The existing elevated South River Road provides views of the river to the east and multidirectional views of the surrounding landscape; these views would be replaced by ground-level views over agricultural lands to the west from the proposed South River Road realignment to the planned Village Parkway with bike lanes. A large mass would be introduced that blocks views of the waterways and surrounding landscape, affecting the visual character from all vantages.

Removal of all vegetation within 15 feet of the levee toe to comply with USACE levee vegetation guidance and the construction of the landside seepage berms constitutes a drastic visual change at these locations and would alter the visual character from a view that is vegetated with grasses, large trees, and shrubs to one that is vegetated only with grasses and rocked for bank slope protection in affected segments, and this would degrade the overall visual quality. While vegetation beyond the 15-foot VFZ would be allowed to remain, the majority of riverbank does not have such areas and would sustain complete vegetation removal along the river's edge.

Under this alternative, breaching of the existing levee, a restored floodplain, and recreational features and opportunities would be beneficial in improving the visual character. Such views may be provided by unofficial recreational access provided by the O&M corridor on the setback levee and by official recreational access provided by new features or facilities that may be constructed nearby and allow for high-quality views. This could include views that would show Bees Lakes when they are hydraulically connected to the river during high flows. During these times, the lakes would not appear to be an isolated water body but would appear to be an area that is inundated with water that has vegetation rising above the water surface. This would be visible from the river and could be visible from land-based recreational views. However, the extent to which restoration would occur and recreational opportunities would be provided is unknown and cannot be qualitatively assessed. Even with such measures implemented, direct effects on the visual character still would be adverse.

These changes in views would be perceived by all viewer groups. Therefore, the proposed project would have a direct adverse effect on the existing visual character and quality of the site and its surroundings. Alternative 2, like Alternatives 4 and 5, would result in the most substantial adverse effect compared to Alternatives 1 and 3, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

Effect VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views

This effect would be similar to that under Alternative 1. However, direct adverse effects would be greatest under this alternative, like Alternatives 4 and 5, because the displacement of agricultural fields, vegetation, and development occurs over a much larger area to accommodate the setback levee, landside seepage berm, and soil borrow areas than under Alternatives 1 and 3. This effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

3.13.3.4 Alternative 3

Implementation of Alternative 3 would result in the following direct effects on visual resources (Table 3.13-4). There are no indirect effects on visual resources under Alternative 3.

Table 3.13-4. Visual Resources Effects and Mitigation Measures for Alternative 3

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
VIS-1: Result in Temporary Visual Effects from Construction	Significant	No effect	Significant and unavoidable	VIS-MM-1: Use Native Wildflower Species in Erosion Control Grassland Seed Mix VIS-MM-2: Develop a Soil Borrow Strategy and Site Reclamation Plan VIS-MM-3: Limit Construction near Residences to Daylight Hours
VIS-2: Adversely Affect a Scenic Vista	Significant and unavoidable	No effect	NA	None
VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings	Significant and unavoidable	No effect	NA	None
VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views	Significant and unavoidable	No effect	NA	None

Effect VIS-1: Result in Temporary Visual Effects from Construction

The construction schedule would proceed as described under Alternative 1. As addressed under Alternative 1, construction occurring past sunset would adversely affect residential viewers. In general, construction operations and traffic, soil borrow sites, and staging areas would be visible in the foreground and middleground to all viewer groups.

Similar to Alternative 1, construction of this alternative would require staging areas and substantial grading, has the potential to create dust clouds, and would introduce considerable heavy equipment and associated vehicles into foreground views from the rural residences and South River, Davis, and Linden Roads; the southern half of Village Parkway; and the eastern end of Lake Washington Boulevard. Dust control would be implemented during construction to reduce the potential for slowly moving dust clouds that would attract attention from visual receptors and reduce the availability of short-range views. Viewers are accustomed to seeing heavy machinery associated with agricultural operations, but viewers would not be accustomed to seeing intense and isolated construction activities because levee construction of this scale is not common in this portion of the project area.

This alternative would require constructing 300-foot-wide landside seepage berms in Segments B, C, and F; slurry cutoff walls in Segments A, D, E, and G; and rock slope protection in Segments A, B, C, D, F, and G. Slope-flattening would also occur in Segment E, but there would be no rock slope protection in this segment. Slope-flattening using the existing levee would shift the existing levee 50 feet to the landside, and landside seepage berms in Segments A–G would displace agricultural fields, residences, and small businesses. This would require the demolition of some of these residences and businesses and result in direct adverse effects through displacement, as under Alternative 1.

The South River Roadway alignment would need to be altered in Segment A, as under Alternative 1, to accommodate slope-flattening, because the roadway is on the landside toe of the existing levee and not on the top. The cutoff wall would be installed during construction of the slope-flattening and would not appear to be a visually separate feature during construction, except if constructed during nighttime hours. Construction of the landside seepage berm, however, would appear separate.

Implementation of Mitigation Measure VIS-MM-1 would help mitigate the effect of new earthen surfaces for all viewers by improving seasonal interest, but direct effects still would be adverse.

Construction activities at the soil borrow sites would be visible to all nearby viewer groups. As described under Alternative 1, for material taken from dredged material stockpiled along the western bank of the DWSC, an area that is visually disturbed from dredge spoil placement, the primary viewers of the DWSC are recreationists using the east levee. Using this area as a borrow site would result in less-than-significant visual effects because the site is not highly visible and already sustains construction activities and visual disturbance. Borrow from various Southport sites would be obtained only from certain parcels (Plate 1-5). Sites/parcels that are used would be graded to different depths for material and then restored to a depth no more than 3 feet below existing grade, reseeded, and returned to pre-use vegetated conditions. Where feasible, excess embankment fill material that is deemed unsuitable for reuse could be placed in the borrow site pits, compacted, and the top soil replaced, returning the site to its original elevation. In addition to these measures, implementation of Mitigation Measure VIS-MM-2 would help mitigate visual effects resulting from borrow sites. The combined measures would help to reduce visual effects, but Alternative 3 would require a greater amount of borrow than Alternative 1 and less than Alternative 2. Because specific sites that would be used are unknown and because borrow sites could result in permanent changes in the existing visual character, direct effects could be adverse if sites other than the DWSC location were used.

While construction would be spread out over 2 years, construction activity would proceed along the 5.6-mile construction footprint, not visible over an extended period of time within each local vista, resulting in visual changes that are short term and temporary. However, as under Alternative 1, visual direct effects would be adverse because of the construction's proximity to residential viewers who are highly sensitive, the displacement of residents, effects resulting from soil borrow, and because major construction is not a common visual element. Implementation of Mitigation Measure VIS-MM-3 and the Property Acquisition Compensation and Temporary Resident Relocation Plan environmental commitment described in Chapter 2 would help mitigate the effect of nighttime construction on residential viewers, but effects still would be adverse. This effect is significant and unavoidable.

Effect VIS-2: Adversely Affect a Scenic Vista

Under this alternative, South River Road would be shifted 50 feet to the west but would remain on top of the levee in Segments B through F. Direct effects on scenic vistas would be very similar to those described under Alternative 1. Therefore, this alternative would result in the same effects discussed under Alternative 1. This effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

Effect VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings

Under this alternative, slope-flattening would create a 50-foot landward shift in the existing levee, whereas under Alternative 1, the new adjacent levee dovetails into the existing levee at an offset of 35 feet landward. Slope-flattening would have the least effect on the visual character compared to Alternatives 1 and 2 because it would require less landform alteration and creation by modifying the existing levee. However, the project under this alternative is still substantial, and direct effects on the existing visual character would be very similar to those described under Alternative 1. Therefore, this alternative would result in the same effects discussed under Alternative 1. This effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

Effect VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views

This direct effect would be similar to that under Alternative 1. However, adverse effects would be the least under this alternative because the displacement of agricultural fields, vegetation, and development is not as great and occurs over a much smaller area to accommodate the setback levee, landside seepage berm, and soil borrow areas than under Alternatives 1, 2, 4, and 5. This effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

3.13.3.5 Alternative 4

Implementation of Alternative 4 would result in the following direct effects on visual resources (Table 3.13-5). There are no indirect effects on visual resources under Alternative 4.

Table 3.13-5. Visual Resources Effects and Mitigation Measures for Alternative 4

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
VIS-1: Result in Temporary Visual Effects from Construction	Significant	No effect	Significant and unavoidable	VIS-MM-1: Use Native Wildflower Species in Erosion Control Grassland Seed Mix VIS-MM-2: Develop a Soil Borrow Strategy and Site Reclamation Plan VIS-MM-3: Limit Construction near Residences to Daylight Hours
VIS-2: Adversely Affect a Scenic Vista	Significant and unavoidable	No effect	NA	None
VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings	Significant and unavoidable	No effect	NA	None
VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views	Significant and unavoidable	No effect	NA	None

Effect VIS-1: Result in Temporary Visual Effects from Construction

Construction schedule would proceed as described under Alternative 1. As addressed under Alternative 1, construction occurring past sunset would adversely affect residential viewers. In general, construction operations and traffic, soil borrow sites, and staging areas would be visible in the foreground and middleground to all viewer groups.

Similar to Alternatives 1, 2, 3, and 5, construction of this alternative would require staging areas and substantial grading, has the potential to create dust clouds, and would introduce considerable heavy equipment and associated vehicles into foreground views from the rural residences and South River, Davis, and Linden Roads; the southern half of Village Parkway; and the eastern end of Lake Washington Boulevard. Dust control would be implemented during construction to reduce the potential for slowly moving dust clouds that would attract attention from visual receptors and reduce the availability of short-range views. Viewers are accustomed to seeing heavy machinery associated with agricultural operations, but viewers would not be accustomed to seeing intense and isolated construction activities because levee construction of this scale is not common in this portion of the project area.

This alternative would require constructing the setback levees 400 feet west of the existing levee centerline in Segments B–E; adjacent levees 35 feet west of the existing levee centerline in Segments A, B, F, and G; 300-foot-wide landside seepage berms in Segments B, C, E, and F; slurry cutoff walls in Segments A, B, D, E, and G; rock slope protection in Segments A, B, F, and G; relocating

South River Road to the landside of the setback levee into the future Village Parkway alignment; lowering the floodplain in offset areas in Segments B, C, and F; removing portions of the existing levees in Segments B, C, and F to provide inlet areas to allow for floodplain inundation in Segments B, C, D, and F; isolating of Segment E (Bees Lakes area) by creating a ring levee; and excavating large sites for soil borrow at several locations west of the proposed adjacent levee.

As with Alternative 2, the South River Roadway alignment would be altered in all segments to the landside of the setback levee through extension of Village Parkway and would be abandoned on the existing levee top because of levee breaching. This would eliminate available views from the existing South River Road because traffic would be rerouted once construction begins and create views of new roadway construction. The alignment for Village Parkway and the overhead utility line relocation would be the same as Alternative 2 except that a roadway connection to Gregory Avenue would be also constructed from Village Parkway. These construction activities would be most readily visible to adjacent residences and viewers on nearby local roadways. As under Alternative 1, the cutoff wall would be installed during construction of the adjacent levee and would not appear to be a visually separate feature during construction, except if constructed during nighttime hours. Construction of the landside seepage berm, however, would appear separate and have direct adverse effects because of the potential size of the berms.

Implementation of Mitigation Measure VIS-MM-1 would help mitigate the direct effect of new earthen surfaces for all viewers by improving seasonal interest, and VIS-MM-2 would help mitigate the visual effects resulting from borrow sites, but effects still would be adverse if sites other than the DWSC location were used.

While construction would be spread out over 2 years, construction activity would proceed along the 5.6-mile construction footprint, not visible over an extended period of time within each local vista, resulting in visual changes that are short term and temporary. However, as under Alternative 1, the construction's proximity to residential viewers who are highly sensitive and the displacement of residents would result in adverse effects. Direct effects would also be adverse because major construction is not a common visual element. Alternative 4, like Alternative 2, would result in the most substantial adverse effect compared to Alternatives 1 and 3. Implementation of Mitigation Measure VIS-MM-3 and the Property Acquisition Compensation and Temporary Resident Relocation Plan environmental commitment described in Chapter 2 would help mitigate the effect of nighttime construction on residential viewers, but effects still would be adverse. This direct effect is significant and unavoidable.

Effect VIS-2: Adversely Affect a Scenic Vista

Under Alternative 4, effects on scenic vistas would be similar to Alternative 2. However, there would be a greater amount of vegetation removed in Segment F because an adjacent levee would be constructed instead of a setback levee, which would require the removal of all vegetation. Alternative 4, like Alternatives 2 and 5, would result in the most substantial adverse effect compared to Alternatives 1 and 3. This effect would be adverse, and there is no available mitigation. This direct effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

Effect VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings

Under Alternative 4, effects on the existing visual character or quality of the site and its surroundings would be similar to Alternative 2, and changes in views would be perceived by all viewer groups. Therefore, the proposed project would have a direct adverse effect on the existing visual character and quality of the site and its surroundings. Alternative 4, like Alternatives 2 and 5, would result in the most substantial adverse effect compared to Alternatives 1 and 3. This effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in adverse effects.

Effect VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views

This direct effect would be similar to that under Alternative 1. However, adverse effects would be greatest under this alternative, like Alternatives 2 and 5, because the displacement of agricultural fields, vegetation, and development occurs over a much larger area to accommodate the setback levee, landside seepage berm, and soil borrow areas than under Alternatives 1 and 3. This effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

3.13.3.6 Alternative 5

Implementation of Alternative 5 would result in the following direct effects on visual resources (Table 3.13-6). There are no indirect effects on visual resources under Alternative 5.

Table 3.13-6. Visual Resources Effects and Mitigation Measures for Alternative 5

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
VIS-1: Result in Temporary Visual Effects from Construction	Significant	No effect	Significant and unavoidable	VIS-MM-1: Use Native Wildflower Species in Erosion Control Grassland Seed Mix VIS-MM-2: Develop a Soil Borrow Strategy and Site Reclamation Plan VIS-MM-3: Limit Construction near Residences to Daylight Hours
VIS-2: Adversely Affect a Scenic Vista	Significant and unavoidable	No effect	NA	None
VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings	Significant and unavoidable	No effect	NA	None
VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views	Significant and unavoidable	No effect	NA	None

Effect VIS-1: Result in Temporary Visual Effects from Construction

Under Alternative 5, effects related to temporary visual effects from construction would be similar to Alternative 2. Implementation of Mitigation Measure VIS-MM-1 would help mitigate the effect of new earthen surfaces for all viewers by improving seasonal interest, and VIS-MM-2 would help mitigate the visual effects resulting from borrow sites, but effects still would be adverse if sites other than the DWSC location were used.

While construction would be spread out over 2 years, construction activity would proceed along the 5.6-mile construction footprint, with short returns to Segments C and F to degrade the second breaches in each segment after the setback levees are built. This means that construction will not be visible over an extended period of time within each local vista, resulting in visual changes that are short term and temporary. However, as under Alternative 1, the construction's proximity to residential viewers who are highly sensitive and the displacement of residents would result in direct adverse effects. Effects would also be adverse because major construction is not a common visual element. Alternative 5, like Alternatives 2 and 4, would result in the most substantial adverse effect compared to Alternatives 1 and 3. Implementation of Mitigation Measure VIS-MM-3 and the Property Acquisition Compensation and Temporary Resident Relocation Plan environmental commitment described in Chapter 2 would help mitigate the effect of nighttime construction on residential viewers, but effects still would be adverse. This direct effect is significant and unavoidable.

Effect VIS-2: Adversely Affect a Scenic Vista

Under Alternative 5, direct effects on scenic vistas would be similar to Alternative 2. Alternative 5, like Alternatives 2 and 4, would result in the most substantial adverse effect compared to Alternatives 1 and 3. This effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

Effect VIS-3: Substantially Degrade the Existing Visual Character or Quality of the Site and Its Surroundings

Under Alternative 5, direct effects on the existing visual character or quality of the site and its surroundings would be similar to Alternative 2, and changes in views would be perceived by all viewer groups. Therefore, the proposed project would have an adverse effect on the existing visual character and quality of the site and its surroundings. Alternative 5, like Alternatives 2 and 4, would result in the most substantial adverse effect compared to Alternatives 1 and 3. This effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable. Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

Effect VIS-4: Create a New Source of Substantial Light or Glare That Would Adversely Affect Day or Nighttime Public Views

This direct effect would be similar to that under Alternative 1. However, adverse effects would be greatest under this alternative, like Alternatives 2 and 4, because the displacement of agricultural fields, vegetation, and development occurs over a much larger area to accommodate the setback levee, landside seepage berm, and soil borrow areas than under Alternatives 1 and 3. This effect would be adverse, and there is no available mitigation. This effect is significant and unavoidable.

Ongoing maintenance would be similar to existing levee maintenance and would not result in direct adverse effects.

3.14 Recreation

3.14.1 Affected Environment

This section describes the affected environment for recreation in the Southport project area, including regulatory and environmental setting.

3.14.1.1 Regulatory Framework

Federal and State

U.S. National Physical Activity Plan

The U.S. National Physical Activity Plan is a comprehensive set of policies, programs, and initiatives that aim to increase physical activity in all segments of the American population. The plan is the product of a private-public sector collaborative. The goal of the plan is that "all Americans will be physically active and they will live, work, and play in environments that facilitate regular physical activity" (National Physical Activity Plan 2010).

Local

The following local policies related to recreation may apply to implementation of the Southport project.

City of West Sacramento General Plan

The West Sacramento General Plan (City of West Sacramento 2004) identifies the Sacramento River as a key location for development of community activity areas. The Recreation and Cultural Resources element of the General Plan commits the City to ensuring continuous public access to the Sacramento River for its full length within West Sacramento, and calls for the linear access to the Sacramento River to be linked to the City's overall system of parks, recreational pathways, and open space. It also commits the City to implementing the Parks Master Plan, described below. A major goal of the Urban Structure and Design element of the general plan is to enhance the relationship between the City and the Sacramento River. Specific policies call for the development of a continuous pedestrian and bicycle path along the river, development of visual and scenic areas along the riverfront, and development of pedestrian links between the river and public schools, parks, and other major open space areas. The Transportation and Circulation element of the general plan specifies that bicycle and pedestrian pathways be included adjacent to waterways, to the extent practical.

City of West Sacramento Parks Master Plan

The *West Sacramento Parks Master Plan* (Parks Master Plan) (City of West Sacramento Parks and Community Services Department 2003) outlines the City's goals and policies with regard to the provision of parks and related recreation facilities for West Sacramento residents and provides an inventory of current and proposed facilities.

As of July 2011, the City oversaw approximately 145 acres of developed parkland (City of West Sacramento Department of Parks and Recreation 2011a). The 2010 United States Census reported that West Sacramento had a population of 48,744 (Hudson 2011). This represents a 99-acre shortfall from the standard of 5 acres per 1,000 residents established in the General Plan. Based on this ratio, it is estimated that by 2025, population growth in West Sacramento would require the City to have a total of 375 acres of parkland available in order to meet this standard.

A demand analysis was part of the preparation of the Parks Master Plan, and it determined that there is high community demand for (among other things) improved water access, increased number and variety of facilities, recreation corridors and trails, and fishing and water access. The Parks Master Plan identifies the following strategies to meet the community demand for recreation opportunities.

- Acquire and develop recreation corridors located along watercourses and railroad right-of-ways to link the park system and provide additional recreation opportunities.
- Locate new parks to take advantage of the city's natural resources, including the river and other watercourses.
- Provide improved river access for boating and fishing.
- Develop open space areas to protect significant wetlands and riparian forests, and to provide passive recreation opportunities.

The Parks Master Plan lists underutilized assets, including the Sacramento River, that are key opportunities for recreation development and protection. Several areas are targeted as particularly well-suited for park development, and the Sacramento River corridor is one of these key areas. The City sees the Sacramento River as central to the identity of West Sacramento. However, the Parks Master Plan points out those opportunities to enjoy the river are hampered by the lack of developed public access. It identifies "providing convenient and safe public river access that is also sensitive to the natural environment" as a key recreational opportunity. The Sacramento River corridor also has been selected by the Parks Master Plan as the location for Recreation Corridor 1 (a linear park that includes multi-use pathways for recreation and non-motorized transportation).

Several neighborhood parks and one community park are proposed for construction in the Southport project area. As defined in the Parks Master Plan, a neighborhood park is a medium-sized park (4 to 10 acres) that serves the informal recreation needs of a single neighborhood, and a community park is a large park (typically more than 20 acres) that contains a wide range of facilities and that serves several neighborhoods or the entire community. Neighborhood parks identified in the Parks Master plan as N15, N21, N22, and N24 are located in the project area. These neighborhood parks are proposed as part of new housing developments, and so will be constructed only when or if the housing developments are built. Southport Community Park (now referred to as River Park), however, is not tied to construction of new housing developments and is proposed for construction at Oak Hall Bend. This 50-acre site would be developed into a riverfront community park and would tie into Recreation Corridor 1. The Bees Lakes Open Space Area also is located in the project area. It is identified in the Parks Master Plan as "having significant natural resources that warrant protection and that can provide for passive recreation use." The Parks Master Plan recommends limiting development of this area to pedestrian-only trails (no horses, vehicles, or bicycles), interpretive facilities, and limited picnic facilities. It also recommends that sensitive habitat areas be protected by preventing human intrusion through the use of fencing, boardwalks, railings, or other design solutions.

Southport Design Guidelines

The Southport Design Guidelines, amended on November 12, 2005, are a component of the overall Southport Framework Plan that provides a detailed community concept and design guidelines for development in the Southport area. The community concept is based on a network of pedestrian-friendly villages that offer convenient walking and biking options. In the project area, the community concept includes a marina village connecting to the Sacramento River for water-oriented recreation and boating, a water-oriented community park adjacent to the Sacramento River, and improvements to levee trails along the Sacramento River, increasing pedestrian, bicycle, and equestrian recreation. The document also offers specific design guidelines for recreation corridors and streetscapes that include walkways and bike lanes (City of West Sacramento Planning Department 1996).

West Sacramento Bicycle, Pedestrian, and Trail Master Plan

The West Sacramento Bicycle, Pedestrian, and Trails Master Plan (City of West Sacramento 2013) proposes a recreation trail along the Sacramento River throughout the entirety of the project area (the plan assumes that South River Road will be relocated off of the levee). The plan encourages use of city infrastructure, including streets, Reclamation District rights-of way, and maintenance roads, for development of the bicycle and pedestrian path system.

Yolo County General Plan

The Yolo County General Plan (Yolo County Community Development Agency 1983) Open Space and Recreation element calls for the establishment of recreational activities along the Sacramento River, and commits to creating a continuous corridor of natural open space along the Sacramento River with provisions for recreational access. The Yolo County General Plan Circulation element specifically encourages the establishment of bike routes along levees, and the Recreation element requires that a portion of urban waterfront should be used for water-dependent activities, including public walkways, fishing access, waterfront parks, and interpretation projects. The Open Space and Recreation element also expresses the County's support of improved access for bank fishing where safe and adequate parking can be provided.

3.14.1.2 Environmental Setting

The following considerations are relevant to recreation conditions in the Southport project area.

Informal Recreational Use

For many years, the Sacramento River South Levee has provided a popular open space venue for informal recreation activities. For most of its length, the waterside of the Sacramento River South Levee is fairly steep but supports a mature riparian forest. The views afforded by the levee's elevated height and proximity to the river and riparian forest entice many types of informal recreationists. South River Road, a two-way paved road, tops the Sacramento River South Levee for most of its extent through the project area. Although South River Road is considered a rural route and features very narrow shoulders with no designated bike lane, it remains a popular bicycling corridor in the region. On a smaller scale, pedestrians and equestrians also use South River Road.

South River Road provides easy access for fishing along the Sacramento River, making fishing a very widespread informal recreation activity along the Sacramento River South Levee. Although the levee's underlying land is privately owned and use of the waterside of the levee therefore is considered trespassing, its use for fishing is generally tolerated at the present time (Shpak pers. comm. 2011).

The southernmost mile of the Sacramento River South Levee is closed to vehicle traffic. It is owned by the City and topped by a gravel surface that is used by pedestrians, equestrians, and some bicyclists (Shpak pers. comm. 2011).

Bees Lakes, a heavily wooded natural area surrounding two fairly large ponds, sits just west of the Sacramento River South Levee approximately 2 miles south of the Barge Canal along South River Road. Because of the thick vegetation, access is difficult, but it is a popular area for nature viewers and paintball enthusiasts (Shpak pers. comm. 2009). Although use of the area is generally tolerated, the property is privately owned and use is considered trespassing (Shpak pers. comm. 2011).

Several of the parcels identified as potential borrow areas in the southwest portion of Southport, including lands along the DWSC, consist of farmland and open fields, and these areas see fairly frequent use by walkers, joggers, bicyclists, and nature-viewers. These parcels and the DWSC East Levee are on privately owned land, but the recreational use of these areas is currently tolerated (Shpak pers. comm. 2011).

Several other parcels that have been identified as potential borrow sites in the eastern portion of Southport also are privately held, yet see a minor amount of recreational use, generally limited to all terrain vehicles (ATVs) and equestrians (Shpak pers. comm. 2011).

Formal Recreation Facilities

Clarksburg Branch Line Trail

The Clarksburg Branch Line Trail is a crushed concrete–base pedestrian and bicycle trail constructed on an old railroad alignment that runs through Southport. It abuts some of the parcels identified as potential borrow areas and crosses into the Southport project area at the trail's southern end. The trail is 3.2 miles long and features a crushed-concrete base suitable for walking and bicycling. The trail is largely shaded by trees, making it a popular recreation corridor, and it provides an alternate route to Southport's busy main thoroughfare, Jefferson Boulevard (Rails to Trails Conservancy 2011). The City also paves a portion of the trail and constructed a bicycle/pedestrian connection from the trail to the West Sacramento Recreation Center and River City High School, which opened in January 2014).

Delta Gardens Park

Delta Gardens Park (a formal City of West Sacramento neighborhood park) is located near the Sacramento River South Levee, about 0.5 mile south of the Barge Canal and approximately 150 feet from the landside toe of the Sacramento River South Levee. Park amenities include youth and tot play structures, picnic areas, barbecues, half-court basketball, a climbing boulder, a performance patio, and a turf play area (City of West Sacramento Department of Parks and Recreation 2011b).

Boating

Boating is a significant recreational use on the waterways surrounding the city. The Sacramento River is a popular regional waterway for motorized boat use, especially within the urbanized reach of the river flowing by the cities of Sacramento and West Sacramento. The riparian vegetation and mature trees lining the river on the Sacramento River South Levee provide an attractive boating corridor. The Sacramento River South Levee is also home to two marinas, described below.

- **Sacramento Yacht Club.** The Sacramento Yacht Club is a nonprofit, member-owned private club located on the waterside of the Sacramento River South Levee approximately 2 miles south of the Barge Canal. Facilities at the Yacht Club include a clubhouse, bar, galley, marina, and covered slips. The public (non-members) can rent facilities on days when it is not in private use.
- **Sherwood Harbor Marina and RV Park.** The Sherwood Harbor Marina and RV Park is a privately owned public marina and recreational vehicle (RV) park with 110 berths and 40 reservable RV sites. It is located approximately 0.5 mile south of the Sacramento Yacht Club on the waterside of the Sacramento River South Levee and is the only riverfront RV park in the Sacramento metropolitan area. Recreation opportunities at the Marina include camping, boating (motor boating, kayaking, and canoeing), picnicking, fishing, swimming, wildlife viewing, and walking. Facilities include restrooms, a pump-out station, fueling station, convenience store, and bait shop (Sacramento River Recreational and Public Access Guide 2011).

Recreation Opportunities in the City of Sacramento

Recreation facilities and opportunities along the left bank of the Sacramento River (on the Sacramento side) are significantly enhanced by views of the mature riparian vegetation along the Sacramento River South Levee in West Sacramento. These facilities and recreation opportunities include Le Rivage Hotel and marina and informal recreational use of the levees in the Pocket and Little Pocket areas of Sacramento.

3.14.2 Environmental Consequences

This section describes the environmental consequences relating to recreation for the Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with and without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.14.2.1 Assessment Methods

The key effects were identified and evaluated based on the environmental characteristics of the Southport project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project.

Effects on recreation related to implementation of the project were evaluated qualitatively. Generally, construction activities could result in a short-term loss of recreation opportunities by disrupting use of recreation areas or recreational boating corridors. A long-term effect could occur if a recreation opportunity is eliminated, the quality of that opportunity is severely reduced, or if a planned recreation facility is no longer feasible as a result of permanent project-related structures or operations. Long-term beneficial effects could occur if new or enhanced recreation opportunities are created through implementation of the project.

3.14.2.2 Determination of Effects

For this analysis, an environmental effect was significant related to recreation if it would result in any of the effects listed below. These effects are based on common NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

- Increase in the use of existing neighborhood and regional parks or other recreation facilities such that substantial physical deterioration of the facility would occur or be accelerated.
- Conflict with any applicable recreation planning or policy documents.
- Substantial restriction or reduction in the availability or quality of existing recreation opportunities in the project vicinity.
- Implementation of operational or construction-related activities related to the placement of project facilities that would cause a substantial long-term disruption of any institutionally recognized recreation activities. Institutionally recognized recreation activities are those associated with an established publicly or privately operated recreation facility, or those actively administered or promoted by a public or private entity.

3.14.3 Effects and Mitigation Measures

3.14.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be implemented, and current levee operations and maintenance would continue. No construction-related effects on recreation facilities would occur.

Existing recreation opportunities in the project area are expected to remain unchanged under the No Action Alternative. Recreational use of the levees, riverbank, parks, and other facilities would continue as established. The City does not plan to move forward with development of any recreational elements on or near the city's levees without prior implementation of necessary levee upgrades (Shpak pers. comm. 2009). Development of new recreational opportunities on or adjacent to levees identified in the City's planning documents therefore would not occur under the No Action Alternative. However, no substantial increase in use of existing recreation facilities should occur under the No Action Alternative, as planned development and population growth in West Sacramento would likely be limited until implementation of one of the action alternatives is complete. The City's Municipal Code (Chapter 15.50) requires new developments to provide 200-year protection or pay into an in-lieu fee program to fund WSAFCA's flood risk management efforts, reducing financial incentive for development until flood risk–reduction measures are constructed. Additionally, the possibility of real estate acquisition to support project implementation may discourage development until project completion. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

Specific to vegetation, as presented in Chapter 2, the No Action Alternative is characterized by three possible future scenarios.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

Full compliance with the USACE's levee vegetation policy would result in the removal of a substantial amount of vegetation from the bank of the Sacramento River, including vegetation that comprises riparian habitat and supports fish and wildlife populations. If the USACE levee vegetation policy is not applied, it is assumed that the vegetation conditions at the time of this analysis will continue into the future. Modified application of ETL through application of the ULDC would result in a slow loss of woody vegetation along the Sacramento River South Levee.

Implementation of the No Action Alternative would result in the following effects on recreation (Table 3.14-1).

Table 3.14-1. Recreation Effects for the No Action Alternative

Effect	Scenario	Finding—Direct
REC-NA-1: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor in Compliance with the USACE Levee Vegetation Policy	No ETL	No effect
	Modified ETL	Significant
	Full ETL	Significant

Effect REC-NA-1: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor in Compliance with the USACE Levee Vegetation Policy

Full compliance with the USACE's levee vegetation policy would result in the removal of a substantial amount of vegetation from the bank of the Sacramento River, including vegetation that comprises riparian habitat and supports fish and wildlife populations. Many recreation activities rely on or are significantly enhanced by the presence of mature woody vegetation. Anglers rely on trees to provide shade during fishing activities, and wildlife viewers are attracted to areas with mature woody vegetation because of the wealth of wildlife such vegetation supports. Many other users, including pedestrians, bicyclists, equestrians, and boaters, also rely on this woody vegetation for shade and for the visual character it contributes to the landscape. Removal of a substantial amount of this riparian vegetation in compliance with the levee vegetation guidance would significantly affect recreation in the project area. This would be a significant effect.

If the USACE levee vegetation policy is not applied, it is assumed that the vegetation conditions at the time of this analysis will continue into the future. There would be no effect on recreation in the project area.

Modified application of the ETL through application of the ULDC would result in a slow loss of woody vegetation along the Sacramento River South Levee. As described above, many recreation activities rely on or are significantly enhanced by the presence of mature woody vegetation. Loss of a significant amount of woody vegetation, even over a very long term, could substantially reduce the quality of recreation activities in the area and result in a significant effect.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.14.3.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on recreation (Table 3.14-2).

Table 3.14-2. Recreation Effects and Mitigation Measures for Alternative 1

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
REC-1: Temporary Disruption of Recreation Opportunities during Construction	Less than significant	No effect	NA	None
REC-2: Temporary Obstruction of Access to Marina or Boat Launch Facilities during Construction	Less than significant	No effect	NA	None
REC-3: Temporary Disruption of Recreational Boating Activities during Construction	Less than significant	No effect	NA	None
REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor	Significant	No effect	Significant and unavoidable	No feasible mitigation
REC-5: Incompatibility with Planning Documents	No effect	Less than significant	NA	None

Effect REC-1: Temporary Disruption of Recreation Opportunities during Construction

In addition to the formal recreation facilities (Delta Gardens Park, Sacramento Yacht Club, and the Sherwood Harbor Marina and RV Park) located along the Sacramento River South Levee, many informal recreational activities occur along the waterside of the Sacramento River South Levee in the Southport project area. Fishing from the riverbank and biking along South River Road are very popular activities in this stretch, and the levee also plays host to pedestrians, equestrians, and visitors to the waterfront. Paintball enthusiasts use the thickly forested area around Bees Lakes, which sit at the landside toe of the levee in Segment E. The Clarksburg Branch Line Trail, a popular biking, walking, and jogging corridor, abuts some of the parcels identified as potential borrow areas. In addition, several parcels identified as potential borrow areas along the east side of the DWSC are frequently used by walkers, joggers, bicyclists, and nature-viewers.

Temporary disruption of these activities would occur during construction when the levee crown, borrow areas, and adjacent construction and staging areas are closed to public access. Even if the recreation areas themselves are not closed, proximity to construction equipment and activities may degrade recreational experiences. However, this direct effect would be temporary, and there are alternative locations for these types of recreation activities in the city. With implementation of the

EC requiring notification of construction area closure (described in Chapter 2, Section 2.4.8, Construction Area Closure Notification) to ensure public safety and provide closure notice in advance of construction activities, this effect would be less than significant. No mitigation is required.

Effect REC-2: Temporary Obstruction of Access to Marina Facilities during Construction

The Sacramento Yacht Club and the Sherwood Harbor Marina and RV Park both are located on the waterside of the Sacramento River South Levee, in Segments F and E, respectively. These are the only two marinas in West Sacramento. Both offer a large number of boat slips, and Sherwood Harbor is the only riverfront RV park in the Sacramento metropolitan area. Visitors must use the levee-top road (South River Road) to access the marinas, but temporary closure of the levee road will be necessary during Alternative 1 construction activities. Closure of the city's only marinas would direct reduce the availability of existing recreational boating opportunities in the project vicinity. However, with implementation of the EC to preserve marina access (described in Chapter 2, Section 2.4.10, Preserve Marina Access), this direct effect would be less than significant. No mitigation is required.

Effect REC-3: Temporary Disruption of Recreational Boating Activities during Construction

Placement of rock slope protection may require in-channel construction activities that could temporarily disrupt recreational boating and personal watercraft use. Temporary disruption of recreational boating, as well as temporary construction effects on channel water quality (i.e., increased turbidity from suspended materials), would result from the presence of construction vehicles, equipment, and personnel in and adjacent to the Sacramento River.

The disruption of recreational boating in the area would be temporary, and WSAFCA would implement the EC to reduce construction-related effects on navigation (as described in Chapter 2, Section 2.4.9, Minimize Construction-Related Effects on Navigation). This EC includes measures to ensure that:

- Construction would not occur during major summer holiday periods.
- Warning signs and buoys would be posted at, upstream of, and downstream of all construction equipment, sites, and activities.

Therefore, this direct effect would be less than significant. No mitigation is required.

Effect REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor

Alternative 1 would necessitate removal of waterside vegetation to accommodate the placement of rip-rap for erosion control. This zone would be maintained free of trees and other woody vegetation in perpetuity.

A narrow band of mature riparian forest currently exists on the waterside slope of the Sacramento River South Levee. This forest is enjoyed by many types of recreationists. Anglers rely on the trees to provide shade during fishing activities, and wildlife viewers are attracted to the mature woody vegetation because of the wealth of wildlife such vegetation supports. Many other users, including pedestrians, bicyclists, equestrians and boaters, also rely on this riparian forest for shade and for the visual character it contributes to the landscape (visual effects of permanent vegetation removal are discussed in Section 3.14, Visual Resources).

Permanent loss of the riparian forest along the project length would substantially reduce the quality of existing recreation activities in the area and therefore is a considered significant direct effect. No feasible mitigation is available to reduce this effect to a lesser level.

Effect REC-5: Incompatibility with Planning Documents

The City of West Sacramento Parks Master Plan identifies the 50-acre site nestled in the crook of Oak Hall Bend (Segment C) as the future location of Southport Community Park (now referred to as River Park). The City planned to develop this site into a riverfront community park featuring sports fields, picnic grounds, special facilities, and a venue for community events. However, construction of the adjacent levee, seepage berm, and landside O&M corridor under Alternative 1 would expand the footprint of the flood management structure into the planned park. This is incompatible with the park as described in the Parks Master Plan, as presence of the expanded flood management structure would either substantially reduce the amount of possible recreational amenities at the park, or make construction of the park infeasible.

However, the Parks Master Plan was written and adopted in 2003, before the city's levee deficiencies were fully understood. Following adoption of the Parks Master Plan, the City has decided not to construct any planned recreation facilities that are on or near levees until flood risk–reduction measures have been completed, in part because the City would not want any lost investment in recreation improvements that would be damaged by or removed to allow subsequent implementation of flood risk–reduction measures. An additional factor is that the City participated in a riverfront master plan effort jointly with the City of Sacramento in which it was recognized that recreation on the river corridor more appropriately would focus on river-dependent open space activities (as opposed to sports fields or similar uses that could be located elsewhere with no loss in function. This means that even if the Southport project is not constructed, the City still likely would not build River Park as it was planned in 2003 and likely would not undertake any construction until flood risk–reduction measures were implemented along the Sacramento River South Levee. Any such flood risk–reduction measure would be expected to force a reduction in park size or make construction of the park infeasible. Additionally, the City is considering changes to their land use policy that would designate a flood management zone along the river corridor, which would limit development of any permanent facilities near the levees. It is anticipated that the City's General Plan Update, which is expected to be released in early 2015, will incorporate these changed circumstances, and, specifically, the Southport project.

The lost functions of River Park can be replaced in other undeveloped areas of Southport. For example, the City has proposed the Southport Sacramento River Corridor Recreation Program(ICF International 2013), which details plans for development of a riverfront recreational parkway and includes recreational amenities that were not identified in the Parks Master Plan at the time of its publication. Along with the multi-use recreational trail proposed for construction under Alternative 1, the Recreation Program amenities include, but are not limited to, parking areas, picnic areas, viewing patios, and interpretive kiosks and would combine with the trail to create a linear parkway.

Therefore, because Alternative 1 alone would not preclude development of River Park, and with its lost functions replaced with the Parkway described in the Southport Sacramento River Corridor Recreation Program, this indirect effect is less than significant.

3.14.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on recreation (Table 3.14-3).

Table 3.14-3. Recreation Effects and Mitigation Measures for Alternative 2

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
REC-1: Temporary Disruption of Recreation Opportunities during Construction	Less than significant	No effect	NA	None
REC-2: Temporary Obstruction of Access to Marina or Boat Launch Facilities during Construction	Less than significant	No effect	NA	None
REC-3: Temporary Disruption of Recreational Boating Activities during Construction	Less than significant	No effect	NA	None
REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor	Less than significant	No effect	NA	None
REC-5: Incompatibility with Planning Documents	No effect	Less than significant	NA	None

Effect REC-1: Temporary Disruption of Recreation Opportunities during Construction

Under Alternative 2, this direct effect would be the same as described under Alternative 1. This effect is less than significant with the EC requiring notification of construction area closure (described in Chapter 2, Section 2.4.8, Construction Area Closure Notification). No mitigation is required.

Effect REC-2: Temporary Obstruction of Access to Marina Facilities during Construction

Under Alternative 2, this direct effect would be the same as described under Alternative 1. This effect is less than significant with the EC to preserve marina access (described in Chapter 2, Section 2.4.10, Preserve Marina Access). No mitigation is required.

Effect REC-3: Temporary Disruption of Recreational Boating Activities during Construction

Under Alternative 2, this direct effect would be similar to that described under Alternative 1. Alternative 2 calls for less rock slope protection placement than Alternative 1, but any in-water construction work would cause temporary disruption of recreational boating in the Sacramento River. This effect is less than significant with the EC to reduce construction-related effects on navigation (described in Chapter 2, Section 2.4.9, Minimize Construction-Related Effects on Navigation). No mitigation is required.

Effect REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor

Under Alternative 2, the woody vegetation in Segments A, G, and a portion of B would be removed to accommodate the placement of rip-rap for erosion control, as well as in other areas along the existing levee where the levee would be degraded (see Section 3.8, Vegetation and Wetlands, for a discussion of effects on vegetation). The loss of vegetation, as well as the loss of river access caused by the removal of South River Road, would result in a long-term reduction in quality of existing recreation opportunities in the levee corridor.

However, as described in the Southport Sacramento River Corridor Recreation Program (ICF International 2013), construction of a setback levee provides a substantial opportunity for recreation enhancements because of offset floodplain area, the large amount of natural space that would be opened up between the Sacramento River and the new levee. In addition, bike lanes would be constructed along the new Village Parkway, which would help offset the loss of South River Road as a cycling corridor. Because loss of any mature riparian woody vegetation would be mitigated onsite within the offset area, and because construction of the setback levees would open up a significant amount of land to public recreational use, this direct effect is less than significant.

Effect REC-5: Incompatibility with Planning Documents

Under Alternative 2, this indirect effect would be the same as described under Alternative 1. Because Alternative 2 alone would not preclude development of River Park, and with its lost functions replaced with the Parkway described in the Southport Sacramento River Corridor Recreation Program, this effect is less than significant.

3.14.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on recreation (Table 3.14-4).

Table 3.14-4. Recreation Effects and Mitigation Measures for Alternative 3

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
REC-1: Temporary Disruption of Recreation Opportunities during Construction	Less than significant	No effect	NA	None
REC-2: Temporary Obstruction of Access to Marina or Boat Launch Facilities during Construction	Less than significant	No effect	NA	None
REC-3: Temporary Disruption of Recreational Boating Activities during Construction	Less than significant	No effect	NA	None
REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor	Significant	No effect	Significant and unavoidable	No feasible mitigation
REC-5: Incompatibility with Planning Documents	No effect	Less than significant	NA	None

Effect REC-1: Temporary Disruption of Recreation Opportunities during Construction

Under Alternative 3, this direct effect would be the same as described under Alternative 1. This effect is less than significant with the EC requiring notification of construction area closure (described in Chapter 2, Section 2.4.8, Construction Area Closure Notification). No mitigation is required.

Effect REC-2: Temporary Obstruction of Access to Marina Facilities during Construction

Under Alternative 3, this direct effect would be the same as described under Alternative 1. This effect is less than significant with the EC to preserve marina access (described in Chapter 2, Section 2.4.10, Preserve Marina Access). No mitigation is required.

Effect REC-3: Temporary Disruption of Recreational Boating Activities during Construction

Under Alternative 3, this direct effect would be the same as described under Alternative 1. This effect is less than significant with the EC to reduce construction-related effects on navigation (described in Chapter 2, Section 2.4.9, Minimize Construction-Related Effects on Navigation). No mitigation is required.

Effect REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor

Under Alternative 3, this direct effect would be the same as described under Alternative 1. Permanent loss of riparian forest along the project reach would substantially reduce the quality of existing recreation activities in the area, and is therefore considered significant. No feasible mitigation is available to reduce this effect to a lesser level.

Effect REC-5: Incompatibility with Planning Documents

Under Alternative 3, this indirect effect would be the same as described under Alternative 1. Because Alternative 3 alone does not preclude development of River Park, and with its lost functions replaced with the Parkway described in the Southport Sacramento River Corridor Recreation Program, this effect is less than significant.

3.14.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on recreation (Table 3.14-5).

Table 3.14-5. Recreation Effects and Mitigation Measures for Alternative 4

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
REC-1: Temporary Disruption of Recreation Opportunities during Construction	Less than significant	No effect	NA	None
REC-2: Temporary Obstruction of Access to Marina or Boat Launch Facilities during Construction	Less than significant	No effect	NA	None
REC-3: Temporary Disruption of Recreational Boating Activities during Construction	Less than significant	No effect	NA	None
REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor	Less than significant	No effect	NA	None
REC-5: Incompatibility with Planning Documents	No effect	Less than significant	NA	None

Effect REC-1: Temporary Disruption of Recreation Opportunities during Construction

Under Alternative 4, this direct effect would be the same as described under Alternative 1. This effect is less than significant with the EC requiring notification of construction area closure (described in Chapter 2, Section 2.4.8, Construction Area Closure Notification). No mitigation is required.

Effect REC-2: Temporary Obstruction of Access to Marina Facilities during Construction

Under Alternative 4, this direct effect would be the same as described under Alternative 1. This effect is less than significant with the EC to preserve marina access (described in Chapter 2, Section 2.4.10, Preserve Marina Access). No mitigation is required.

Effect REC-3: Temporary Disruption of Recreational Boating Activities during Construction

Under Alternative 4, this direct effect would be the same as described under Alternative 2. This effect is less than significant with the EC to reduce construction-related effects on navigation (described in Chapter 2, Section 2.4.9, Minimize Construction-Related Effects on Navigation). No mitigation is required.

Effect REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor

Under Alternative 4, this direct effect would be similar to the effect described under Alternative 2, with removal of vegetation along Segment F to accommodate placement of rip-rap as well. Because a large portion of mature riparian woody vegetation would be preserved under this alternative, and because construction of the setback levees would open up a significant amount of land to public recreational use, this effect is less than significant.

Effect REC-5: Incompatibility with Planning Documents

Under Alternative 4, this indirect effect would be the same as described under Alternative 1. Because Alternative 4 would not preclude development of River Park, and with its lost functions replaced with the Parkway described in the Southport Sacramento River Corridor Recreation Program, this effect is less than significant.

3.14.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on recreation (Table 3.14-6).

Table 3.14-6. Recreation Effects and Mitigation Measures for Alternative 5

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
REC-1: Temporary Disruption of Recreation Opportunities during Construction	Less than significant	No effect	NA	None
REC-2: Temporary Obstruction of Access to Marina or Boat Launch Facilities during Construction	Less than significant	No effect	NA	None
REC-3: Temporary Disruption of Recreational Boating Activities during Construction	Less than significant	No effect	NA	None
REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor	Less than significant	No effect	NA	None
REC-5: Incompatibility with Planning Documents	No effect	Less than significant	NA	None

Effect REC-1: Temporary Disruption of Recreation Opportunities during Construction

Under Alternative 5, this direct effect would be the same as described under Alternative 1. This effect is less than significant with the EC requiring notification of construction area closure (described in Chapter 2, Section 2.4.8, Construction Area Closure Notification). No mitigation is required.

Effect REC-2: Temporary Obstruction of Access to Marina Facilities during Construction

Under Alternative 5, this direct effect would be the same as described under Alternative 1. This effect is less than significant with the EC to preserve marina access (described in Chapter 2, Section 2.4.10, Preserve Marina Access). No mitigation is required.

Effect REC-3: Temporary Disruption of Recreational Boating Activities during Construction

Under Alternative 5, this direct effect would be the same as described under Alternative 2. This effect is less than significant with the EC to reduce construction-related effects on navigation (described in Chapter 2, Section 2.4.9, Minimize Construction-Related Effects on Navigation). No mitigation is required.

Effect REC-4: Long-Term Reduction in Quality of Existing Recreation Opportunities in the Levee Corridor

Under Alternative 5, this direct effect would be the same as described under Alternative 2. Because a large portion of mature riparian woody vegetation would be preserved under this alternative, and because construction of the setback levees would open up a significant amount of land to public recreational use, this effect is less than significant.

Effect REC-5: Incompatibility with Planning Documents

Under Alternative 5, this indirect effect would be the same as described under Alternative 1. Because Alternative 5 alone would not preclude development of River Park, and with its lost functions replaced with the Parkway described in the Southport Sacramento River Corridor Recreation Program, this effect is less than significant.

3.15 Utilities and Public Services

3.15.1 Affected Environment

This section describes the affected environment for utilities and public services in the Southport project area.

3.15.1.1 Regulatory Framework

State

The following state regulations related to utilities and public services may apply to implementation of the Southport project.

California Public Utilities Commission

The California Public Utilities Commission (CPUC) regulates privately owned telecommunications, electric, natural gas, water, railroad, rail transit, and passenger transportation companies in the state.

California Integrated Waste Management Act

The enactment of AB 939 known as the Integrated Waste Management Act, established the California Integrated Waste Management Board and set forth aggressive solid waste diversion requirements. Under AB 939, every city and county in California is required to reduce the volume of waste sent to landfills by 50% through recycling, reuse, composting, and other means. AB 939 requires counties to prepare a countywide integrated waste management plan (CIWMP).

Local

The following local policies related to utilities and public services may apply to implementation of the Southport project.

Yolo County General Plan

The Public Facilities and Services Element of the Yolo County General Plan provides guidance and information to ensure that infrastructure and services will be sufficient to support existing and new development (Yolo County 2009).

City of West Sacramento General Plan

The City of West Sacramento General Plan Policy Document (City of West Sacramento 2004) defines the policies and objectives governing City responsibilities for public utilities and services.

Stormwater Drainage

City of West Sacramento General Plan Section IV, Goal C, states that the City will maintain an adequate level of service in the storm drainage system to accommodate runoff from existing and future development and to prevent property damage from flooding. The policies to accomplish this goal are listed below.

1. Where practical and economical, the City shall upgrade existing drainage facilities as necessary to correct localized flooding problems.
2. The City shall cooperate with other responsible agencies in ensuring that levees surrounding the city are maintained and improved to provide a minimum 200-year flood protection.

Water

The City provides water to its constituents in accordance with the *City of West Sacramento General Plan*, Section IV, Goal A. This goal states the City will maintain an adequate level of service in the water system to meet the needs of existing and future development.

Wastewater

The City of West Sacramento manages the wastewater according to the City of West Sacramento General Plan, Section IV, Goal B. The City states it will maintain an adequate level of service in the City's sewage collection and disposal system to meet the needs of existing and future development.

Solid Waste

Solid waste disposal is provided by Yolo County and governed by the City of West Sacramento General Plan, Section IV, Goal D, in close consultation with Yolo County Department of Public Works. This plan defines the programs for recycling and reuse, resource recovery, and disposal. The City commits to provide for the collection and disposal of solid waste while minimizing the generation of waste.

Public Services

The placement of public services in the City is authorized by the City of West Sacramento Planning Department in accordance the goals and policies established in the City of West Sacramento General Plan, Section IV. The City of West Sacramento Public Works Department is responsible for operating and maintaining city roads, which serve as emergency vehicle routes.

3.15.1.2 Environmental Setting

This section discusses the environmental setting related to utilities and public services in the Southport project area.

Electricity and Gas

Electric and natural gas service is provided to West Sacramento customers by The Pacific Gas and Electric Company (PG&E). PG&E currently operates a standard 12 kilovolt (kV) electrical distribution line supported by overhead wooden poles located along South River Road, roughly parallel to the Southport project levee. In addition, the Sacramento Municipal Utility District operates a standard 12kV electrical line that provides electricity to the Sacramento Regional County Sanitation District (SRCSD) sewer interceptor pump station located south of the South Cross Levee.

Chevron operates an 8 inch petroleum underground pipeline that runs parallel to South River Road at Segment A. Avoidance of this pipeline is discussed further in Section 3.16, Public Health and Environmental Hazards.

Communication

Communication service in the project area is provided by multiple providers, including AT&T and Pacific Bell. AT&T operates underground and overhead telephone lines that are located parallel to the Southport project levee; overhead lines typically utilize PG&E electrical distribution line facilities. The above and below ground lines typically are aligned parallel to roadways and then traverse the roadways to supply individual service units. In addition to the telephone lines, the American Tower Corporation (ATC) operates a cellular communication tower at the corner of Linden Road and South River Road.

Water Service

The city's main water source is the Sacramento River. The intake structure is located at Bryte Bend, upstream of the confluence of the Sacramento and American Rivers. Water withdrawn from the Sacramento River is treated at the Bryte Bend Water Treatment Plant, which is operated 24 hours a day by state-certified water treatment plant operators.

Water distribution infrastructure is present only at the Riva subdivision in the northern portion of the project area (Segment G) and the area south of Linden Road (Segments E and F). All other properties near the Southport levee use private wells for water supply. Most of the wells are domestic wells, but there are also a number of irrigation wells located in the project area. A preliminary estimate of private wells in each segment made by Luhdorff & Scalmanini (2011) shows at least 38 domestic and six irrigation wells within about 500 feet of the Southport levee. Private well locations were included in a survey of infrastructure near the Southport levee conducted in 2012.

Stormwater and Drainage

Stormwater management in West Sacramento is a cooperative effort between the City, the local reclamation districts, and the State of California. The State and the local reclamation districts share responsibility for the levees that manage flood risk from the river and the City shares responsibility with the reclamation districts for stormwater infrastructure inside the city. Most of the City, including the entire Southport area, lies within Reclamation District 900 (RD 900). The primary drainage facilities in the Southport area are the Main Drainage Canal and the Main Drain Pump Station. The Canal collects stormwater drainage from the area and carries it south to the Pump Station, which discharges into the DWSC (City of West Sacramento Department of Community Development 1990).

Infrastructure within the project area consists of storm drain inlets, storm drain manholes, and a storm drain main line within the Washington Boulevard and Village Parkway right of ways in Segments F and G (Coward pers. comm. 2011).

As described in Chapter 2, Section 2.2.3.3, Common Elements and Assumptions, an irrigation pump station maintained by RD 900 is located in Segment F at the corner of Linden Road and South River Road.

Wastewater

The City currently performs wastewater treatment operations at its Wastewater Treatment Plant (WWTP) on South River Road, just north of the DWSC. The WWTP was constructed in 1951 and has been expanded to its current treatment capacity of 7.5 million gallons per day (mgd). Sewage reaches the plant through a network of collector lines, main interceptor lines, pump stations, and force mains. In the project area, transmission of wastewater is facilitated by 6-inch sanitary sewer lines. There are two operating pump stations in the Southport area. The Bridgeway Island Station serves the development in the Northwest Village area and the Southport Station serves the development in the Northeast Village area. Some areas within the Southport area remain without connection to the sewer system and utilize septic systems.

Sanitary infrastructure within the project area consists of both manholes and main lines. Two sanitary manholes border Segment A and B of the project area, and sanitary sewer main lines may exist in borrow areas east of the project area (Coward pers. comm. 2011). SRCSD operates the 120-inch Southport Gravity Sewer wastewater interceptor pipeline that runs through portions of the potential borrow areas and adjacent to Segment A. (Sacramento Regional County Sanitation District 2008; Mui 2011). Avoidance of this pipeline is discussed further in Section 3.16, Public Health and Environmental Hazards.

Solid Waste

Solid waste disposal is governed by the City of West Sacramento General Plan in close consultation with Yolo County Department of Public Works. This plan defines the programs for recycling and reuse, resource recovery, and disposal. Solid waste currently is disposed of at the Yolo County Central Landfill located in the city of Davis. As of July 2011, the remaining capacity is 36.5 million cubic yards (Kieffer pers. comm. 2012).

Utility and Service System Encroachments

The project encroaches upon multiple types of utility and service system equipment, including wells, septic tanks, electric and telephone transmission lines, irrigation infrastructure, pump station infrastructure, cellular and radio towers, gas pipelines, and other service infrastructure along the Southport Sacramento River project reach as described under the project alternatives descriptions.

An inventory of existing utilities and permitted encroachments that because of the project may require modification or relocation was compiled in a technical memorandum, titled, *Previous Existing Utilities and Encroachment Document*, provided by HDR (dated October 25, 2011) (HDR 2011). The report consists of information from a variety of data sources which included field inspection reports and research, as part of the levee evaluation survey work which was adopted into the *Draft Problem Identification Report* (dated April 2008) (HDR 2008), and review of Central Valley Flood Protection Board encroachment permits. The utilities listed in the inventory may not be in compliance with the CVFPB and USACE utility placement standards within levees. Table 3.15-1 lists known utilities, not including ground wells and septic systems, requiring relocation or modification in the Southport project area from the technical memorandum inventory created by HDR. The technical memorandum is located in Appendix F.

Table 3.15-1. Known Utilities Requiring Relocation or Modification in the Southport Project Area

Segment	Approximate Stations	Utility	Owner	The Utility is Affected by the following Alternative				
				1	2	3	4	5
A–G	00+00-281+00	12-kV Electric Line	PG&E	X	X	X	X	X
F	236+81	Cellular Facility (Tower and Buildings)	Unknown	X	X	X	X	X
F	236+81	Communication Tower	Unknown	X	X	X	X	X
F	228+50	Boat Dock with Electric and Water Lines	Private Owner		X	X	X	X
F	227+78	Landscape Irrigation Lines	Sacramento Yacht Club		X	X	X	X
F	215+90	Electric Lines to Driftwood Boat Harbor Club House	Private Owner	X	X	X	X	X
C	108+00	8-inch Metal Pipe	Unknown		X		X	X
C	95+00	Communication Tower	Unknown	X	X	X	X	X
A, B, and F	52+75–46+35, 259+60, 53+30–00+00	Overhead and Underground Telephone Line	AT&T, Pacific Bell	X	X	X	X	X
A	5+00	Radio Tower	Unknown		X		X	X

Source: HDR 2011 (Appendix F).

Public Services

Fire Protection

The City's Fire Department has the mission of protecting life, environment, and property within the city of West Sacramento. The fire stations servicing the Southport project area are Stations 42 and 45. They are open 24 hours a day, 7 days a week.

Police Protection

The Police Department provides a full range of police services to the residents of West Sacramento 24 hours a day, 7 days a week.

The Police Department is staffed with 75 sworn officers and 39 civilian full-time employees. Other positions include part-time police officers, parking enforcement officers, reserve police officers, and volunteers.

Emergency Medical Services

No hospitals are located in the city of West Sacramento. The nearest hospital is Sutter General Hospital, which is 3.7 miles from West Sacramento at 29th Street in Sacramento.

3.15.2 Environmental Consequences

This section describes the environmental consequences relating to utilities and public services for the Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.15.2.1 Assessment Methods

This evaluation of utilities and public services is based on professional standards and information cited throughout the section.

The key effects were identified and evaluated based on the environmental characteristics of the Southport project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project.

This evaluation of utilities and public services is based on information obtained from the following sources.

- A review of relevant documents and Web sites to obtain information regarding known public services and utilities in the study area.
- The analysis of geographic map research to determine locations of existing utilities and public services for project components.

3.15.2.2 Determination of Effects

For this analysis, an environmental effect was significant related to utilities and public services if it would result in any of the effects listed below. These effects are based on common NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

- Require the construction or expansion of electrical or natural gas transmission or distribution facilities.
- Require the construction or expansion of a water conveyance or wastewater treatment facility or require new or expanded water supply entitlements.
- Require the construction of new or expanded stormwater drainage facilities.
- Cause the capacity of a solid waste landfill to be reached sooner than it would without the project.
- Require the construction or expansion of communications facilities (telephone, cell, cable, satellite dish).
- Significantly affect public utility facilities that are located underground or aboveground along the local roadways as a result of project construction activities.
- Create an increased need for new fire protection, police protection, or ambulance services or significantly affect existing emergency response times or facilities.
- Intersect with major infrastructure components, such as bridges or overpasses, requiring relocation of the components.

The Southport project would not involve any changes that would increase demand for electricity or natural gas and would not require the construction or expansion of electrical or natural gas transmission lines or public utilities. Similarly, implementation of the project would not require the construction or expansion of water conveyance or wastewater treatment facilities, nor would it require the relocation of major infrastructure.

3.15.3 Effects and Mitigation Measures

3.15.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be implemented. No construction-related effects relating to utilities and public services such as electric power, natural gas, and communications transmission, water supply, wastewater, and solid waste service, and stormwater drainage would occur. Therefore, there would be no effect on utilities and public services attributable to the implementation of the No Action Alternative. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

As discussed in Chapter 2, "Alternatives," there are three possible scenarios related to the levee vegetation policy under the No Action Alternative.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

However, no utilities or public services would be affected by the implementation of any of the three vegetation management scenarios.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.15.3.2 Alternative 1

Implementation of the Southport Alternative 1 would result in the following effects on utilities and public services (Table 3.15-2).

Table 3.15-2. Utilities and Public Services Effects and Mitigation Measures for Alternative 1

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
UTL-1: Potential Temporary Disruption of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction	Significant	Significant	Less than significant	UTL-MM-1: Coordinate with Water Supply Users before and during All Water Supply Infrastructure Modifications and Implement Measures to Minimize Interruptions of Supply
UTL-2: Decrease in Domestic and Irrigation Water Supply	No effect	Significant	Less than significant	UTL-MM-2: Restore Affected Domestic and Irrigation Water Service to Pre-project Conditions
UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction	Significant	No effect	Less than significant	UTL-MM-3: Verify Utility Locations, Coordinate with Utility Providers, Prepare a Response Plan, and Conduct Worker Training
UTL-4: Increase in Solid Waste Generation due to Project Construction	No effect	Less than significant	NA	None
UTL-5: Increase in Emergency Response Times during Project Construction	Less than significant	No effect	NA	None

Effect UTL-1: Potential Temporary Disruption of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction

As described in Section 2.2.3.3, Land Acquisition, Structure and Utility Relocation, and Road Construction, and in detail below, implementation of Alternative 1 would require modifications to domestic water supply, irrigation, and drainage infrastructure. Water supply and irrigation/drainage infrastructure includes domestic and irrigation wells, and drainage canals. The private wells and drainage canals in the footprint of the proposed flood risk–reduction facilities would be removed and replaced in locations farther from the project footprint. Relocated wells would be replaced with in-kind structures compatible with the new levee footprint.

Repair, replacement, or relocation of public infrastructure elements would provide water supply and drainage service equivalent to existing code. Construction of Alternative 1 could result in the need to temporarily take individual water supply and drainage infrastructure elements out of service for short periods, anticipated to last no longer than 4 hours at a time. Because the potential exists for damage to cause delay in provisions of water supply and drainage infrastructure elements, this potential construction direct and indirect effect is considered significant. Mitigation Measure UTL-MM-1 would reduce this potential effect to a less-than-significant level.

The timing of these replacements would be planned, to the extent feasible, to prevent disruptions of service.

Mitigation Measure UTL-MM-1: Coordinate with Water Supply Users before and during All Water Supply Infrastructure Modifications and Implement Measures to Minimize Interruptions of Supply

WSAFCA will ensure the following measures are implemented to avoid and minimize potential for domestic and irrigation water supply interruptions during construction activities.

- Coordinate the timing of all modifications to domestic and irrigation water supply infrastructure with the affected infrastructure owners and water supply users.
- Include detailed scheduling of the phases of modifications/replacement of existing domestic and irrigation water supply infrastructure components in project design and in construction plans and specifications.
- Provide temporary relocation housing to residents if their water service is interrupted for 8 hours or longer.
- Plan and complete modifications of irrigation infrastructure for the non-irrigation season to the extent feasible.
- Provide for alternative water supply, if necessary, when modification/replacement of irrigation infrastructure must be conducted during a period when it otherwise would be in normal use by an irrigator.
- Ensure either that (1) users of irrigation water supply do not, as a result of physical interference associated with the project, experience a substantial interruption in irrigation supply when such supply is needed for normal, planned farming operations or (2) compensate users of irrigation water supply that experience a substantial decrease in an existing level of service (that meets the established standards for the project area) in kind for losses associated with the reduction in level of service.

Effect UTL-2: Decrease in Domestic and Irrigation Water Supply

The potential effects of slurry cutoff walls on water supply provided by domestic and irrigation wells include lower groundwater levels, reduced well capacities, and increased pumping costs. Changes in water quality are addressed in Section 3.2, Water Quality and Groundwater Resources. It is anticipated that shallow wells within 500 feet or less of a deep slurry wall would be the most affected. However, the extent of the effects would vary by location. Well depth information is not currently available for most wells near the Southport levee, but several are known to be shallow (less than 120 feet deep).

Luhdorff & Scalmanini (2012) developed groundwater flow models to estimate the potential effects of proposed slurry cutoff walls on private wells near the Southport levee. The potential reductions in domestic and irrigation well capacities were estimated based on simulated changes in groundwater levels as a result of the cutoff walls. One model was developed for Segments A through C, and a separate model was created for Segments F and G due to deeper cutoff walls proposed for that area under all project alternatives. The magnitude of the effect in each area is directly related to the length and depth of the proposed cutoff wall. Model results for Segments B and C were also used to estimate impacts in Segments D and E because geologic conditions and proposed cutoff wall depths are similar in these segments.

Pumping of domestic wells, small-capacity irrigation wells, and large-capacity irrigation wells was simulated in Segments A through C. Simulations conducted for Segments F and G were limited to domestic and small-capacity irrigation wells because there is no large-scale irrigation in that area. Domestic well pumping was simulated throughout the year, but irrigation well pumping was only simulated during a 6-month irrigation season. As shown in Table 3.15-3, the shallow slurry cutoff walls proposed for Segments A, D, and E are predicted to have negligible effects on groundwater levels or well capacities. The lack of impact is due to the fact that the shallow cutoff walls proposed for these segments would not penetrate any of the water-bearing sands tapped by the domestic or irrigation wells (Luhdorff & Scalmanini 2012).

In all alternatives, a deeper slurry cutoff wall, not to exceed 84 feet in depth, is proposed for Segment G. The Luhdorff & Scalmanini model results show that a combination of lower static and pumping groundwater levels likely would occur on the landside of the cutoff wall during most periods. The lower water levels could cause reduced well capacities and increased pumping costs. The estimates shown in Table 3.15-3 are for wells located in proximity (150 feet) to the slurry cutoff wall in Segment G; impacts would be smaller for wells located farther from the wall. For domestic wells that pump year-round, the change in static groundwater levels is predicted to range from about +2 to -11 feet, with an average of -1 foot. For irrigation wells, which only pump during the irrigation season, the change in static water levels is estimated to range from about +2 to -3 feet, with an average of -0.1 foot. In both cases, water level increases are predicted to occur when groundwater flow is toward the river. Water level decreases would occur when groundwater flow is away from the river, and the largest water level decreases would occur during the periods of highest stage. Because high stage events have short durations, the average water level decrease is much lower than the maximum decrease. Impacts would be smallest during the irrigation season when the lowest pumping water levels normally occur. No impacts on groundwater quality would be anticipated as a result of these relatively small changes in groundwater levels.

In addition to lower static groundwater levels, some wells could experience increased drawdown during pumping periods because the cutoff walls would partially isolate the wells from the river and reduce the effective volume of the aquifer in that direction. Two conditions would need to be met for this impact to occur: (1) the cutoff wall must be deep enough to penetrate the water-bearing zone tapped by the well, and (2) the cone of depression produced by the well must be large enough to intersect the cutoff wall. The latter could occur due to a combination of the pumping rate of the well, the duration of the pumping cycles, and the proximity of the well to the cutoff wall. The model results summarized in Table 3.15-3 indicate that this impact would not occur in Segments A through F because the proposed cutoff walls are too shallow. In Segment G, domestic wells would not experience increased drawdowns because the pumping rate is too low and the pumping cycles are too short. A small-capacity irrigation well was simulated in Segment G, and the results show that such a well could experience a small increase in drawdown ranging from about 0.3 to 2.9 feet, with an average of 1.6 feet (Luhdorff & Scalmanini 2012).

Table 3.15-3. Estimated Effects on Domestic and Irrigation Wells, Alternatives 1 through 5

Well Type[1]	Levee Segment	Change in Static Water Level[2] (feet)		Increase in Well Drawdown[2] (feet)		Change in Pumped Well Capacity[3] (%)	
		Range	Average	Range	Average	Range	Average
Domestic	A through F	0	0	0	0	0	0
	G	+1.9 to -10.5	-1	0	0	+2 to -17	-1
Irrigation[4]	A through F	0	0	0	0	0	0
	G	+1.9 to -2.9	0	0.3 to 2.9	1.6	+3 to -17	-2.9

Source: Luhdorff & Scalmanini 2012.

[1] Domestic well pumping rate = 40 gallons per minute (gpm). Irrigation well pumping rate = 200 gpm.

[2] The change in water levels and well drawdown are based on the results of the MODFLOW model simulations. A positive drawdown is equivalent to a negative change in water level.

[3] The potential decrease in pumped well capacity is based on the following assumptions: (a) horsepower remains relatively constant; (b) discharge pressure is 40 pounds per square inch (psi) for domestic and 6.5 psi for irrigation wells; (c) existing static water levels are assumed to be 10 feet below ground surface (ft bgs) during irrigation season and 5 ft bgs during off season, and (d) increased head can result in a 0 to 5% decline in bowl efficiency.

[4] Irrigation well pumping was only simulated during the irrigation season. There are no known irrigation wells in Segment G, but a small-capacity irrigation well was simulated in this segment.

Wells could experience reduced pumping capacities due to a combination of lower static water levels and increased drawdown. As shown in Table 3.15-3, no change in pumping capacity would be expected in Segments A through F, but wells in Segment G would experience slightly reduced capacities because of generally lower water levels caused by the cutoff wall. For wells in Segment G, the change in capacity is estimated to range from +3 to -17%, with an average of -1% for domestic wells and -2.9% for irrigation wells.

Although some of the maximum predicted effects on well capacities are relatively large on a percentage basis, these would occur only during high-stage events. In almost all cases, wells could continue to pump enough water to meet existing demands, but some well owners may experience slightly increased pumping costs. This would be an indirect effect from effects on pumped well capacity. However, the predicted effects are limited to Segment G, and there are very few wells in this area. These effects are considered to be significant. Mitigation Measure UTL-MM-2 would reduce the effects to a less-than-significant level.

Mitigation Measure UTL-MM-2: Restore Affected Domestic and Irrigation Water Service to Pre-project Conditions

In the event that significant effects on groundwater supply attributable to implementation of Alternative 1 are identified through user reporting, monitoring, and comparison with baseline conditions, WSAFCA will work with the affected user to restore affected domestic and irrigation water service to preproject conditions. Mitigation options will be equal in user cost, quality and convenience to the previous source. Such options include, but are not limited to, monetary compensation; lowering or replacement of well pumps; or installation of a new well. If an affected user is within the City's municipal water service area, water may be supplied from the City's current water system.

Effect UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction

Construction of the Alternative 1 could necessitate the relocation of utility infrastructure, which could result in temporary loss of service. As described above in the Environmental Setting section and in Chapter 2, in the Land Acquisition, Structure and Utility Relocation, and Road Construction section, existing infrastructure in the Alternative 1 project area includes telephone lines, electric lines, water lines, Chevron petroleum line, storm drains, and sewer utilities.

Utility infrastructure could require significant actions to repair, relocate, or replace. Additionally, Alternative 1 construction could necessitate that existing utilities be taken off line or could cause accidental damage to identified and unidentified infrastructure. Because the potential exists for damage and service interruptions to existing utilities, the direct effect of this potential construction effect is considered significant. Mitigation Measure UTL-MM-3 would reduce this potential effect to a less-than-significant level.

Mitigation Measure UTL-MM-3: Verify Utility Locations, Coordinate with Utility Providers, Prepare a Response Plan, and Conduct Worker Training

WSAFCA will ensure the following measures are implemented to avoid and minimize potential damage to utilities and service disruptions during construction. Implementing these measures will help ensure existing utilities are not damaged and that service interruptions are minimized.

- Obtain utility excavation or encroachment permits as necessary before initiating any work with the potential to affect utility lines, and include all necessary permit terms in construction contract specifications.
- Before starting construction, coordinate with the CVFPB and utility providers in the area to locate existing lines and to implement orderly relocation of utilities that need to be removed or relocated. Avoid relocating utilities when possible. Provide notification of potential interruptions in services to the appropriate agencies.
- Before starting construction, verify utility locations through field surveys and the use of the Underground Service Alert services. Clearly mark any buried utility lines in the area of construction before any earthmoving activity.
- Before starting construction, prepare a response plan to address potential accidental damage to a utility line. The plan will identify chain-of-command rules for notifying authorities and appropriate actions and responsibilities to ensure the safety of the public and the workers. Contractors will conduct worker training to respond to these situations.
- Stage utility relocations to minimize service interruptions.

Effect UTL-4: Increase in Solid Waste Generation due to Project Construction

Implementation of Alternative 1 may generate up to approximately 558,500 cubic yards of solid waste that would require disposal. Sources of solid waste related to construction activities would include cleared vegetation and structural debris from removal of residences and agricultural structures within the project footprint. A portion of the waste material resulting from the degradation of the existing levee could be disposed of on-site and used for new levee construction, if it is suitable material. Disposal of the soil material would occur if soil characteristics make it infeasible for reuse as levee material or the soil is determined to have contaminants that would require appropriate disposal. Embankment fill material excavated to construct flood risk–reduction measures would be evaluated for reuse after excavation and prior to disposal. Solid waste requiring disposal as part of Alternative 1 likely would be transported to the Yolo County Central Landfill; however, the location of the landfill used for disposal of spoil material and other construction-related waste may be determined by the construction contractor at the time of construction activity based on capacity, type of waste, and other factors. Only those landfills determined to have the ability to accommodate the construction disposal needs of Alternative 1 would be used.

As of July 2011, the remaining waste capacity for the Yolo County Central Landfill was 36.5 million cubic yards. Some of the disposed soils may be deemed suitable by the Yolo County Central Landfill for other beneficial uses. These soils would be stored only temporarily at the landfill and would not have an effect on its overcall capacity. The current landfill closure projection is in 2070, which takes into account disposal growth rate, including both beneficial and non-beneficial soil materials. (Kieffer pers. comm. 2012) Assuming all of the estimated 558,500 cubic yards of solid waste would require permanent disposal, project Alternative 1 implementation would represent less than 1% of the remaining capacity of the Yolo County Central Landfill. However, the option of beneficial reuse is likely to reduce the cubic yards of solid waste that require permanent disposal. Therefore, the indirect effect would be less than significant. No mitigation is required.

Effect UTL-5: Increase in Emergency Response Times during Project Construction

Emergency access to the project vicinity could be affected by construction of Alternative 1, and construction-related traffic could delay or obstruct the movement of emergency vehicles. However, execution of the EC to develop and implement a traffic control and road maintenance plan, described in Chapter 2, Section 2.4.6, Traffic Control and Road Maintenance Plan, would minimize construction-related effects on emergency response times. This direct effect would be less than significant. No mitigation is required.

3.15.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on utilities and public services (Table 3.15-4).

Table 3.15-4. Utilities and Public Services Effects and Mitigation Measures for Alternative 2

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
UTL-1: Potential Temporary Disruption of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction	Significant	Significant	Less than significant	UTL-MM-1: Coordinate with Water Supply Users before and during All Water Supply Infrastructure Modifications and Implement Measures to Minimize Interruptions of Supply
UTL-2: Decrease in Domestic and Irrigation Water Supply	No effect	Significant	Less than significant	UTL-MM-2: Restore Affected Domestic and Irrigation Water Service to Pre-project Conditions
UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction	Significant	No effect	Less than significant	UTL-MM-3: Verify Utility Locations, Coordinate with Utility Providers, Prepare a Response Plan, and Conduct Worker Training
UTL-4: Increase in Solid Waste Generation due to Project Construction	No effect	Less than significant	NA	None
UTL-5: Increase in Emergency Response Times during Project Construction	Less than significant	No effect	NA	None

Effect UTL-1: Potential Temporary Disruption and Damage of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction

Direct and indirect effects and mitigation associated with Effect UTL-1 under Alternative 2 are identical to those described above for Effect UTL-1 under Alternative 1.

Effect UTL-2: Decrease in Domestic and Irrigation Water Supply

Indirect effects and mitigation associated with Effect UTL-2 under Alternative 2 are identical to those described above for Effect UTL-2 under Alternative 1.

Effect UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction

Direct effects and mitigation associated with Effect UTL-3 under Alternative 2 are identical to those described above for Effect UTL-3 under Alternative 1.

Effect UTL-4: Increase in Solid Waste Generation due to Project Construction

Indirect effects associated with Effect UTL-4 under Alternative 2 are similar to those described above for Effect UTL-4 under Alternative 1. Implementation of Alternative 2 may generate up to approximately 613,500 cubic yards of solid waste that would require disposal. The quantity of solid waste generated would be higher than Alternative 1 because of the increase in building demolition that would be required to construct the setback levee, as well as the degradation and breaching of the existing levee once the setback levee is completed. Assuming all of the estimated 613,500 cubic yards of solid waste would require permanent disposal, Alternative 2 implementation would represent less than 1% of the remaining capacity of the Yolo County Central Landfill, making this indirect effect less than significant. No mitigation is required.

Effect UTL-5: Increase in Emergency Response Times during Project Construction

Direct effects associated with Effect UTL-5 under Alternative 2 are identical to those described above for Effect UTL-5 under Alternative 1.

3.15.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on utilities and public services (Table 3.15-5).

Table 3.15-5. Utilities and Public Services Effects and Mitigation Measures for Alternative 3

	Finding			
Effect	Direct	Indirect	With Mitigation	Mitigation Measure
UTL-1: Potential Temporary Disruption of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction	Significant	Significant	Less than significant	UTL-MM-1: Coordinate with Water Supply Users before and during All Water Supply Infrastructure Modifications and Implement Measures to Minimize Interruptions of Supply
UTL-2: Decrease in Domestic and Irrigation Water Supply	No effect	Significant	Less than significant	UTL-MM-2: Restore Affected Domestic and Irrigation Water Service to Pre-project Conditions
UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction	Significant	No effect	Less than significant	UTL-MM-3: Verify Utility Locations, Coordinate with Utility Providers, Prepare a Response Plan, and Conduct Worker Training
UTL-4: Increase in Solid Waste Generation due to Project Construction	No effect	Less than significant	NA	None
UTL-5: Increase in Emergency Response Times during Project Construction	Less than significant	No effect	NA	None

Effect UTL-1: Potential Temporary Disruption and Damage of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction

Direct and indirect effects and mitigation associated with Effect UTL-1 under Alternative 3 are identical to those described above for Effect UTL-1 under Alternative 1.

Effect UTL-2: Decrease in Domestic and Irrigation Water Supply

Indirect effects and mitigation associated with Effect UTL-2 under Alternative 3 are identical to those described above for Effect UTL-2 under Alternative 1.

Effect UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction

Direct effects and mitigation associated with Effect UTL-3 under Alternative 3 are identical to those described above for Effect UTL-3 under Alternative 1.

Effect UTL-4: Increase in Solid Waste Generation due to Project Construction

Indirect effects associated with Effect UTL-4 under Alternative 3 are similar to those described above for Effect UTL-4 under Alternative 1. Implementation of Alternative 3 may generate up to approximately 327,000 cubic yards of solid waste that would require disposal. Assuming all of the estimated 327,000 cubic yards of solid waste would require permanent disposal, Alternative 3 implementation would represent less than 1% of the remaining capacity of the Yolo County Central Landfill, making this indirect effect less than significant. No mitigation is required.

Effect UTL-5: Increase in Emergency Response Times during Project Construction

Direct effects associated with Effect UTL-5 under Alternative 3 are identical to those described above for Effect UTL-5 under Alternative 1.

3.15.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on utilities and public services (Table 3.15-6).

Table 3.15-6. Utilities and Public Services Effects and Mitigation Measures for Alternative 4

	Finding		With	
Effect	**Direct**	**Indirect**	**Mitigation**	**Mitigation Measure**
UTL-1: Potential Temporary Disruption of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction	Significant	Significant	Less than significant	UTL-MM-1: Coordinate with Water Supply Users before and during All Water Supply Infrastructure Modifications and Implement Measures to Minimize Interruptions of Supply
UTL-2: Decrease in Domestic and Irrigation Water Supply	No effect	Significant	Less than significant	UTL-MM-2: Restore Affected Domestic and Irrigation Water Service to Pre-project Conditions
UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction	Significant	No effect	Less than significant	UTL-MM-3: Verify Utility Locations, Coordinate with Utility Providers, Prepare a Response Plan, and Conduct Worker Training
UTL-4: Increase in Solid Waste Generation due to Project Construction	No effect	Less than significant	NA	None
UTL-5: Increase in Emergency Response Times during Project Construction	Less than significant	No effect	NA	None

Effect UTL-1: Potential Temporary Disruption and Damage of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction

Direct and indirect effects and mitigation associated with Effect UTL-1 under Alternative 4 are identical to those described above for Effect UTL-1 under Alternative 1.

Effect UTL-2: Decrease in Domestic and Irrigation Water Supply

Indirect effects and mitigation associated with Effect UTL-2 under Alternative 4 are identical to those described above for Effect UTL-2 under Alternative 1.

Effect UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction

Direct effects and mitigation associated with Effect UTL-3 under Alternative 4 are identical to those described above for Effect UTL-3 under Alternative 1.

Effect UTL-4: Increase in Solid Waste Generation due to Project Construction

Indirect effects associated with Effect UTL-4 under Alternative 4 are similar to those described above for Effect UTL-4 under Alternative 2. While fewer structures would be demolished under Alternative 4 than under Alternative 2, the effects are similar. More material would be stripped for adjacent levee construction in Segment F under Alternative 4 than would be stripped for the setback levee in Segment F under Alternative 2, offsetting the reduced structure demolition. Assuming all of the estimated 613,500 cubic yards of solid waste would require permanent disposal, Alternative 4 implementation would represent less than 1% of the remaining capacity of the Yolo County Central Landfill, making this indirect effect less than significant. No mitigation is required.

Effect UTL-5: Increase in Emergency Response Times during Project Construction

Direct effects associated with Effect UTL-5 under Alternative 4 are identical to those described above for Effect UTL-5 under Alternative 1.

3.15.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on utilities and public services (Table 3.15-7).

Table 3.15-7. Utilities and Public Services Effects and Mitigation Measures for Alternative 5

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
UTL-1: Potential Temporary Disruption of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction	Significant	Significant	Less than significant	UTL-MM-1: Coordinate with Water Supply Users before and during All Water Supply Infrastructure Modifications and Implement Measures to Minimize Interruptions of Supply
UTL-2: Decrease in Domestic and Irrigation Water Supply	No effect	Significant	Less than significant	UTL-MM-2: Restore Affected Domestic and Irrigation Water Service to Pre-project Conditions
UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction	Significant	No effect	Less than significant	UTL-MM-3: Verify Utility Locations, Coordinate with Utility Providers, Prepare a Response Plan, and Conduct Worker Training
UTL-4: Increase in Solid Waste Generation due to Project Construction	No effect	Less than significant	NA	None
UTL-5: Increase in Emergency Response Times during Project Construction	Less than significant	No effect	NA	None

Effect UTL-1: Potential Temporary Disruption and Damage of Domestic Water Supply and Irrigation/Drainage Facilities due to Project Construction

Direct and indirect effects and mitigation associated with Effect UTL-1 under Alternative 5 are identical to those described above for Effect UTL-1 under Alternative 1.

Effect UTL-2: Decrease in Domestic and Irrigation Water Supply

Indirect effects and mitigation associated with Effect UTL-2 under Alternative 5 are identical to those described above for Effect UTL-2 under Alternative 1.

Effect UTL-3: Damage of Public Utility Infrastructure and Disruption of Service as a Result of Project Construction

Direct effects and mitigation associated with Effect UTL-3 under Alternative 5 are identical to those described above for Effect UTL-3 under Alternative 1.

Effect UTL-4: Increase in Solid Waste Generation due to Project Construction

Indirect effects associated with Effect UTL-4 under Alternative 5 are identical to those described above for Effect UTL-4 under Alternative 2.

Effect UTL-5: Increase in Emergency Response Times during Project Construction

Direct effects associated with Effect UTL-5 under Alternative 5 are identical to those described above for Effect UTL-5 under Alternative 1.

3.16 Public Health and Environmental Hazards

3.16.1 Affected Environment

This section describes the affected environment for public health and environmental hazards in the Southport project area, including regulatory and environmental settings.

3.16.1.1 Regulatory Framework

Federal

The principal Federal regulatory agency responsible for the safe use and handling of hazardous materials is the EPA. Two key Federal regulations pertaining to hazardous wastes are described below. Other applicable Federal regulations are contained primarily in CFR Titles 29, 40, and 49.

The following Federal regulations related to public health and environmental hazards may apply to implementation of the Southport project.

Resource Conservation and Recovery Act

The Federal Resource Conservation and Recovery Act enables the EPA to administer a regulatory project that extends from the manufacture of hazardous materials to their disposal.

State

California regulations are equal to or more stringent than Federal regulations. EPA has granted the California Department of Toxic Substances Control (DTSC) and the State Water Board primary oversight responsibility to administer and enforce hazardous waste management programs, including the remediation of sites contaminated by hazardous substances. Several key laws pertaining to hazardous wastes, emergency services, and mosquito abatement are discussed below.

Hazardous Waste Control Act

The Hazardous Waste Control Act created the state hazardous waste management program, which is similar to but more stringent than the Federal Resource Conservation and Recovery Act program. The act is implemented by regulations contained in Title 26 CCR.

Emergency Services Act

Under the Emergency Services Act, the state developed an emergency response plan to coordinate emergency services provided by Federal, state, and local agencies. The California Office of Emergency Services administers the plan and coordinates the responses of other agencies, including the EPA, California Highway Patrol, RWQCBs, air quality management districts, and county disaster response offices.

Local

The following local policies related to public health and environmental hazards may apply to implementation of the Southport project.

Yolo County

The Health and Safety Element of the *2030 Countywide General Plan* for Yolo County (Yolo County 2009) contains goals, policies, and actions aimed at reducing the risk associated with natural and human-made hazards within the county, including those related to flood hazards. The general plan requires a minimum 50-foot setback for all permanent structures from the toe of any flood management levee, encourages flood hazard reduction projects along the Sacramento River to be consistent with the Sacramento River Corridor Floodway Management Plan, and supports the construction or rehabilitation of levees at a distance from the river. The general plan also states that the upgrade, expansion, or construction of any flood management levee should demonstrate that it will not adversely divert flood water or increase flooding.

City of West Sacramento General Plan

The Central Valley Flood Protection Plan requires 200-year flood protection by the year 2025. In addition, within its General Plan, the City adopted a goal of achieving 200-year flood protection. The Health and Safety Section of the *City of West Sacramento General Plan Policy Document* (City of West Sacramento 2004) contains goals and policies aimed at reducing the risks associated with natural and human-made hazards within the county. The general plan specifically states that the City will cooperate with responsible agencies to maintain, inspect, and repair area levees in order to prevent loss of life, injury, and property damage.

West Sacramento Area Flood Control Agency

WSAFCA is a Joint Powers Authority created in 1994 through a Joint Exercise of Powers Agreement by the City, RD 900, and RD 537. WSAFCA is responsible for the operations and maintenance of the city’s detention basins, pump stations, and levees.

HAZMAT Program

The HAZMAT Program is responsible for responding to emergency hazardous materials situations in the West Sacramento area. The program provides 24-hour response and works in partnership with the Sacramento Metropolitan Fire District and the Sacramento County Environmental Division.

3.16.1.2 Environmental Setting

The following considerations are relevant to public health and environmental hazards conditions in the Southport project area.

Hazardous Materials

Hazardous materials are chemicals and other substances defined as hazardous by Federal and state laws and regulations. In general, these materials are substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may have harmful effects on public health or the environment during their use or when released to the environment. Hazardous materials also include waste chemicals and spilled materials. Hazardous materials occur in common contexts and can include the following items.

- Pesticides, herbicides, and fertilizers
- Petroleum hydrocarbons

- Underground storage tanks
- Contaminated debris
- Lead
- Wastewater
- Pits or ponds
- Stormwater runoff structures
- Transformers that may contain polychlorinated biphenyls (PCBs).

An Area-Wide Assessment (Assessment) was conducted by SCS Engineers for parcels in which construction of flood risk–reduction measures would potentially occur (SCS Engineers 2012); potential borrow areas were not included in the Assessment. The Assessment determined the likelihood that recognized environmental conditions (RECs) were present in the project site as a result of the current or historical site land use or from a known and reported off-site source. RECs are defined as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. Another purpose of the Assessment was to collect sufficient information to evaluate the need for a subsequent Phase II Environmental Assessment, which would consist of further assessing the presence of hazardous materials in the project site through sample collection and analysis, as well as site surveys.

Based on data in the Assessment conducted for the Southport project, approximately 80 parcels were identified as having potential RECs along the Sacramento River South Levee. Based on the records searches conducted for the Assessment, most of the potential RECs are associated with current or historical agriculture and relate to the potential for metallic and/or organochlorine pesticides to be present. Fourteen parcels in the project area were identified as having or historically having had above- or belowground fuel tanks and dispensers. A full summary of the Assessment is provided in Appendix G.

To date, an initial Phase II Environmental Site Assessment has been performed at one site in the project area, located near the intersection of South River Road and Linden Road in Segment F. A summary of the assessment's findings to date is provided in Appendix G. According to historic documentation review performed in support of Phase II, the approximately 4.5-acre site housed above-ground storage tanks for petroleum products from at least 1952 through 1975. The tanks were removed sometime between 1978 and 1980. Through soil and groundwater testing performed as part of the Phase II investigation in April 2014, it was determined detectable levels of petroleum products were present onsite. An expanded Phase II site assessment was initiated in June 2014 to gain a more in-depth understanding of the nature and distribution of soil and groundwater impacts in the AST area and to guide future development of a remediation plan for the site.

The expanded Phase II work consisted of the collection and analysis of soil samples from 42 borings (5 of which were completed as monitor wells) and groundwater samples from 5 monitor wells. Results from the groundwater samples indicate the presence of elevated levels of petroleum-related compounds in one of the five groundwater monitor wells (well MW-4). The other four monitor wells contained either no detectable concentrations of petroleum-related compounds or very low concentrations. Soil samples collected from six borings located around MW-4 also contained elevated levels of petroleum hydrocarbon-related compounds. Soil samples from the other borings in the AST area either contained no hydrocarbons or very low concentrations of petroleum hydrocarbon constituents.

While analysis of the findings of the expanded Phase II is ongoing, the current data suggest that the area of soil and groundwater impact is limited to an area of approximately 50 feet by 70 feet. To prevent further and potential ongoing impacts groundwater quality in this area, petroleum-impacted soils within this area would likely be remediated prior to the implementation of any proposed flood risk-reduction measures onsite. However, it is not yet known what effect, if any, remediation of the contamination might have on project construction phasing or methodology. Following completion of the Phase II testing and consideration of the results, a remediation plan would be developed in compliance with CCR Title 22 procedures for hazardous materials in coordination with the State Water Board, as described in the Soil Hazards Testing and Soil Disposal Plan detailed in Section 2.4.18.

In addition to the items listed above, Chevron operates an 8-inch petroleum underground pipeline that runs parallel to South River Road in Segment A, and the Sacramento Regional County Sanitation District (SRCSD) operates a wastewater gravity interceptor pipeline that runs through portions of the potential borrow areas (Sacramento Regional County Sanitation District 2008).

Wildland Fires

The area surrounding the Southport project site is not considered a fire-prone area.

Emergency Response and Evacuation

Emergency response and evacuation services for the project area are provided by the various departments in the City of West Sacramento and through Yolo County Sheriff, Fire, and Emergency Services Departments. The City of West Sacramento and RD 537 have entered a joint flood operation agreement. The agreement has established procedures to protect the health, safety, welfare and property of the residents and landowners in the project area. Procedures described in the agreement document consist of flood preparedness, information management, monitoring, flood fighting, and flood evacuation. The West Sacramento Police Department provides a full range of police services to the residents of West Sacramento 24 hours a day, 7 days a week. The Police Department is staffed with 75 sworn officers and 39 civilian full-time employees. Other positions include part-time police officers, parking enforcement officers, reserve police officers, and volunteers. The nearest fire stations are Stations 42 and 45, on Jefferson Boulevard and Lake Washington Boulevard, respectively.

Schools

There are no schools located within 0.25 mile of the Southport project area. This is relevant because the State CEQA Guidelines advise that hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school could constitute a significant environmental effect.

Vector Control

The project area is located within the West Sacramento zone of the SYMVCD service area. SYMVCD provides year-round mosquito and vector control services to Yolo and Sacramento Counties, including urban, commercial, and agricultural lands. SYMVCD conducts ongoing surveillance to determine the threat of disease transmission and cooperates with property owners, residents, and government agencies to protect the public from diseases such as West Nile virus, Western Equine Encephalitis, canine heartworm, and malaria.

3.16.2 Environmental Consequences

This section describes the environmental consequences relating to public health and environmental hazards for the proposed Southport project. It describes the methods used to determine the effects of the proposed project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.16.2.1 Assessment Methods

This evaluation of public health and environmental hazards is based on professional standards and information cited throughout the section.

The key effects were identified and evaluated based on the environmental characteristics of the Southport project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project. The analysis includes evaluation of (1) the potential effects related to construction activities on workers, and (2) general safety of and hazards to both workers and the public posed by the construction and implementation of the levee alternatives.

3.16.2.2 Determination of Effects

For this analysis, an environmental effect was significant related to public health and environmental hazards if it would result in any of the effects listed below. These effects are based on common NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice.

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials to the environment.
- Emit hazardous emissions or involve handling hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.
- Be located on a site that is on a list of hazardous materials sites compiled pursuant to California Government Code 65962.5, and as a result create a significant hazard to the public or the environment.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- Place within a 100-year flood hazard area structures that would impede or redirect floodflows.
- 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.

- Significantly affect drinking water quality.

3.16.3 Effects and Mitigation Measures

3.16.3.1 No Action Alternative

The No Action Alternative represents the continuation of existing deficiencies along the 5.6-mile reach from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south. No flood risk–reduction measures would be implemented, and the level of flood risk would remain the same. No construction-related effects relating to public health and environmental hazards would occur. Therefore, there would be no effect on public health and environmental hazards attributable to the implementation of the No Action Alternative. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

Specific to vegetation, as presented in Chapter 2, "Alternatives," the No Action Alternative is characterized by three possible future scenarios.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

There would be no effect related to hazardous materials in the project area under the implementation of any of the three vegetation management scenarios.

Implementation of the No Action Alternative would result in the following effects (Table 3.16-1).

Table 3.16-1. Public Health and Environmental Hazards Effects for the No Action Alternative

Effect	Scenario	Finding—Direct
HAZ-NA-1: Improve Access for Levee Maintenance and Flood-fighting	No ETL	No effect
	Modified ETL	Beneficial
	Full ETL	Beneficial

Effect HAZ-NA-1: Improve Access for Levee Maintenance and Flood-fighting

Full compliance with the USACE levee vegetation policy would result in the removal of a substantial amount of vegetation from the bank of the Sacramento River. The absence of vegetation would provide easier access for levee maintenance personnel to identify areas of concern along the levee and conduct necessary maintenance, as well as improve access for flood-fighting efforts. Compliance with the levee vegetation guidance would be beneficial to public health.

If the USACE levee vegetation policy is not applied, it is assumed that the vegetation conditions at the time of this analysis will continue into the future. There would be no effect on public health in the project area.

Modified application of the ETL through application of the ULDC would result in a slow loss of woody vegetation along the Sacramento River South Levee. As described above, the loss of vegetation would make it easier for levee maintenance personnel to maintain the levee and provide improved access for flood-fighting efforts. It would potentially take decades for the existing woody vegetation to die out and be cleared, but modified application of the ETL as proposed in the ULDC still would be beneficial to public health.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.16.3.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on public health and environmental hazards (Table 3.16-2).

Table 3.16-2. Public Health and Environmental Hazards Effects and Mitigation Measures for Alternative 1

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
HAZ-1: Incidental Release of Hazardous Materials during Construction	Less than significant	Less than significant	NA	None
HAZ-2: Exposure of Hazardous Materials Encountered at Project Site	Less than significant	No effect	NA	None
HAZ-3: Safety Hazards from the Construction Site and Vehicles	Less than significant	No effect	NA	None
HAZ-4: Exposure of People or Structures to Flood Risk-related Hazards	Beneficial	No effect	NA	None
HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation	Potentially significant	No effect	Less than significant	HAZ-MM-1: Coordinate and Implement Pipeline Avoidance and Protection Measures

Effect HAZ-1: Incidental Release of Hazardous Materials during Construction

Alternative 1 implementation would require the use of hazardous materials such as fuels and lubricants to operate construction equipment and vehicles such as excavators, compactors, haul trucks, and loaders. Bentonite (a non-hazardous material) would be transported to sites where slurry cutoff wall construction would occur. Construction contractors would be required to use, store, and transport hazardous materials in compliance with Federal, state, and local regulations during project construction. However, fuels and lubricants could be released accidentally into the environment at the construction site and along haul routes, causing environmental or human exposure to these hazards. Risks to water quality (surface, ground-, and drinking water) associated with incidental release of these materials are addressed in Section 3.2, Water Quality and Groundwater Resources.

As discussed in Chapter 2, the implementation of ECs, including a SWPPP, a BSSCP, and an SPCCP, would ensure that the risk of accidental spills and releases into the environment would be minimal and that the direct effect on water quality would be less than significant.

In addition, WSAFCA would be required to comply with applicable Federal, state, and local laws, which would reduce the potential for accidental release of hazardous materials during their transport and use. Consequently, the risk of incidental release of hazardous materials during their transport and use during Alternative 1 construction activities is low, and the direct and indirect effect is considered less than significant. No mitigation is required.

Effect HAZ-2: Exposure of Hazardous Materials Encountered at Project Site

As stated above, approximately 80 parcels in the Southport project site were identified as having potential RECs, and 1 parcel is currently known to have detectable petroleum hydrocarbon contamination. While it is not yet known if remediation of hazardous materials would be necessary for the implementation of Alternative 1, excavation and construction activities at or near areas of soil or groundwater contamination could result in the direct exposure of construction workers, the general public, and the environment to hazardous materials such as petroleum hydrocarbons, pesticides, herbicides, fertilizers, and contaminated debris or elevated levels of other chemicals that could be hazardous. However, implementation of the Soil Hazards Testing and Soil Disposal Plan detailed in Chapter 2, Section 2.4.18 in compliance with CCR Title 22~~,~~ would limit this direct effect to a less-than-significant level. No mitigation is required.

Effect HAZ-3: Safety Hazards from the Construction Site and Vehicles

Under Alternative 1, construction workers would operate vehicles and other mechanical equipment that, if used improperly, could result in safety hazards at the construction site. WSAFCA would ensure that all workers are properly trained to operate equipment. Safety precautions would be followed at all times during construction to avoid accidents. WSAFCA also would require that all workers have a valid driver's license and insurance. These measures would ensure that this direct effect would be less than significant.

In addition, people may walk, ride bicycles, or otherwise use the roadways adjacent to the project area during the construction period when heavy machinery and haul trucks would be accessing the site. The staging of the equipment when construction is not under way (weekends, holidays, or overnight, if construction is not performed 24 hours per day) may pose a threat to public safety if the equipment is not properly secured. Proper signage and detours would be provided as stated in the ECs to provide notification of construction area closure (described in Chapter 2). These measures would reduce the risk to the public when construction is under way and when it is not. Therefore, this direct effect would be less than significant. No mitigation is required.

Effect HAZ-4: Exposure of People or Structures to Flood Risk-Related Hazards

All levees have the potential to fail, regardless of design. Under Alternative 1, the Sacramento River South Levee would be modified using methods that meet engineering requirements set forth by both

USACE and the CVFPB. In addition, this levee would meet requirements for FEMA certification that the levee will provide a level of performance sufficient to reduce risk from a 200-year flood. Implementation of Alternative 1's flood risk–reduction measures would reduce the level of flood risk in the city of West Sacramento from its present level, resulting in a direct beneficial effect.

Effect HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation

Chevron operates an 8 inch petroleum underground pipeline that runs parallel to South River Road in Segment A, and SRCSD operates a wastewater pipeline that runs through portions of the potential borrow areas. Ground disturbing activities or project design interfering with pipeline maintenance necessary to protect public safety could accidentally cause a rupture in these pipelines, resulting in the release of petroleum or wastewater into the surrounding area. This release would result in soil and groundwater contamination, and could have a direct adverse effect on public health. Therefore, this direct effect would be significant. Implementation of Mitigation Measure HAZ-MM-1 would reduce this effect to a less-than-significant level.

Mitigation Measure HAZ-MM-1: Coordinate and Implement Pipeline Avoidance and Protection Measures

In coordination with Chevron and SRCSD, WSAFCA will locate and mark these pipelines within any area of ground disturbance or heavy equipment operation, determining depth and condition. WSAFCA will work with Chevron and SRCSD to establish and implement pipeline protection measures to avoid damage to the pipelines and ensure future pipeline access for operation and maintenance activities is maintained. Such measures may include avoidance, protection with steel plating or other matting to cushion or distribute equipment weight, and/or encasement of the pipelines to protect against fracture.

3.16.3.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on public health and environmental hazards (Table 3.16-3).

Table 3.16-3. Public Health and Environmental Hazards Effects and Mitigation Measures for Alternative 2

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
HAZ-1: Incidental Release of Hazardous Materials during Construction	Less than significant	Less than significant	NA	None
HAZ-2: Exposure of Hazardous Materials Encountered at Project Site	Less than significant	No effect	NA	None
HAZ-3: Safety Hazards from the Construction Site and Vehicles	Less than significant	No effect	NA	None
HAZ-4: Exposure of People or Structures to Flood Risk-Related Hazards	Beneficial	No effect	NA	None
HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation	Potentially significant	No effect	Less than significant	HAZ-MM-1: Coordinate and Implement Pipeline Avoidance and Protection Measures
HAZ-6: Changes in Exposure to Mosquitoes	Beneficial	No effect	NA	None
HAZ-7: Safety Hazards from Offset Area Operation	Less than significant	Less than significant	NA	None

Effect HAZ-1: Incidental Release of Hazardous Materials during Construction

Direct and indirect effects associated with Effect HAZ-1 under Alternative 2 are identical to those described above for Effect HAZ-1 under Alternative 1.

Effect HAZ-2: Exposure of Hazardous Materials Encountered at Project Site

Direct effects associated with Effect HAZ-2 under Alternative 2 are identical to those described above for Effect HAZ-2 under Alternative 1.

Effect HAZ-3: Safety Hazards from the Construction Site and Vehicles

Direct effects associated with Effect HAZ-3 under Alternative 2 are identical to those described above for Effect HAZ-3 under Alternative 1.

Effect HAZ-4: Exposure of People or Structures to Flood Risk-Related Hazards

Direct effects associated with Effect HAZ-4 under Alternative 2 are identical to those described above for Effect HAZ-4 under Alternative 1.

Effect HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation

Direct effects associated with Effect HAZ-5 under Alternative 2 are identical to those described above for Effect HAZ-5 under Alternative 1.

Effect HAZ-6: Changes in Exposure to Mosquitoes

Creation of the offset areas under Alternative 2 would increase the surface area of water in the project area, which would potentially increase the amount of mosquito breeding habitat due to prolonged inundation periods during high stage events in the Sacramento River. However, the offset areas would be designed to have positive drainage, and the design would minimize areas with standing and stagnant water. As flows in the offset areas would be tied to flows in the Sacramento River, there would be sufficient water movement to inhibit mosquito larvae development. Consequently, the potential increase in exposure to mosquitoes and mosquito-borne diseases would be negligible. If a standing water condition were to occur, WSAFCA would coordinate with SYMVCD to ensure that abatement measures are enacted consistent with the Mosquito and Vector Control Management Plan specified in the Environmental Commitments section of Chapter 2.

Alternative 2 would also open Bees Lakes to flows from the Sacramento River, which would reduce the amount of standing water in the project area. The reduction of standing water would lessen the amount of mosquito breeding habitat and, therefore, reduce exposure of the public to mosquitos as well as reduce the need for abatement measures. This effect is beneficial.

Effect HAZ-7: Safety Hazards from Offset Area Operation

Construction of the offset area proposed under Alternative 2 could create opportunities for informal recreation, which could attract more people to the area. The increased use and relative remoteness of the offset areas could cause the offset area to be used for illegal activity, potentially creating a public safety hazard. However, the riverfront properties proposed for inclusion in the offset area are currently subject to a variety of informal recreational uses, facilitated by the ease of access to the river provided by South River Road. While removal of public access to South River Road would increase the offset area's relative remoteness, its accessibility would be commensurately reduced, making an appreciable increase in illegal usage of the offset area unlikely. Further, the properties to be included in the offset area are currently within the law enforcement jurisdiction of the West Sacramento Police Department, which would continue to patrol the affected areas. WSAFCA has notified the Police Department of the proposed project to ensure the project area would continue to be patrolled, and that there would be no drop in service and no appreciable increase in public safety hazards. This effect is thus less than significant.

3.16.3.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on public health and environmental hazards (Table 3.16-4).

Table 3.16-4. Public Health and Environmental Hazards Effects and Mitigation Measures for Alternative 3

	Finding		With	
Effect	Direct	Indirect	Mitigation	Mitigation Measure
HAZ-1: Incidental Release of Hazardous Materials during Construction	Less than significant	Less than significant	NA	None
HAZ-2: Exposure of Hazardous Materials Encountered at Project Site	Less than significant	No effect	NA	None
HAZ-3: Safety Hazards from the Construction Site and Vehicles	Less than significant	No effect	NA	None
HAZ-4: Exposure of People or Structures to Flood Risk-Related Hazards	Beneficial	No effect	NA	None
HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation	Potentially significant	No effect	Less than significant	HAZ-MM-1: Coordinate and Implement Pipeline Avoidance and Protection Measures

Effect HAZ-1: Incidental Release of Hazardous Materials during Construction

Direct and indirect effects associated with Effect HAZ-1 under Alternative 3 are identical to those described above for Effect HAZ-1 under Alternative 1.

Effect HAZ-2: Exposure of Hazardous Materials Encountered at Project Site

Direct effects associated with Effect HAZ-2 under Alternative 3 are identical to those described above for Effect HAZ-2 under Alternative 1.

Effect HAZ-3: Safety Hazards from the Construction Site and Vehicles

Direct effects associated with Effect HAZ-3 under Alternative 3 are identical to those described above for Effect HAZ-3 under Alternative 1.

Effect HAZ-4: Exposure of People or Structures to Flood Risk-Related Hazards

Direct effects associated with Effect HAZ-4 under Alternative 3 are identical to those described above for Effect HAZ-4 under Alternative 1.

Effect HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation

Direct effects associated with Effect HAZ-5 under Alternative 3 are identical to those described above for Effect HAZ-5 under Alternative 1.

3.16.3.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on public health and environmental hazards (Table 3.16-5).

Table 3.16-5. Public Health and Environmental Hazards Effects and Mitigation Measures for Alternative 4

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
HAZ-1: Incidental Release of Hazardous Materials during Construction	Less than significant	Less than significant	NA	None
HAZ-2: Exposure of Hazardous Materials Encountered at Project Site	Less than significant	No effect	NA	None
HAZ-3: Safety Hazards from the Construction Site and Vehicles	Less than significant	No effect	NA	None
HAZ-4: Exposure of People or Structures to Flood Risk-Related Hazards	Beneficial	No effect	NA	None
HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation	Potentially significant	No effect	Less than significant	HAZ-MM-1: Coordinate and Implement Pipeline Avoidance and Protection Measures
HAZ-6: Changes in Exposure to Mosquitoes	Less than significant	No effect	NA	None
HAZ-7: Safety Hazards from Offset Area Operation	Less than significant	Less than significant	NA	None

Effect HAZ-1: Incidental Release of Hazardous Materials during Construction

Direct and indirect effects associated with Effect HAZ-1 under Alternative 4 are identical to those described above for Effect HAZ-1 under Alternative 1.

Effect HAZ-2: Exposure of Hazardous Materials Encountered at Project Site

Direct effects associated with Effect HAZ-2 under Alternative 4 are identical to those described above for Effect HAZ-2 under Alternative 1.

Effect HAZ-3: Safety Hazards from the Construction Site and Vehicles

Direct effects associated with Effect HAZ-3 under Alternative 4 are identical to those described above for Effect HAZ-3 under Alternative 1.

Effect HAZ-4: Exposure of People or Structures to Flood Risk-Related Hazards

Direct effects associated with Effect HAZ-4 under Alternative 4 are identical to those described above for Effect HAZ-4 under Alternative 1.

Effect HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation

Direct effects associated with Effect HAZ-5 under Alternative 4 are identical to those described above for Effect HAZ-5 under Alternative 1.

Effect HAZ-6: Changes in Exposure to Mosquitoes

Creation of the offset area under Alternative 4 would increase the surface area of water in the project area, which could increase the amount of mosquito breeding habitat due to prolonged inundation periods during high stage events in the Sacramento River. However, the offset area would be designed to have positive drainage, and the design would minimize areas with standing and stagnant water. As flows in the offset area would be tied to flows in the Sacramento River, there would be sufficient water movement to inhibit mosquito larvae development. Consequently, the potential increase in exposure to mosquitoes and mosquito-borne diseases would be negligible. If a standing water condition were to occur, WSAFCA would coordinate with SYMVCD to ensure that abatement measures are enacted consistent with the Mosquito and Vector Control Management Plan specified in the Environmental Commitments section of Chapter 2. This effect is less than significant.

Effect HAZ-7: Safety Hazards from Offset Area Operation

Direct and indirect effects associated with Effect HAZ-7 under Alternative 4 are similar to those described above for Effect HAZ-7 under Alternative 2, but to a lesser extent since a reduced offset area would be constructed.

3.16.3.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on public health and environmental hazards (Table 3.16-6).

Table 3.16-6. Public Health and Environmental Hazards Effects and Mitigation Measures for Alternative 5

Effect	Finding: Direct	Finding: Indirect	With Mitigation	Mitigation Measure
HAZ-1: Incidental Release of Hazardous Materials during Construction	Less than significant	Less than significant	NA	None
HAZ-2: Exposure of Hazardous Materials Encountered at Project Site	Less than significant	No effect	NA	None
HAZ-3: Safety Hazards from the Construction Site and Vehicles	Less than significant	No effect	NA	None
HAZ-4: Exposure of People or Structures to Flood Risk-Related Hazards	Beneficial	No effect	NA	None
HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation	Potentially significant	No effect	Less than significant	HAZ-MM-1: Coordinate and Implement Pipeline Avoidance and Protection Measures
HAZ-6: Changes in Exposure to Mosquitoes	Less than significant	No effect	NA	None
HAZ-7: Safety Hazards from Offset Area Operation	Less than significant	Less than significant	NA	None

Effect HAZ-1: Incidental Release of Hazardous Materials during Construction

Direct and indirect effects associated with Effect HAZ-1 under Alternative 5 are identical to those described above for Effect HAZ-1 under Alternative 1.

Effect HAZ-2: Exposure of Hazardous Materials Encountered at Project Site

Direct effects associated with Effect HAZ-2 under Alternative 5 are identical to those described above for Effect HAZ-2 under Alternative 1.

Effect HAZ-3: Safety Hazards from the Construction Site and Vehicles

Direct effects associated with Effect HAZ-3 under Alternative 5 are identical to those described above for Effect HAZ-3 under Alternative 1.

Effect HAZ-4: Exposure of People or Structures to Flood Risk-Related Hazards

Direct effects associated with Effect HAZ-4 under Alternative 5 are identical to those described above for Effect HAZ-4 under Alternative 1.

Effect HAZ-5: Accidental Release of Hazardous Materials into the Environment during Project Construction or Operation

Direct effects associated with Effect HAZ-5 under Alternative 5 are identical to those described above for Effect HAZ-5 under Alternative 1.

Effect HAZ-6: Changes in Exposure to Mosquitoes

Under Alternative 5, breaching of the existing levee would occur as described in Section 2.2.8.1, Alternative 5 Flood Risk–Reduction Measures, which would create a backwater during the 1-year interim condition. The lack of flows in the offset areas during the interim condition has the potential to increase mosquito breeding habitat, particularly in areas that would have shallow inundation levels. The increase in breeding habitat could increase the exposure of the public to mosquitoes and mosquito-borne diseases during the 1-year interim condition. If such a condition were to occur, WSAFCA would coordinate with SYMVCD to ensure that abatement measures are enacted consistent with the Mosquito and Vector Control Management Plan specified in the Environmental Commitments section of Chapter 2.

The long-term effect of Alternative 5 relating to mosquito exposure would be the same as described under Alternative 4. This effect is less than significant.

Effect HAZ-7: Safety Hazards from Offset Area Operation

Direct and indirect effects associated with Effect HAZ-7 under Alternative 5 are similar to those described above for Effect HAZ-7 under Alternative 2.

3.17 Cultural Resources

3.17.1 Affected Environment

This section describes the affected environment for cultural resources in the Southport project area, including the regulatory and environmental setting.

The key sources of data and information used in the preparation of this section include data from the Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS), consultation with the NAHC, a review of historic maps of the project study area, published and unpublished reports, information from the ICF library, and field surveys.

3.17.1.1 Regulatory Framework

Federal

Section 106 of the National Historic Preservation Act

The proposed project would require permits and authorizations from USACE under Section 14 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. These permits and authorizations require that USACE comply with Section 106 of the NHPA of 1966, as amended, and its implementing regulations (36 CFR 800, Section 106). Section 106 requires that, before beginning any undertaking, a Federal agency must take into account the effects of the undertaking on *historic properties* (cultural resources listed or eligible for listing on the National Register of Historic Places [NRHP]) and afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on these actions. Federal agencies may comply with Section 106 by either completing the management steps indicated in the regulations (36 CFR Part 800) or preparing an agreement document that describes the particular process an agency will use to complete the same steps for a specific set of undertakings, as described below.

The Section 106 regulations specifically authorize phased management of cultural resources where the project area covers a large area or access is restricted (36 CFR Part 800.4[b][2]). This section of the regulations allows the agency to provide for a phased management process in a programmatic agreement (PA) or memorandum of agreement (MOA). The Section 106 regulations thus allow an agency to complete management steps as access becomes available, while providing other permits and authorizations in advance of some Section 106 management activities, if phased management is described in an executed (signed) PA or MOA. WSAFCA and USACE are therefore working with the State Historic Preservation Officer (SHPO) and other appropriate consulting parties to develop a draft PA. The PA will require WSAFCA and USACE to complete the following steps for each discrete phase or activity associated with the Southport project:

- Prepare a map of the area of potential effects (APE) for the phase or activity associated with the project in consultation with the SHPO. The APE map will consist of the geographic area where project activities may result in effects on historic properties.
- Complete an inventory of the APE. During the inventory, USACE and WSAFCA will conduct a survey of the APE and record identified cultural resources and prepare updates to existing records for previously recorded resources.

- Evaluate all cultural resources in the APE for eligibility for listing in the NRHP. During the evaluation phase USACE and WSAFCA will evaluate identified resources to determine if they are eligible for listing in the NRHP, per the criteria provided below.
- Prepare a finding of effect for each resource. During this step WSAFCA and USACE will apply the criteria of adverse effect, as described below in Section 3.17.3.2, Determination of Effects.
- Resolve adverse effects through treatment or avoidance. During this step WSAFCA and USACE will identify feasible methods to resolve adverse effects by performing additional studies or documentation to retrieve or preserve a record of the characteristics that convey the eligibility of adversely affected resources. Treatment may also consist of preservation of eligible resources in place.
- In addition, WSAFCA and USACE will prepare a research design and treatment plan that provides a range of treatment methods that may be used to resolve adverse effects.

The management activities prescribed in the PA will be conducted in consultation with SHPO, the Native American community, and any other party that constitutes a stakeholder in the management of cultural resources for the project. As of October 2014, USACE has submitted the PA and HPMP to the SHPO for final review. The latest version of these documents is provided as Appendix H.

Criteria for Eligibility for the National Register of Historic Places

Cultural resources are eligible for the NRHP if they have integrity and significance as defined in the regulations for the NRHP. Four primary criteria define significance; a property may be significant if it displays one or more of the following characteristics.

A. It is associated with events that have made a significant contribution to the broad pattern of our history; or

B. It is associated with the lives of people significant in our past; or

C. It embodies the distinct characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or it represents a significant and distinguishable entity whose components may lack individual distinction; or

D. It has yielded, or is likely to yield, information important in prehistory or history (36 CFR 60.4).

Some types of cultural resources are not typically eligible for the NRHP. These resources consist of cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years. These property types may be eligible for the NRHP, however, if they are integral parts of eligible districts of resources or meet the criteria considerations described in 36 CFR 60.4.

In addition to possessing significance, a property must also have integrity to be eligible for listing in the NRHP. The principle of integrity has seven aspects: location, design, setting, materials, workmanship, feeling, and association (36 CFR 60.4). To retain historic integrity, a property needs to possess several, and usually most, of these aspects (U.S. Department of the Interior 1995:44).

State

Inadvertent Discovery of Human Remains

Because the proposed project would be located on non-Federal land in California, it must comply with state laws pertaining to the inadvertent discovery of human remains of Native American origin. The procedures that must be followed if burials of Native American origin are discovered on non-Federal land in California are described in Section 3.17-4, Effects and Mitigation Measures.

State Historic Significance Criteria

The State CEQA Guidelines define three ways that a cultural resource may qualify as a historical resource for the purposes of CEQA:

1. The resource is listed in or determined eligible for listing in the California Register of Historical Resources (CRHR).
2. The resource is included in a local register of historical resources, as defined in PRC 5020.1(k), or is identified as significant in a historical resource survey meeting the requirements of PRC 5024.1(g), unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
3. The lead agency determines the resource to be significant as supported by substantial evidence in light of the whole record (14 CCR 15064.5[a]).

For a historical resource to be eligible for listing in the CRHR, it must be significant at the local, state, or national level under one or more of the following criteria from 14 CCR 15064.5(a)(3)(A–D).

1. It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
2. It is associated with the lives of persons important in our past.
3. It 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.
4. It has yielded, or may be likely to yield, information important in prehistory or history.

Historical resources automatically listed in the CRHR include those historic properties listed in, or formally determined to be eligible for listing in, the NRHP (PRC 5024.1).

In addition, CEQA distinguishes between two classes of archaeological resources: archaeological sites that meet the definition of a historical resource as defined above and unique archaeological resources. An archaeological resource is considered unique if it:

- is associated with an event or person of recognized significance in California or American history or of recognized scientific importance in prehistory;
- can provide information that is of demonstrable public interest and is useful in addressing scientifically consequential and reasonable research questions; or
- has a special or particular quality such as oldest, best example, largest, or last surviving example of its kind (PRC 21083.2).

Resources that qualify as unique archaeological resources also meet at least one of the CRHR criteria. It is current professional practice, therefore, to address the importance or significance of a cultural resource by determining solely whether it qualifies as a historical resource, without the expressed distinction or determination as to its status as a unique archaeological resource. For the purposes of this project, significant cultural resources as defined by CEQA are those resources that meet at least one of the CRHR eligibility criteria.

Notably, a project that causes a substantial adverse change in the significance of a historical resource is a project that may have significant impact under CEQA (14 CCR Section 15064.5[b]). A substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired. The significance of a historical resource is materially impaired if the project demolishes or materially alters any qualities that justify the:

- inclusion or eligibility for inclusion of a resource in the CRHR (14 CCR Section 15064.5[b][2][A],[C]).
- inclusion of the resource in a local register (14 CCR Section 15064.5[b][2][B]).

Local

The following local policies related to cultural resources may apply to implementation of the Southport project.

Yolo County General Plan

Yolo County strives to encourage the enhancement of cultural quality and education in Yolo County through the development of goals, objectives, and policies that the county has established in the Historic Preservation Element of the Yolo County General Plan, Part 1 (adopted July 1983) to preserve county history and historical sites (Yolo County 2009).

City of West Sacramento General Plan

The City of West Sacramento has adopted policies for identifying, evaluating and protecting historical resources in their general plan (revised and adopted December 2004) Section V Recreational and Cultural Resources Goals and Policies (City of West Sacramento 2004).

3.17.2 Environmental Setting

This section discusses the environmental setting related to cultural resources in the Southport project area, including the records searches and field survey methods used to evaluate cultural resource conditions, and a summary of known cultural resources.

3.17.2.1 Study Area

For the purposes of this section, the Southport project study area consists of the project disturbance footprint, which includes all areas where ground disturbance may occur as a result of construction activities. The study area is in the city of West Sacramento in Yolo County and includes a mix of residential and agricultural land uses.

3.17.2.2 Prehistoric Context

Although the Sacramento Valley may have been inhabited by humans as early as 10,000 years ago, the evidence for early human occupation likely is buried by deep alluvial sediments that accumulated rapidly during the late Holocene Epoch. Although rare, archaeological remains of this early period allegedly have been identified in and around the Central Valley. (Johnson 1967:283–284) presents evidence for some use of the Mokelumne River area, under what is now Camanche Reservoir, during the late Pleistocene Epoch. These archaeological materials and similar materials in the region have been termed the *Farmington Complex*. Recent work in the vicinity of Camanche Reservoir, however, calls into question whether Farmington Complex exceeds an age of 10,000 Before Present (B.P.) (Rosenthal et al. 2007:151).

Preliminary results from Tremaine & Associates' recent excavations at Sacramento City Hall (Sacramento City Hall overlies the Nisenan village of Sacum'ne, CA-SAC-38) reveal the earliest confirmed habitation of the immediate Sacramento vicinity. Obsidian hydration readings on artifacts may represent use of the site during 3000–8000 B.P. Tremaine & Associates also ran three radiocarbon assays, which yielded conventional dates of 5870, 6690, and 6700 B.P. The radiocarbon assays were taken between 9.8 feet and 11.5 feet below ground surface (Tremaine 2008:99–101).

Later periods of prehistory are better understood because of their more abundant representation in the archaeological record. Fredrickson (1973) identified three general patterns of cultural manifestations for the period between 4500 and 100 B.P.: the Windmiller, Berkeley, and Augustine Patterns.

The Windmiller Pattern (4500–2800 B.P.) shows evidence of a mixed economy consisting of the generalized hunting of game, fishing, and use of wild plant foods. Settlement strategies during the Windmiller period reflect seasonal occupation of valleys during the winter and of foothills during the summer (Moratto 1984:201, 206).

Cultural changes are manifested in the Berkeley Pattern (3500–2500 B.P.). Technological changes in groundstone from handstones and milling slabs to the mortar and pestle indicate a greater dependence on acorns, and the presence of a wide variety of projectile points and atlatls indicates hunting was still an important activity (Fredrickson 1973).

The Berkeley Pattern was superseded by the Augustine Pattern around 1450 B.P., reflecting a change in subsistence and land use patterns similar to those of the ethnographically known people of the proto-historic era. This pattern exhibits a great elaboration of ceremonial and social organization, including the development of social stratification. Complex exchange systems, further reliance on acorns, and a wide variety of artifacts (flanged tubular smoking pipes, harpoons, clamshell disc beads, and an especially elaborate baked clay industry, which included figurines and pottery vessels called *Cosumnes Brownware*) are associated with the Augustine Pattern. Increased village sedentism, population growth, and an incipient monetary economy are also hallmarks of this pattern (Moratto 1984:211, 213).

3.17.2.3 Ethnographic Context

The project vicinity is located at the interface of three Native American tribes: the Patwin (or Wintun), the Nisenan, and the Plains Miwok. The banks of the Sacramento River and associated riparian and tule marshland habitats were inhabited by the River or Valley Patwin. The Plains Miwok and Nisenan (also called Southern Maidu), while primarily occupying territories east of the

Sacramento River, used land west of the river as well (Johnson 1978:350, Figure 1; Levy 1978:Figure 1; Wilson and Towne 1978:Figure 1).

The material culture and settlement-subsistence behavior of these tribes exhibit similarities, likely because of historical relationships and a shared natural environment. Historic maps and accounts of early travelers to the Sacramento Valley testify that tule marshes, open grasslands, and occasional oak groves (Jackson 1851; Ord 1843; Wyld 1849) characterized the project vicinity. The area was generally wet in the winter and often subject to flooding; the weather was exceedingly dry in summer. Much of the floodplain presumably was sparsely inhabited, and Native Americans typically situated their larger, permanent settlements on high ground along the Sacramento and American Rivers (Bennyhoff 1977; Kroeber 1925:351, 1932; Levy 1978; Wilson and Towne 1978:388).

The Native American economy in the project vicinity was based principally on the use of natural resources from the riparian corridors, wetlands, and grasslands adjacent to the Sacramento River. Fish, shellfish, and waterfowl were important sources of protein in the diet of these tribes (Johnson 1978:355; Kroeber 1932). Salmon, sturgeon, perch, chub, sucker, pike, trout, and steelhead were caught with nets, weirs, lines and fishhooks, and harpoons. Mussels were harvested from the gravels along the Sacramento River channel. Geese, ducks, and mudhens were hunted using decoys and various types of nets. The majority of important plant resources in the Patwin diet came from the grasslands of the Sacramento River floodplain (Stevens 2004a: Table 1). Plants important to California Indians also were obtained from and managed in valley wetlands (Stevens 2004b:7). In addition to the staple acorn, numerous plants were important secondary food sources, including sunflower, wild oat, alfalfa, clover, and bunchgrass (Johnson 1978:355).

3.17.2.4 Historic Context

Early History

The project area is located in Yolo County, one of the original 27 counties created when California became a state in 1850. Woodland serves as the county seat (Hoover et al. 2002:566).

Spanish explorers visited Yolo County as early as the 1700s in their search for suitable inland mission sites. In 1772, Pedro Fages passed through San Francisco Bay and the Delta and reached the San Joaquin and Sacramento Rivers. Between 1793 and 1817, several other mission site reconnaissance expeditions were conducted. The first European American to travel through the area was Jedediah Strong Smith who, in the late 1820s, reported on the quantity and quality of furs in California. Joseph Walker and Ewing Young, during separate excursions, followed his general path in the 1830s. Mexican, American, and European settlers began to arrive and set down roots within the bounds of present-day Yolo County in the 1840s and 1850s (Hoover et al. 2002:566–567).

Sacramento River

The Sacramento River played an important role in the development of Yolo County prior to and during Euroamerican occupation of the region. The river was a convenient landmark for the early explorations that also facilitated reconnaissance of the Sacramento Valley. The Spanish, in 1817, were the first Europeans to traverse the portion of the Sacramento River that passes through the project study area, having made an exploratory boat trip up the river as far as its confluence with the Feather River (Goldfried 1988:8). This expedition was followed by a series of Spanish, Russian, British, and American land and water forays up the Sacramento River from the 1820s through 1840s (Goldfried 1988:8–9).

River traffic through the project study area became more frequent between 1839 and 1848 with the establishment of John Sutter's fort at his New Helvetia Rancho, as well other settlements upriver hosted by Peter Lassen, John Sinclair, John Bidwell, and others (Goldfried 1988:9; Lydecker and James 2009:9; Sutter et al. 1939 [1845–1848]:1–3). The 1848 gold discovery at Coloma, however, was responsible for the vast increase in Sacramento River traffic in the project study area through the 1850s, as Sutter's embarcadero, at what is now Old Sacramento, served as the principal point of departure for persons and goods headed for the Sierra Nevada diggings. Crews frequently abandoned their ships at the embarcadero during the Gold Rush, leaving them to sink or be converted by others into warehouses, stores, and hotels on the river. (Goldfried 1988:11.)

The city of Sacramento and the communities of Washington and Riverbank/Bryte provided a lasting draw to river traffic through the 1920s because water transportation was a convenient and efficient way to move large amounts of goods and people to and from San Francisco and points beyond. River transportation from the mid–nineteenth century through the early twentieth century resulted in numerous marks along the river corridor, including ferries, wharves, shipwrecks, and many communities (Lydecker and James 2009:28, Figure 2-2).

Yolo County

The decline of the California gold rush resulted in disenchanted miners who realized they could make a greater fortune through farming and ranching than in gold prospecting, transforming Yolo County from an isolated farming community into a booming agricultural region. Through both the mid-nineteenth and twentieth centuries, Yolo County commerce was generally agrarian in focus, the main crops being wheat, barley, and other grains. Commercial enterprises related to agriculture and livestock also sprang up during this period, furthering the development and growth of the region (Larkey and Walters 1987:25–45).

Development

Yolo County's first town was Fremont, founded in 1849 near the confluence of the Sacramento and Feather Rivers (south of present-day Knights Landing). It became the first county seat in 1850. After the damaging flood of 1851, the county seat was moved to the town of Washington (now part of present-day West Sacramento). Between 1857 and 1861, the county seat moved from Washington to Cacheville (present day Yolo) and back to Washington. However, in 1862, more flooding episodes had motivated the community voters to select the centrally located town of Woodland as the permanent county seat (Hoover et al. 2002:566, 568–569).

Present-day West Sacramento experienced little growth until the early 1900s, when levee construction along the Sacramento River encouraged settlement and development of the area. Early settlers included Jan Lows de Swart (holder of the Rancho Nueva Flandria land grant), and James McDowell. In 1911, the West Sacramento Company laid out the community of Riverbank (later called Bryte) just west of the Sacramento River. Shortly thereafter, plans were under way for the establishment of the town of West Sacramento (Corbett 1993; Hoover et al. 2002: 568).

Following World War I, West Sacramento remained an unincorporated area populated primarily by small farms and a handful of industries. By the 1920s, the main east-west transcontinental highway (U.S. Highway 40, now West Capitol Avenue) extended through West Sacramento; within a few years several hotels and motels were constructed along its route through town. During World War II, factories and other industries began to prosper along the west bank of the Sacramento River.

Following the war, the region—like much of the state—experienced a housing boom that would last for several decades (Corbett 1993).

In 1987, after numerous attempts, the City of West Sacramento was officially incorporated. The new city included the former communities of Broderick, Bryte, and surrounding urban and rural areas on the west side of the Sacramento River into Southport (Walters 1987:46).

Reclamation and Flood Management

Historically, much of the Sacramento Valley was marsh and swampland, and there was seasonal flooding and periodic inundation of usually dry areas. Starting in the nineteenth century, flood management and land reclamation projects were undertaken to make the area habitable for larger populations and to expand agriculture.

In 1861, the legislature created the State Board of Reclamation Commissioners (Board) and authorized the formation of reclamation districts to reduce risks of flooding in the American and Yolo Basins and in lower Sacramento County. In an attempt to enclose large areas bounded by natural levees, 32 districts were formed (Thompson 1958:196–198; McGowan 1961:284). Swampland Districts 1, 2, and 18 were organized to reduce risk of flooding in the American and Yolo Basins and in lower Sacramento County and to allow reclamation of agricultural lands. Construction of flood risk-reduction facilities began in 1863; by 1865, 42 kilometers (km)/26 miles of levees and 32 km/20 miles of drainage canals had been constructed (Bouey and Herbert 1990).

Because of the onset of the Civil War and modification of the assembly bill that established the Board, the work was not completed (Bradley and Corbett 1995). The Board was dissolved in 1866, and control of swamp and overflow land fell to the counties (Thompson 1958:198). The Green Act of 1868 removed acreage limitations, and incentive programs were instituted. When a landholder certified that $2 per 1 acre had been spent on reclamation, the purchase price of the land was refunded and the owner given the deed. Speculators took advantage of this offer, and a period of opportunistic and often irrational levee building followed (McGowan 1961:285; Thompson 1958:199–202).

In 1911, the State Reclamation Board was established; the new board had jurisdiction over reclamation districts and levee plans. That year, with approval from the state, the Sacramento Flood Control Plan was implemented. The plan proposed the construction of levees, weirs, and bypasses along the river. By 1918, hundreds of miles of levees were constructed in order to manage flood risk in the Sacramento Valley. As early as 1892, farmers of Yolo County came together to construct levees along the Sacramento River from the town of Washington to roughly 9 miles downstream. In March 1911, the Sacramento Land Company (formerly the West Sacramento Land Company) assisted with the establishment of RD 900 in what is now West Sacramento. The formation of this reclamation district created a framework for using public funds through bonds, levies, and taxes to drain the land (Corbett 1993; Walters 1987:21–23).

Under the direction of civil engineers Haviland & Tibbetts, formation of RD 900 began. The district spanned 11,500 acres from the east-west line of the Southern Pacific Railroad (SPRR) tracks, south to the vicinity of Riverview. Construction involved installing drainage canals, levees, and pumphouses. The canals carried drainage to the pumphouses, which, in turn, moved the water over the levees into the Yolo Bypass. As the land was drained of water, the fields of tules were removed, establishing acres of agricultural land (Corbett 1993). Reclamation districts such as RD 900 frequently result in historically and functionally cohesive, patterned modifications of rural areas through their networks of irrigation works, roads, boundary markers, and buildings. Such rural historic landscapes have been documented in the Sacramento Valley, some of which—such as RD 1000 in Sacramento and Sutter Counties—have been determined eligible for listing in the NRHP (Bradley and Corbett 1995; Jones & Stokes 2004:22; JRP Historical Consulting Services 1994; Peak 1997).

3.17.2.5 Records Search

ICF staff conducted a records search in June 2011, and an amendment to the records search for a potential borrow site in February 2013, at the Northwest Information Center of the California Historical Resources Information System located at Sonoma State University. The research consisted of a database search of all previously recorded sites and studies within the study area and a 0.50-mile-wide radius around the study area. The search also consulted the current listings for the NRHP, the CRHR, and pertinent historic inventories and historic maps. The following sources were consulted as part of the record search efforts.

- *California Inventory of Historic Resources*. California Department of Parks and Recreation. 1976.
- *California Historical Landmarks*. California Department of Parks and Recreation. 1996.
- *California Historical Resources Information System*, Directory of properties in the historic property data file for Yolo and Sacramento Counties. Office of Historic Preservation. 2007.
- *California Historical Resources Information System*. Archeological determinations of eligibility, Sacramento County. Office of Historic Preservation. 2007.
- U.S. Geological Survey. 1907. 15-minute Davisville, California, topographic quadrangle.
- U.S. Geological Survey. 1908. 15-minute Courtland, California, topographic quadrangle.

The records search resulted in the finding that only a small percentage of the project area has been previously surveyed for the presence of cultural resources.

Two prehistoric sites occur on or near the proposed borrow locations depicted in Plate 1-5; CA-Yol-132 and CA-Yol-18. CA-Yol-132 consists of a prehistoric midden site measuring 30 meters containing midden (habitation debris) and baked clay. CA-Yol-18 is a midden site spanning 24 meters, with documented human remains, midden, project points, and shell pendants.

Historic map research revealed that two known historic-era cultural resources are in the project area: a segment of the Sacramento Northern Railroad alignment and the Sacramento River Levee. Neither of these resources within the study area has been previously recorded or evaluated for significance under NRHP or CRHR criteria.

3.17.2.6 Shipwrecks Database

ICF consulted the California State Lands Commission's Shipwrecks Database (last updated 2009) to determine whether historic shipwrecks may be present in the project area. The database was searched by selecting Yolo County in the search field, which generated a list of 12 shipwrecks in Yolo County. The database search yielded latitude and longitude coordinates for 11 of the shipwrecks, which were plotted using an online mapping program to determine whether any of the shipwrecks were in the project area. None of the shipwrecks appears to be within or adjacent to the project area.

3.17.2.7 Field Survey

Through April and May of 2011, ICF archaeologists conducted a reconnaissance-level survey of the parcels in the project area where access has been granted by landowners. Access to several parcels of the proposed survey area was not obtained prior to the survey. The majority of the project area consists of both fallow and planted agricultural fields with some residential properties. Residential properties typically were graded and landscaped. No previously unidentified archaeological resources were noted in the project area as a result of the reconnaissance-level survey.

On June 9, 2011, an ICF architectural historian conducted an initial field survey of the project area. As part of the field process, buildings and structures 50 years old or older were inspected, photographed, and documented. Roughly 80% of the study was accessible for survey. Due to access restrictions, several properties were recorded from South River Road at a distance of 100–400 yards away from partially visible buildings and structures. Dense vegetation in the form of trees and shrubs presented further problems as they obstructed any available line of sight.

In April of 2013, ICF architectural historians conducted an additional field survey to identify all buildings and structures 50 years old or older in the study area. At this time, access was granted to several of the parcels, making it possible to survey all of the buildings and structures in the study area. This survey resulted in the identification of 31 properties containing buildings or structures at least 50 years of age. All properties were photographed and documented with written notes.

3.17.2.8 Native American Consultation

In August 2011 and again in September 2012, ICF cultural resources staff contacted the NAHC to request a search of their Sacred Lands File. The NAHC staff responded on September 29, 2011, and again on October 9, 2012, with a list of Native American contacts for Yolo and Sacramento Counties and indicated that the results of the sacred lands database search were negative for the project area.

On October 6, 2011, October 15, 2012, and February 14, 2013, ICF staff sent letters to the Native American contacts on the lists provided by NAHC as well as Native American tribeslisted by the Bureau of Indian Affairs. Letters were sent to 22 Native American representatives. The correspondence included a map depicting the project corridor, a brief description of the proposed project, and a request for the contacts to share any knowledge or concerns they may have regarding cultural resources in or adjacent to the study area. Four tribes, the Yocha Dehe Wintun Nation, the United Auburn Indian Community, the Buena Vista Rancheria, and the Wilton Rancheria, responded to letters with a request to consult on the proposed project. On August 6, 2013, an on-site meeting was held with the United Auburn Indian Community, the Wilton Rancheria, a USACE archaeologist, an ICF archaeologist, and a representative from the City of West Sacramento. On August 20, 2013, an on-site meeting was held with the Yocha Dehe Wintun Nation, a USACE archaeologist, an ICF archaeologist, and a representative from the City of West Sacramento. Consultation with these tribes is ongoing. To date, no other tribes have responded.

3.17.2.9 Additional Research and Consultation

In an effort to identify important historic people, events, and trends that may have been associated with the project area, an ICF historian conducted archival research at the California State Library and the Yolo County Assessor's Office. These two facilities revealed chain of ownership information for properties within the study area. Historic maps and aerials and County biographies also revealed information relevant to the development of the subject properties. ICF also sent project notification letters to the Yolo County Historical Museum, the Yolo County Historical Society, the Portuguese Historical and Cultural Society, the West Sacramento Historical Society, and the California Institute for Rural Studies requesting information regarding cultural resources that may be located within the project area. To date, no responses have been received.

3.17.2.10 Summary of Known Cultural Resources

Archaeological Resources

There are two previously recorded potentially significant archaeological sites within the boundaries of the study area. A summary of these resources is provided below (Table 3.17-1). Ca-Yol-18 was recorded in 1935 and updated in 1960. The site has not been relocated since that time. According to the primary record, the site is in the back yard of a residence and has been extensively looted. The NWIC shows four possible locations for the site, one of which is partially in a potential borrow location. All other possible locations are outside the project area and appear to be in developed residential neighborhoods and will not be effected by the proposed project. Ca-Yol-132 was recorded by Patti and Jerry Johnson in 1974. The site has not been relocated since that time. According to the primary record, the site is under the levee and has been heavily disturbed by levee construction and erosion. The site was slated to be covered with riprap in late 1975. No indication of the site was noted during the survey.

Table 3.17-1. Archaeological Resources

Trinomial	Description	Eligibility
Ca-Yol-18	Prehistoric site approximately 24 meters in diameter. Described as a midden mound that includes projectile points, bone awls, shell beads, and one burial.	Not Evaluated
Ca-Yol-132	Prehistoric site approximately 30 meters in diameter. Described as a midden deposit with obsidian flakes, chert flakes, baked clay balls.	Not Evaluated

Architectural/Built Environment Resources

In total, 31 properties containing buildings or structures at least 50 years of age are in the study area. These properties include parcels containing buildings or structures 50 years old or older. Overall, the survey population includes 27 residential properties, 2 remains of railroad bridges associated with the Sacramento Northern Railway, a 5.6-mile segment of the Sacramento River Levee, and several docking structures along the levee. Field surveys revealed that the segment of the Sacramento Northern Railway in the study area no longer exists. The rail alignment has been completely abandoned and replaced with a public trail. Consequently, this property was not included in the survey population.

The results of the survey and evaluation of the architectural resources are documented in detail in the technical report prepared for this project (in progress). The following is a summary of the property types identified as a result of these investigations. The only resource found eligible for the NRHP and the CRHR in the study area for this project is a 5.6-mile segment of the Sacramento River Levee.

Non-Eligible Architectural/Built Environment Property Types

Residential Buildings and Farm Complexes

Twenty-seven parcels containing residential building and farm complexes over 50 years of age are in the study area. The earliest residential building dates to 1917, while the majority of buildings date between the 1930s and 1950s. Many of the residential buildings are vernacular representations of architectural styles including bungalows, revival styles, minimal traditional, and ranch houses. Many of the residential buildings have been modified over time to the extent that the original architectural style is nearly indiscernible. Other buildings in the study area include a wide range of utilitarian and agricultural related resources, such as barns, sheds, and corrugated metal storage buildings of various sizes. Most parcels are farm complexes containing a combination of residences and agricultural related buildings. Research did not reveal any significant associations indicating that any of these buildings are representative of West Sacramento's early residential and agricultural growth or that they are known to be directly associated with events that have made significant contributions to the history of Sacramento and Yolo Counties the state, or nation. Therefore, none of the buildings appear to be eligible for listing in the NRHP under Criterion A or the CRHR under Criterion 1.

Deed research was conducted on all properties 50 years of age in the study area. This research did not reveal that the properties have any associations with any individual's important historic work and, therefore, they do not appear eligible for the NRHP under Criterion B or the CRHR under Criterion 2. As noted above, architecturally, the buildings in the study area are modest and/or vernacular examples of a variety of popular architectural styles between the early to mid-twentieth century. Many of the styles or building types, including the utilitarian buildings, are commonly found in the agricultural Delta region of California. Therefore, these buildings are not exceptional or known to be the work of a master architect and do not appear eligible for listing in the NRHP under Criterion C or the CRHR under Criterion 3. Furthermore, on the whole, the subject buildings lack historic integrity due to a wide variety of changes, including non-compatible additions, alternations of original plans, and replacement of original exterior siding and windows. Overall, none of the 27 parcels containing residential building and farm complexes over 50 years of age in the study area appear eligible for listing in the NRHP or CRHR as individual resources or as a group of resources, such as a historic district.

Sacramento Northern Railroad Bridges

A former Sacramento Northern Railway segment extends through the project area in a roughly northeast-southwest direction. The Sacramento Northern Railroad alignment was originally constructed in 1911 as part of the Sacramento and Woodland Railroad and later the Northern Electric Railroad. In 1918, Sacramento Northern Railway assumed ownership, which resulted in the incorporation of all electric lines in the Sacramento Valley. Over time, portions of the rail alignment, including the subject segment, were abandoned. The segment within the study area has been completely removed and replaced with a public bike/running trail. Remnants of two bridges that once carried the rail line over local streets are located in the study area. One remnant consists of the abutments for a bridge over South River Road. The other is a small timber trestle that once carried the track over Gregory Avenue. Neither appears to be eligible for listing in the NRHP or CRHR, owing to a loss of integrity for the abutments and because the timber trestle has little integrity and is an example of a very common railroad bridge type. Because of a lack of integrity, the railroad bridges do not appear to meet NRHP or CRHR criteria.

Docking Structures

The study area includes nine docking structures that do not appear to meet any of the NRHP or CRHR criteria. Near Linden Road there is a group of timber pilings that are at least 50 years of age (based on historic aerials), but lack physical integrity as a docking structure. Adjacent to these pilings is a timber stairway, a movable boat cradle, and another set of timber pilings, all of which are less than 50 years of age. In the Oak Hall Bend area, approximately 3,600 feet southeast of Davis Road, there are timber pilings that are at least 50 years of age but lack physical integrity as docking structures. Approximately 6,000 feet west of these structures adjacent to South River Road is a floating dock, gangway, stairs, and timber pilings, all of which are less than 50 years of age. Because the docking structures in the project area are either less than 50 years of age (and do not meet any of the NRHP special criteria considerations) or lack sufficient physical integrity, none of these structures appear to be eligible for listing in the NRHP or the CRHR.

Eligible Architectural/ Built Environment Resources

Table 3.17-2. Identified Architectural/Built Environment Resource Eligibility and Potential Effects

Identified Properties	Year Built	Current Eligibility Status	Assumed Eligibility and Effects
Sacramento River Levee Segment	1860s–1910s	Not listed locally or nationally	NRHP A/CRHR 1; substantial adverse effect under all Alternatives

Sacramento River Levee

A 5.6-mile segment of the Sacramento River Levee is in the project area. The Sacramento River Levee is an earthen levee extending in a roughly north-south direction along the west bank of the Sacramento River. South River Road, which is paved, is on top of the levee. The Sacramento River Levee is part of a conglomeration of water control structures constructed in the Sacramento Valley between the mid-nineteenth and mid-twentieth centuries as a response to heavy flooding in the area, which occurred repeatedly between the 1850s and early 1910s. Construction of flood risk-reduction measures, including the levee, began as early as the 1860s and continued until the early- to mid-twentieth century as increasing development in the area led to a greater need for more substantial and extensive levees. The Sacramento River Levee appears to meet NRHP Criterion A and CRHR Criterion 1 for its association with flood risk–reduction and land reclamation efforts in California.

3.17.3 Environmental Consequences

This section describes the environmental consequences relating to cultural resources for the Southport project. It describes the methods used to determine the effects of the project and lists the thresholds used to conclude whether an effect would be significant. The effects that would result from implementation of the Southport project, findings with or without mitigation, and applicable mitigation measures are presented in a table under each alternative.

3.17.3.1 Assessment Methods

This evaluation of cultural resources is based on professional standards and information cited throughout the section.

The key effects were identified and evaluated based on the environmental characteristics of the Southport project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project.

Evaluation of effects on cultural resources is based on the type and location of proposed flood management and recreation improvements and the potential of project activities to affect known resources or sensitive areas based on information provided by literature review, records searches, historic map research, and consultation with Native Americans.

3.17.3.2 Determination of Effects

For this analysis, an environmental effect was significant related to cultural resources if it would result in any of the effects listed below. These effects are based on NEPA standards, State CEQA Guidelines Appendix G (14 CCR 15000 et seq.), and standards of professional practice:

Federal Criteria

According to 36 CFR 800.5, an undertaking would have an adverse effect on historic properties if the effect alters the characteristics that make a property eligible for inclusion in the NRHP. Such effects also would be considered adverse under NEPA. Adverse effects can occur when prehistoric or historic archaeological sites, structures, or objects listed in or eligible for listing in the NRHP are subjected to the following phenomena:

- physical destruction of or damage to all or part of the property;
- alteration of the property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines;
- removal of the property from its historic location;
- change in the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
- introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;
- neglect of the property that causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; or
- transfer, lease, or sale of the property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

State Criteria

CEQA defines a significant impact on cultural resources in 14 CCR 15064.5(b) (1) and (2) as one with the potential to cause a substantial adverse change in the significance of a historical resource or unique archaeological resource. Substantial adverse change in the significance of a resource means the physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the resource would be materially impaired. The significance of a historical resource is materially impaired when a project results in demolition or material alteration in an adverse manner of those physical characteristics of a resource that:

- convey its historical significance and that justify its inclusion in, or eligibility for inclusion in, the CRHR;
- account for its inclusion in a local register of historical resources pursuant to PRC 5020.1(k) or its identification in a historical resources survey meeting the requirements of PRC 5024.1(g), unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or
- convey its historical significance and that justify its eligibility for inclusion in the CRHR as determined by a lead agency for purposes of CEQA.

3.17.4 Effects and Mitigation Measures

This section describes the anticipated effects of proposed flood risk–reduction measures on cultural resources associated with each alternative, for actions analyzed at a project level of detail. The excavation of borrow may also have effects on cultural resources because cultural resources have the potential to occur in borrow sites that WSAFCA is evaluating for the project. Because the precise location where borrow may be removed within the set of borrow sites under consideration remains uncertain, this chapter describes effects on cultural resources associated with these borrow sites at a program level of detail. Effects of borrow excavation on cultural resources will be considered at a project level when locations of borrow excavation are known, and further public disclosure provided as needed.

3.17.4.1 No Action Alternative

Under the No Action Alternative, existing deficiencies along the 5.6-mile reach of Sacramento River Levee from approximately 0.25 mile south of the Barge Canal on the north to the Cross Levee on the south would continue. No flood risk–reduction measures would be implemented. Under the No Action Alternative, it is presumed that no ground-disturbing activities associated with levee construction would occur and there would be no resulting effect on cultural resources. The consequences of levee failure and flooding are described under the No Action Alternative description in Chapter 2, Section 2.3.2.2, Consequences of Levee Failure, including a summary of environmental effects.

As discussed in Chapter 2, “Alternatives,” there are three possible scenarios related to the levee vegetation policy under the No Action Alternative.

- Full application of USACE levee vegetation policy, as detailed in the ETL, meaning prohibition and removal of woody vegetation within the levee prism or within 15 feet of the landside or waterside levee toes (U.S. Army Corps of Engineers 2014).
- No application of the ETL; assumes the continued existence into the future of the vegetation conditions at the time of the analysis.
- Modified application of the ETL; assumes application of the ULDC (California Department of Water Resources 2012) and CVFPP concepts for management of woody vegetation, meaning trimming and thinning to allow visibility and accessibility, selective retention and removal based on engineering inspection and evaluation, and LCM.

However, no cultural resources would be affected by the implementation of any of the three vegetation management scenarios.

Effects of the action alternatives described below were determined in comparison with the No Action Alternative, No Application of the ETL scenario. This No Action scenario was used because it represents the greatest environmental divergence from the action alternatives and, therefore, discloses to the public the widest range of potential effects. This is consistent with the CEQA approach of determining effects in comparison with present conditions.

3.17.4.2 Alternative 1

Implementation of Alternative 1 would result in the following effects on cultural resources (Table 3.17-3). No indirect effects on cultural resources would result from implementation of the Southport project alternatives.

Table 3.17-3. Cultural Resources Effects and Mitigation Measures for Alternative 1

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
CUL-1: Effects on Architectural (Built Environment) Resources (the Sacramento River Levee)	Significant	Significant	Significant and unavoidable	CUL-MM-1: Detailed Recordation of the Affected Levee
CUL-2: Change in the Significance of an Archaeological Resource	Significant	No effect	Significant and unavoidable	CUL-MM-2: Complete Archaeological Inventory and Evaluation prior to Construction and Implement Treatment or Preservation for Eligible and Adversely Affected Resources CUL-MM-3: Implement Inadvertent Discovery Procedures
CUL-3: Disturbance of Native American and Historic-Period Human Remains	Significant	No effect	Significant and unavoidable	CUL-MM-4. Implement Human Remains Discovery Procedures
CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material	Significant	No effect	Significant and unavoidable	CUL-MM-5: Implement Cultural Resource Management Protocols for Borrow Areas

Effect CUL-1: Effects on Architectural (Built Environment) Resources

Construction of floor risk-reduction measures such as seepage berms under Alternative 1 would substantially alter the physical characteristics of the Sacramento River Levee, causing a major change to its engineering design or overall setting and resulting in a direct adverse effect to a historic resource. While implementation of Mitigation Measure CUL-MM-1 would reduce the intensity of the effect, the direct effect would still be significant and unavoidable under both state and Federal criteria.

Mitigation Measure CUL-MM-1: Detailed Recordation of the Affected Levee

To mitigate for effects on the historic property, a detailed recordation of the levee will be conducted prior to construction. This could include a range of specific mitigation measures to be determined in Section 106 consultation with the State Office of Historic Preservation.

Documentation of the levee could include a range of options, such as interpretive displays, online resources, or historic contexts. The most common form of mitigation for a resource such as the levee is documentation through Historic American Engineering Record (HAER). Prior to any construction work, WSAFCA will hire a qualified cultural resources specialist to document the levee with a historical narrative and large format photographs in a manner consistent with the HAER. Copies of the narrative and photographs will be distributed to the Library of Congress. The preparation of the HAER document will follow standard National Park Service procedures. There will be three main tasks: (1) gather data, (2) prepare photographic documentation, and (3) prepare a written historic and descriptive report. Photographic documentation will include 4-by-5 inch negatives in labeled sleeves, 8-by-10-inch prints mounted on labeled photo cards, and an index to the photographs. In addition to the levee structure, its setting, and its relationship to the landscape, the research will include possible photographic reproduction of any valuable engineering blueprints.

Effect CUL-2: Change in the Significance of an Archaeological Resource

Although the project area has not been fully surveyed because rights of entry to all affected parcels cannot currently be acquired, no archaeological resources have been found in areas that have been surveyed. There is the possibility, however, that construction would unearth archaeological materials from beneath the ground surface that cannot currently be identified because of limited access and because of the infeasibility of identifying all buried resources prior to construction. Damage to such resources, if they meet the significance criteria of the NRHP and/or the CRHR, would constitute a significant effect under CEQA (14 CCR 15064.5) and an adverse effect under Section 106 of the NHPA and NEPA. Therefore, the direct effect on archaeological resources would be significant. While implementation of Mitigation Measures CUL-MM-2 and CUL-MM-3 would reduce the intensity of the effect, the effect would still be significant and unavoidable.

Mitigation Measure CUL-MM-2: Complete Archaeological Inventory and Evaluation prior to Construction and Implement Treatment or Preservation for Eligible and Adversely Affected Resources

WSAFCA will retain an archaeologist meeting the Secretary of the Interior's standards for archaeologists) to conduct an archaeological inventory of any unsurveyed and currently inaccessible parcels that could potentially be affected by the project in order to identify resources prior to construction where feasible. The pedestrian survey will cover all areas that have not been previously surveyed and are proposed for project-related ground disturbance and where native substrate materials are exposed. All resources located during the survey will be recorded on the appropriate DPR 523 forms, photographed, and mapped. Archaeological resources will be plotted on a 7.5-minute USGS topographic map using locational data collected with a GPS receiver. Methods and results will be documented in a technical report prepared consistently with the PA. The significance of any identified resources will be evaluated for eligibility to be listed on the NRHP and CRHR. Site records will be produced and forwarded to the California Historical Resources Information System.

For all eligible resources that may be identified in currently inaccessible areas, WSAFCA will prepare a finding of effect. For all resources that may be adversely affected under Section 106 or materially impaired within the meaning of CEQA, WSAFCA will implement treatment to reduce or avoid adverse effects to the extent feasible. WSAFCA will consider preservation in place as the preferred mitigation, as required under CEQA Guidelines Section 15126.4(b). WSAFCA will prepare a discussion documenting the basis for the selection of treatment consistent with this section.

Mitigation Measure CUL-MM-3: Implement Inadvertent Discovery Procedures

If cultural resources are discovered during construction, all construction will immediately stop within 100 feet (30 meters) of the discovery, the location of the discovery will be marked for avoidance, and efforts will be made to prevent inadvertent destruction of the find. The contractor must notify the USACE and WSAFCA (if not on location). WSAFCA, in consultation with USACE, will determine whether the discovery is a potential NRHP-eligible resource by evaluating the resource per the criteria in 36 CFR Part 60.4. WSAFCA will also evaluate the resource to determine whether it is a historical resource or unique archaeological resource under CEQA. If WSAFCA and USACE determine that the discovery is neither an NRHP-eligible resource nor a historical resource, the discovery will be documented and construction may proceed at the direction of USACE and WSAFCA.

If WSAFCA and USACE determine that human remains are not present, that the discovery is not an isolated find, and that the discovery may be eligible for the NRHP or significant under CEQA, the WSAFCA and USACE will notify the SHPO and other relevant parties as early as feasible. Notification will include a description of the discovery, the circumstances leading to its identification, and recommendations for further action. Where feasible, the notification will also include a tentative NRHP and CRHR eligibility recommendation and description of probable effects. If the resource cannot be evaluated based on available evidence (for example where test excavation is required), WSAFCA will use testing and evaluation methods provided in the research design and treatment plan appended to the PA for further technical work necessary to determine the eligibility of the resource and to describe effects under CEQA and NHPA. Treatment will be implemented where necessary to resolve adverse or significant effects on inadvertently discovered cultural resources that are CRHR or NRHP eligible. WSAFCA will consider preservation in place as the preferred mitigation, as required under CEQA Guidelines Section 15126.4(b) for all CRHR-eligible resources that are subject to significant effects. WSAFCA will prepare a discussion documenting the basis for the selection of treatment consistent with this section.

If human remains are found as part of the find, those remains will be managed as required under Mitigation Measure CUL-MM-4, below.

Effect CUL-3: Disturbance of Native American and Historic-Period Human Remains

The project area is sensitive for archaeological cultural remains, including burials. The potential for buried human remains to be unearthed and disturbed during ground-disturbing activities that would be associated with construction in the study area is considered high. The disturbance of any human remains is considered a significant direct effect. Implementation of the human remains discovery provisions in Mitigation Measure CUL-MM-4 would likely reduce the severity of this effect, but it would still be considered a significant and unavoidable effect.

Mitigation Measure CUL-MM-4. Implement Human Remains Discovery Procedures

Response to human remains discoveries for the project is governed California state law, as the project is located on non-Federal land. In the event of a human remains discovery, WSAFCA will immediately notify the Yolo County Coroner. The coroner, as required by the California Health and Safety Code (Section 7050.5), will make the final determination about whether the remains constitute a crime scene and are Native American in origin. The coroner may take 2 working days from the time of notification to make this determination.

If the coroner determines that the remains are of Native American origin, the coroner will contact the NAHC within 24 hours of the determination. The NAHC will immediately designate and contact the most likely descendant (MLD), who must make recommendations for treatment of the remains within about 48 hours from completion of their examination of the finds, as required by PRC 5097.98(a). WSAFCA will then contact the landowner.

It is likely that if a Native American burial is found, it will be found in the context of a prehistoric archaeological property. For a prehistoric property associated with burials, decisions must be made about how the remainder of the property will be treated for its archaeological (and possibly other) values. Not only must the MLD make decisions about the burials, but a plan must be devised also for evaluation and—if determined to be eligible for the NRHP—treatment of the property in consultation with the MLD, SHPO, and other consulting parties (see Mitigation Measure CUL-MM-3 above).

If the remains are found not to be Native American in origin and do not appear to be in an archaeological context, construction will proceed at the direction of the coroner and WSAFCA. It is likely that the coroner will exhume the remains. Once the remains have been appropriately and legally treated, construction may resume in the discovery area upon receipt of WSAFCA's express authorization to proceed.

Effect CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material

WSAFCA is evaluating a number of locations where borrow material necessary to construct flood risk–reduction measures may be removed. These borrow locations are depicted on Plate 1-5. The final selection of borrow sites has not been completed because the geotechnical work necessary to identify the distribution of suitable material is ongoing. In addition, rights-of-entry to all borrow sites have not yet been acquired. Therefore, this impact discussion evaluates potential direct effects on cultural resources associated with borrow removal at a program level of detail.

Prehistoric resources have been documented along the Sacramento River and adjacent uplands on similar projects in the region (Sacramento Area Flood Control Agency 2007:3.8-17). In addition, two prehistoric resources have been documented on or near the borrow areas, as described above under Section 3.17.2.5, Records Search. The relatively low number of prehistoric cultural resources documented in the landside parcels associated with the project likely reflects the dearth of previous studies rather than a low density of resources. In addition, soil in the project area consists of Pleistocene and Holocene deposits (Meyer et al. 2008:7). Soil types that occur in the project area and associated typical ages and sensitivity are summarized below in Table 3.17-4. Of the 17 soil types identified in the project area, 11 have high to very high sensitivity for buried sites with little or no surface manifestation. These sites may also contain human remains. Landform sensitivity thus provides a proxy indicator of prehistoric site sensitivity in the absence of site-specific studies. Buried sites obscured by overlying soil layers are likely to contain deposits that remain intact despite surface disturbance such as agricultural land use; therefore, these sites are likely to have integrity. These sites may also offer material useful in archaeological research. For these reasons, both known archaeological sites (CA-Yol-132 and CA-Yol-18) that occur within the borrow areas and sites that have not been identified may have both significance and integrity and, therefore, may qualify as both historical resources under CEQA and historic properties under the NHPA.

Table 3.17-4. Project Area Soil Types, Ages, and Archaeological Sensitivity

Soil Type	Sampled Age	Sensitivity
Capay	late Holocene	4,000-2,000 B.P./high
Clear Lake	latest Holocene	2,000-150 B.P./very high
Columbia	historic modern	150 BP-present/variable
Egbert	latest Holocene	2,000-150 B.P./very high
Galt	late Holocene	4,000-2,000 B.P./high
Hollenbeck	late Holocene	4,000-2,000 B.P./high
Jacktone	mid-Holocene	7,000-4,000 B.P./moderate
Marcum	latest Pleistocene	15,000-11,500 B.P./very low
Omni	latest Holocene	2,000-150 B.P./very high
Ryde	no data	no data
Sacramento	latest Holocene	2,000-150 B.P./very high
Sailboat	latest Holocene	2,000-150 B.P./very high
San Joaquin	older Pleistocene	>15,000 B.P./very low
Shanghai	historic modern	150 B.P-present/variable
Stockton	late Holocene	4,000-2,000 B.P./high
Sycamore	latest Holocene	2,000-150 B.P./very high
Valdez	latest Holocene	2,000-150 B.P./very high

* Soil types identified by U.S. Department of Agriculture, Natural Resources Conservation Service (2012), landform sensitivity described by (Meyer et al. 2008:161).

Historic-era archaeological resources and built environment resources may also occur in the borrow sites selected for excavation. A total of 31 structures have been documented in other portions of the project area. Additional historic-era structures and associated archaeological deposits have the potential to occur in the borrow sites under consideration. Identification efforts for these features have not been completed because not all of the borrow sites are legally accessible, nor have the specific locations of work been decided. These resources may be associated with the significant historical themes of reclamation and agricultural land development. In addition, individual structures may be significant for their architectural or stylistic value. If the setting surrounding these structures, as well as the character-defining elements of these structures, remains intact the structures may qualify for the NRHP or CRHR.

Excavation of borrow has the potential to damage archaeological resources, human remains, and historic-era structures that potentially occur in the borrow areas. Damage to archaeological sites could occur through inadvertent excavation where sites are obscured by surface strata, compaction or, vibration associated with heavy equipment. Damage to historic structures may occur through demolition, vibration, or alteration of the setting.

WSAFCA and USACE would complete an inventory, evaluation, findings of effect, and implement treatment as necessary for cultural resources that may occur in the borrow areas, as required under Mitigation Measures CUL-MM-1, CUL-MM-2 and CUL-MM-3. WSAFCA would prioritize preservation in place for archaeological resources as required under State CEQA Guidelines Section 15126.4(b). In addition, human remains would be managed and protected as required under Mitigation Measure CUL-MM-4. These mitigation measures have been adopted for all borrow activities under Mitigation

Measure CUM-MM-5 below. However, because sites and associated human remains may be buried with little surface manifestation, some register-eligible archaeological resources may be disturbed before they can be discovered. In addition, preservation of sites, remains, and built environment resources that may be discovered may not be feasible in all instances because of the need to coordinate protection of other natural resources and the need to locate suitable material for implementation of flood risk–reduction measures. For these reasons, this direct effect remains significant and unavoidable.

Mitigation Measure CUL-MM-5: Implement Cultural Resource Management Protocols for Borrow Areas

WSAFCA will complete the following management and mitigation steps for all borrow areas, on determination of the specific set of parcels to be used for borrow:

- **Mitigation Measure CUL-MM-1: Recordation for any Significant Built Environment Resource Adversely Affected by the Borrow Activities, Similar to the Recordation Proposed for the Sacramento River Levee**
- **Mitigation Measure CUL-MM-2: Complete Archaeological Inventory and Evaluation prior to Construction and Implement Treatment or Preservation for Eligible and Adversely Affected Resources**
- **Mitigation Measure CUL-MM-3: Implement Inadvertent Discovery Procedures**
- **Mitigation Measure CUL-MM-4. Implement Human Remains Discovery Procedures**

3.17.4.3 Alternative 2

Implementation of Alternative 2 would result in the following effects on cultural resources (Table 3.17-5).

Table 3.17-5. Cultural Resources Effects and Mitigation Measures for Alternative 2

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
CUL-1: Effects on Architectural (Built Environment) Resources	Significant	Significant	Significant and unavoidable	CUL-MM-1: Detailed Recordation of the Affected Levee
CUL-2: Change in the Significance of an Archaeological Resource	Significant	No effect	Significant and unavoidable	CUL-MM-2: Complete Archaeological Inventory and Evaluation prior to Construction and Implement Treatment or Preservation for Eligible and Adversely Affected Resources CUL-MM-3: Implement Inadvertent Discovery Procedures
CUL-3: Disturbance of Native American and Historic-Period Human Remains	Significant	No effect	Significant and unavoidable	CUL-MM-4. Implement Human Remains Discovery Procedures
CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material	Significant	No effect	Significant and unavoidable	CUL-MM-5: Implement Cultural Resource Management Protocols for Borrow Areas

Effect CUL-1: Effects on Architectural (Built Environment) Resources

Under Alternative 2, proposed construction of flood risk-reduction measures, such as creation of the offset floodplain area, would partially demolish and substantially alter the physical characteristics, causing a major change to its engineering design or overall setting and resulting in a direct adverse effect to a historic resource. While implementation of Mitigation Measure CUL-MM-1 would reduce the intensity of the effect, the direct effect would still be significant and unavoidable under both state and Federal criteria.

Effect CUL-2: Change in the Significance of an Archaeological Resource

Direct effects and mitigation associated with Effect CUL-2 under Alternative 2 are identical to those described above for Effect CUL-2 under Alternative 1.

Effect CUL-3: Disturbance of Native American and Historic-Period Human Remains

Direct effects associated with Effect CUL-3 under Alternative 2 are identical to those described above for Effect CUL-3 under Alternative 1.

Effect CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material

Direct effects and mitigation associated with Effect CUL-4 under Alternative 2 are identical to those described above for Effect CUL-4 under Alternative 1.

3.17.4.4 Alternative 3

Implementation of Alternative 3 would result in the following effects on cultural resources (Table 3.17-6).

Table 3.17-6. Cultural Resources Effects and Mitigation Measures for Alternative 3

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
CUL-1: Effects on Architectural (Built Environment) Resources	Significant	Significant	Significant and unavoidable	CUL-MM-1: Detailed Recordation of the Affected Levee
CUL-2: Change in the Significance of an Archaeological Resource	Significant	No effect	Significant and unavoidable	CUL-MM-2: Complete Archaeological Inventory and Evaluation prior to Construction and Implement Treatment or Preservation for Eligible and Adversely Affected Resources CUL-MM-3: Implement Inadvertent Discovery Procedures
CUL-3: Disturbance of Native American and Historic-Period Human Remains	Significant	No effect	Significant and unavoidable	CUL-MM-4. Implement Human Remains Discovery Procedures
CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material	Significant	No effect	Significant and unavoidable	CUL-MM-5: Implement Cultural Resource Management Protocols for Borrow Areas

Effect CUL-1: Effects on Architectural (Built Environment) Resources and Cultural Landscapes

Under Alternative 3, construction of flood risk-reduction measures would substantially alter the physical characteristics of the levee and cause a major change to its engineering design or overall setting, resulting in a direct adverse effect to a historic resource. While implementation of Mitigation Measure CUL-MM-1 would reduce the intensity of the effect, the direct effect would still be significant and unavoidable under both state and Federal criteria.

Effect CUL-2: Change in the Significance of an Archaeological Resource

Direct effects and mitigation associated with Effect CUL-2 under Alternative 3 are identical to those described above for Effect CUL-2 under Alternative 1.

Effect CUL-3: Disturbance of Native American and Historic-Period Human Remains

Direct effects and mitigation associated with Effect CUL-3 under Alternative 3 are identical to those described above for Effect CUL-3 under Alternative 1.

Effect CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material

Direct effects and mitigation associated with Effect CUL-4 under Alternative 3 are identical to those described above for Effect CUL-4 under Alternative 1.

3.17.4.5 Alternative 4

Implementation of Alternative 4 would result in the following effects on cultural resources (Table 3.17-7).

Table 3.17-7. Cultural Resources Effects and Mitigation Measures for Alternative 4

	Finding			
Effect	**Direct**	**Indirect**	**With Mitigation**	**Mitigation Measure**
CUL-1: Effects on Architectural (Built Environment) Resources	Significant	Significant	Significant and unavoidable	CUL-MM-1: Detailed Recordation of the Affected Levee
CUL-2: Change in the Significance of an Archaeological Resource	Significant	No effect	Significant and unavoidable	CUL-MM-2: Complete Archaeological Inventory and Evaluation prior to Construction and Implement Treatment or Preservation for Eligible and Adversely Affected Resources CUL-MM-3: Implement Inadvertent Discovery Procedures
CUL-3: Disturbance of Native American and Historic-Period Human Remains	Significant	No effect	Significant and unavoidable	CUL-MM-4. Implement Human Remains Discovery Procedures
CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material	Significant	No effect	Significant and unavoidable	CUL-MM-5: Implement Cultural Resource Management Protocols for Borrow Areas

Effect CUL-1: Effects on Architectural (Built Environment) Resources and Cultural Landscapes

Construction related to Alternative 4 would partially demolish and substantially alter the physical characteristics of the levee, causing a major change to its engineering design or overall setting and resulting in a direct adverse effect to a historic resource. While implementation of Mitigation Measure CUL-MM-1 would reduce the intensity of the effect, the direct effect would still be significant and unavoidable under both state and Federal criteria.

Effect CUL-2: Change in the Significance of an Archaeological Resource

Direct effects and mitigation associated with Effect CUL-2 under Alternative 4 are identical to those described above for Effect CUL-2 under Alternative 1.

Effect CUL-3: Disturbance of Native American and Historic-Period Human Remains

Direct effects and mitigation associated with Effect CUL-3 under Alternative 4 are identical to those described above for Effect CUL-3 under Alternative 1.

Effect CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material

Direct effects and mitigation associated with Effect CUL-4 under Alternative 4 are identical to those described above for Effect CUL-4 under Alternative 1.

3.17.4.6 Alternative 5

Implementation of Alternative 5 would result in the following effects on cultural resources (Table 3.17-8).

Table 3.17-8. Cultural Resources Effects and Mitigation Measures for Alternative 5

Effect	Finding		With Mitigation	Mitigation Measure
	Direct	Indirect		
CUL-1: Effects on Architectural (Built Environment) Resources	Significant	Significant	Significant and unavoidable	CUL-MM-1: Detailed Recordation of the Affected Levee
CUL-2: Change in the Significance of an Archaeological Resource	Significant	No effect	Significant and unavoidable	CUL-MM-2: Complete Archaeological Inventory and Evaluation prior to Construction and Implement Treatment or Preservation for Eligible and Adversely Affected Resources CUL-MM-3: Implement Inadvertent Discovery Procedures
CUL-3: Disturbance of Native American and Historic-Period Human Remains	Significant	No effect	Significant and unavoidable	CUL-MM-4. Implement Human Remains Discovery Procedures
CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material	Significant	No effect	Significant and unavoidable	CUL-MM-5: Implement Cultural Resource Management Protocols for Borrow Areas

Effect CUL-1: Effects on Architectural (Built Environment) Resources and Cultural Landscapes

The portion of Sacramento River Levee in the study area appears to meet NRHP and CRHR criteria. Under Alternative 5, construction related to the project would demolish or substantially alter the physical characteristics of the levee or cause a major change to its engineering design or overall setting. This would constitute a significant effect under CEQA (14 CCR 15064.5) and an adverse effect under Section 106 of the NHPA and NEPA. Therefore, the direct effect on the levee would be significant. While implementation of Mitigation Measure CUL-MM-1 would reduce the intensity of the effect, the effect would still be significant and unavoidable.

Effect CUL-2: Change in the Significance of an Archaeological Resource

Direct effects and mitigation associated with Effect CUL-2 under Alternative 5 are identical to those described above for Effect CUL-2 under Alternative 1.

Effect CUL-3: Disturbance of Native American and Historic-Period Human Remains

Direct effects and mitigation associated with Effect CUL-3 under Alternative 5 are identical to those described above for Effect CUL-3 under Alternative 1.

Effect CUL-4: Effects on Cultural Resources Associated with Excavation of Borrow Material

Direct effects and mitigation associated with Effect CUL-4 under Alternative 5 are identical to those described above for Effect CUL-4 under Alternative 1.

Chapter 4
Growth-Inducing and Cumulative Effects

This chapter provides an analysis of both the growth-inducing and cumulative effects that may result from the Southport project.

4.1 Growth-Inducing Effects

4.1.1 Introduction

NEPA and CEQA require that an EIS and EIR discuss how a project, if implemented, could induce growth. This section presents an analysis of the potential growth-inducing effects of the Southport project. This section includes:

- Background information related to growth inducement.
- The methods used to analyze growth-inducing effects.
- The effect conclusions.

4.1.2 Affected Environment

4.1.2.1 Regulatory Setting

NEPA and CEQA Requirements

CEQ regulations require that potential indirect effects of a proposed action be addressed in the appropriate NEPA document (EIS in this case). The indirect effects of an action include those that occur later in time or farther away in distance, but are still reasonably foreseeable, and "may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate" (40 CFR Section 1508.8[b]).

In addition, Section 21100(b)(5) of CEQA requires an EIR to discuss how a proposed project, if implemented, may induce growth and the effects of that induced growth (see also State CEQA Guidelines Section 15126). CEQA requires an EIR to discuss specifically "the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment" (State CEQA Guidelines Section 15126.2[d]). Only the elements of the Southport project that have the possibility to induce growth or remove obstacles to growth are assessed in this analysis; as flood risk–reduction measures in general could support floodplain development, these measures are assessed, in aggregate, in this section. The Southport project's recreation, habitat, and open space enhancements are not discussed in this section, as they would not induce growth or remove obstacles to growth.

Regulations Regarding Floodplain Development (Executive Order 11988)

Executive Order 11988 (May 24, 1977) requires a Federal agency, when taking an action, to avoid short- and long-term adverse effects associated with the occupancy and the modification of a floodplain. Federal actions must avoid direct and indirect support of floodplain development whenever there is a reasonable and feasible alternative. If the only reasonable and feasible alternative involves siting in a floodplain, the agency must minimize potential harm to or in the floodplain and explain why the action is proposed in the floodplain. An analysis of compliance with Executive Order 11988 is included below as part of the effects discussion under Section 4.1.3.1.

4.1.2.2 Environmental Setting

The information in this section provides context for the analysis and helps the reader understand the structure of the analysis. This background information includes the legal requirements for analyzing growth-inducing effects in CEQA and NEPA documents.

Growth Projections

In 2012, California's population was estimated to be 38 million people. By 2025, the state population is expected to rise to nearly 43 million. (California Department of Finance 2012a, 2012b.)

Locally, the population of West Sacramento has grown from 31,615 people in 2000 to an estimated 47,782 as of January 1, 2009 (California Department of Finance 2009). According to the Sacramento Area Council of Government's population growth and distribution data, 87,402 people are projected to reside in the city of West Sacramento in 2035 (Sacramento Area Council of Government 2008). Anticipated growth projections described in the General Plan Update are discussed below.

Current and Planned West Sacramento Development

West Sacramento has experienced extensive growth over the last decade. This growth has been generally consistent with the City of West Sacramento General Plan (City of West Sacramento 2004) but has slowed considerably as a result of current economic conditions (Rikala pers. comm. 2009). The General Plan Update is in development and is expected to be released in early 2015. The General Plan Update will describe the development anticipated to occur by the year 2030 and is expected to consider whether long-term development within the city could be hampered if flood risk within the city is not reduced, given the possibility that FEMA may implement restrictions in the future as a result of levee conditions.

The General Plan Update is expected to characterize new development and recently completed development. The City released an alternatives report in October 2009 describing the base case and three alternative land use scenarios showing different levels of development over the next 20 years. Public meetings will be scheduled to provide opportunities for public comment on the alternatives, and the City will approve a preferred alternative to further evaluate for the General Plan Update. The alternative scenarios would result in net new dwelling units ranging from 22,550 to 30,554. The base case describes present conditions and likely future developments in the absence of any changes to existing general plans and would result in 21,129 net new dwelling units. Table 4-1 presents preliminary data describing the three alternatives being considered.

Table 4-1. West Sacramento General Plan Update Alternatives

Alternative	Net New Dwelling Units	Net New Population	Net New Employment
Base Case	21,129	48,761	41,369
Alternative A	29,832	65,883	56,042
Alternative B	22,550	50,893	32,175
Alternative C	30,554	72,959	51,125

The base case data have been analyzed in the following documents.

- *City of West Sacramento General Plan Policy Document* (City of West Sacramento 2004).
- *City of West Sacramento General Plan 2000 Update SEIR* (City of West Sacramento 2000).
- *Triangle Specific Plan EIR* (Zimmer Gunsul Frasca Partnership 1993).
- *Washington Specific Plan EIR* (PBR 1996).
- *Southport Framework Plan EIR* (Willdan Associates 1994).
- *Triangle Specific Plan SEIR* (City of West Sacramento 2009).

To account for growth relative to flood risk management, the City has in place the following measures (introduced in Chapter 1, "Introduction"):

- An Emergency Operations Plan, which includes a Flood Plan and an Evacuation Plan, is reviewed yearly, with a more comprehensive update minimally every 3 years to accommodate changes in population and the built environment.
- The City's Municipal Code (Chapter 15.50) requires new developments to provide 200-year protection or pay into an in-lieu fee program to fund WSAFCA's flood risk management efforts.

4.1.3 Environmental Consequences

An action that removes an obstacle to growth is considered to be growth inducing. Thus, where flood risk may be seen as an obstacle to growth in an area, levee treatments that would reduce that risk may be considered to remove an obstacle to growth and thereby may be growth inducing.

Growth inducement can lead to environmental effects, such as increased demand for utilities and public services, increased traffic and noise, degradation of air or water quality, degradation or loss of plant or animal habitats, and conversion of agricultural and open space land to urban uses. Growth within a floodplain area increases the risk to people or property from flooding.

However, if the induced growth is consistent with or provided for by the adopted land use plans and growth management plans and policies for the area affected (e.g., city and county general plans, specific plans, transportation management plans), the secondary effects of such planned growth would have been identified and evaluated through a formal CEQA environmental review process and, as necessary, mitigation would have been adopted to address these effects.. In some instances, significant and unavoidable effects would occur as a result of implementation of land use plans. All effects associated with this planned growth are the responsibility of the city or county in which the growth takes place, developers, or other entities proposing or approving the development. Local land use plans provide for land use development patterns and growth policies that encourage orderly urban development supported by adequate urban public services such as water supply, roadway infrastructure, sewer services, and solid waste services. This urban development may have environmental effects, as identified in CEQA documents prepared for adoption of local land use plans. If a project would have growth inducement potential that is not consistent with the land use plans and growth management plans and policies for the area affected (e.g., growth beyond that reflected in adopted plans and polic*i*es), then additional adverse secondary effects of growth beyond those previously evaluated could occur. Thus, it is important to assess the degree to which the growth associated with a project would or would not be consistent with regional and local planning.

4.1.3.1 Effects and Mitigation Measures

No Action Alternative

Under the No Action Alternative, USACE would not grant Section 408 permission, CWA Section 404 or RHA Section 10 permit, and WSAFCA would not implement the proposed project. Routine O&M activities would continue, but structural deficiencies would persist and necessitate other flood risk–reduction measures that would not require permission from USACE (such as non-structural measures). In addition, the associated risk to human health and safety and property and the adverse economic effect that serious flooding could cause would continue, and the risk of a catastrophic flood would remain high. Regular operations and maintenance of the levee system would continue as presently executed by the local maintaining entities, but activity requiring authorization from USACE would not be implemented. Further detail on the No Action Alternative is provided in Chapter 2.

As described in Chapter 2, despite the likelihood of state- or Federal-led implementation of repairs, for the purposes of evaluating effects under the No Action Alternative, the EIS assumes that the flood risk–reduction measures would not occur. This assumption provides the most conservative approach for disclosure and comparison of potential effects. Therefore, the No Action Alternative assumes no levee repair or strengthening would be implemented, the purpose and objectives would not be met, and the current level of flood risk would continue.

Proposed Project

The Southport project would incrementally reduce localized flood risk for the Southport area by addressing known site-specific levee deficiencies that contribute to current risk; these deficiencies are described in Chapter 1. However, the Southport project is also a key link in West Sacramento's overall flood management system. As the Southport reach is one of nine levee reaches around West Sacramento (as shown on Plate 1-2), the project would further incrementally reduce flood risk for the entire city, bringing the subject reach up to standards to meet the state-mandated 200-year protection for urban areas. Thus, the Southport project would bring WSAFCA one step closer toward achieving reduced flood risk as part of a larger program for all of West Sacramento.

The remaining reaches are currently under study for implementation of flood risk-reduction measures that may continue over time. There are two associated programs to reduce flood risk: one is led by WSAFCA with state and local funding (similar to the Southport project and prior projects constructed in 2008 at the I Street Bridge site and in 2011 at the CHP Academy and The Rivers sites), and the other is based on the outcome of the West Sacramento GRR as led by USACE working with WSAFCA and the state.

Based on these circumstances, the Southport project is considered incrementally growth inducing. However, it should be noted that there are currently no obstacles to growth in West Sacramento resulting from flood management factors. Specifically, West Sacramento is not currently designated as a special flood hazard area (defined as having less than the level of performance needed to withstand a 100-year flood event) in current FEMA maps; therefore, there are no FEMA restrictions on development. Even if West Sacramento were to be designated as a special flood hazard area, and FEMA restrictions were in place, the Southport reach is one of nine reaches comprising the total levee system in West Sacramento. The level of performance of the entire levee system is the determining factor in FEMA mapping and build-out decisions (i.e., FEMA accrediting is based on complete systems rather than individual segments). In other words, the Southport project would not change the current FEMA rating either for the city as a whole or for the southern basin of the city in which the project occurs, nor would it be likely to change the FEMA rating if the city or southern basin were to be mapped into a special flood hazard area in the future.

Similar to the circumstances for the FEMA rating stated above, while the Southport project would meet the state's urban levee design criteria for this reach of the levee system, it would not change the overall system rating and, thus, would not affect state regulations for development. In addition to the target of achieving a level of performance sufficient to withstand a 200-year flood event by 2025, the state has an intermediate objective that requires urban municipalities to demonstrate progress toward that goal by 2015, to which the Southport project would contribute.

With regard to the specific potential for growth to occur, it should be noted that the project would reduce the developable footprint adjacent to the levee because that area would be occupied by the project features. Under the present West Sacramento general plan and subordinate specific area plans, substantial development and population growth is planned within the city and especially in the Southport area over the next decades. The City is currently developing a general plan update (and associated *West Sacramento 2030 General Plan Update SEIR*) that is expected to be substantially consistent with these prior plans in terms of the nature and magnitude of the development and land use designations. As described in the existing planning documents and their associated environmental documents (including the 2004 City of West Sacramento General Plan, 1994 Southport Framework Plan, and the EIRs for River Park and Yarbrough), growth and increases in population could lead to effects on air and water quality, water supply, traffic, and noise conditions, and increases in the demand for such public services as schools, fire, police, sewer, solid waste disposal, and electrical and gas utilities. In addition, the expansion of such services could result in significant effects. The City of West Sacramento will impose and enforce measures to avoid, minimize, and mitigate effects from such development. Ultimately, the effects associated with growth in West Sacramento are the responsibility of the City and specific project proponents.

In conclusion, the project is acknowledged to be an incremental part of a larger program with a goal of achieving a level of performance sufficient to withstand a 200-year flood event for West Sacramento and, therefore, would facilitate future growth. However, there are no growth restrictions currently in place based on Federal or state designations, and the project alone would not cause a change in current or future FEMA maps or buildout decisions (with the exception that implementation of the project would reduce the developable footprint in the project area and would be restoring area to natural floodplain).

Executive Order 11988 Analysis

As introduced in Section 4.1.2.1, Regulatory Setting, Executive Order 11988 addresses growth and development in floodplains as a primary issue. In February 1978, the Water Resources Council issued Floodplain Management Guidelines for Implementing Executive Order 11988. These guidelines provide analysis of the executive order, definitions of key terms, and an eight-step decision-making process for carrying out the executive order's directives. The process contained in the Water Resources Council guidelines incorporates the basic requirements of the executive order. Briefly, the eight-step process is outlined below, followed by discussion of the project's application of the process to demonstrate compliance.

- **Step 1: Determine whether a proposed action is in the base floodplain (100-year floodplain, or 1% chance flood, or 500-year floodplain, or 0.2% chance flood, if the action falls under the definition of critical, discussed separately below).** The project area for the Southport project includes the footprint of the levee work, a portion of expanded and restored natural floodplain of the Sacramento River, and the area landward of the levee for which risk of flooding would be reduced. The current FEMA 100-year floodplain is waterward of the existing levee. The primary purpose of the project is to reduce flood risk to achieve the State of California's stated goal of 200-year flood protection, as determined by WSAFCA. The proposed project is described in Chapter 2, which includes location, construction methods, and O&M activities.

  The Water Resources Council Floodplain Management Guidelines present the concept of a *critical action*. While there is no precise definition of critical action, the guidelines (under Part II, Decision-Making Process, Step 1C) outline the parameters and describe a critical action as "any activity for which even a slight chance of flooding is too great." This definition is intended to apply to those Federal actions that would involve facilities or infrastructure that are sensitive to flooding and for which the consequences of flooding would be severe in terms of ability to provide essential community services or to reduce risks to life and welfare (as described in the criteria above). The area that would be affected by the Southport project includes a number of these critical facilities, such as police and fire stations and schools. Therefore, for purposes of the analysis required under EO 11988, this EIS assumes that the project is considered a critical action because the project would benefit critical facilities already located in the floodplain by reducing the risk of flooding.

- **Step 2: Provide public review.** The NEPA/CEQA process provides for public disclosure; the EIS is one instrument for public review of the project. As discussed in Chapter 1, USACE and WSAFCA have established a multimedia outreach program to allow for public review and disclosure of the project. The approach to the outreach program has been to go beyond the guidelines and requirements of NEPA and CEQA for public noticing to ensure the affected community and other interested stakeholders are informed, engaged, and involved through an accessible, open, and transparent process. Actions conducted as part of the outreach program are listed in Chapter 1, Section 1.6.1, Community Outreach.

  As the proposed project is further developed, the outreach program will continue in a broad sense through the methods listed above and will expand through more targeted specific outreach to residents and businesses who might be more directly affected by construction or operation of the proposed flood risk–reduction measures.

  A more detailed accounting of the scoping process is provided in Appendix A.

- **Step 3: Identify and evaluate reasonable and feasible alternatives to locating in the base floodplain.** Previously, West Sacramento has not been mapped in the base floodplain, and land use planning decisions have been based on studies demonstrating that existing levees provide an acceptable level of performance relative to the base flood. However, recent studies (as described in Chapter 1) based on evolving levee standards now necessitate flood risk–reduction measures to continue to provide the mandated level of performance. The project is specifically targeted to provide such flood risk–reduction measures and increase the level of performance beyond the base flood to that of the 0.5% chance (200-year) flood event, per goals set by the State of California.

- **Step 4: Identify the effects of the proposed action.** This EIS analyzes the environmental effects potentially resulting from the project per NEPA/CEQA requirements. Review under ESA, CWA, CAA, and other Federal and state environmental regulations is also occurring in coordination with the EIS. Potential environmental effects for the Southport project are described in Chapter 3, "Affected Environment and Environmental Consequences." In brief, the project may have temporary construction-related effects on roadway traffic and air quality from heavy equipment use, on residents due to noise generation, temporary and permanent effects on biological resources, changes in visual quality and land use, permanent loss of residences, farmland, agricultural production, and interruption in utility service and property access. The project's potential effect on flood risk and transference of risk is discussed in Section 3.1, Flood Risk Management and Geomorphic Conditions.
- **Step 5: Minimize threats to life and property and to natural and beneficial floodplain values. Restore and preserve natural and beneficial floodplain values.** The project would involve expanding and restoring a portion of the natural floodplain of the Sacramento River providing hydraulic and ecological benefits to the region. In addition, the project would reduce flood risk to life and property within West Sacramento and would reduce the area potentially developable on the landside of the levee. The existing levee system was originally designed and constructed to provide a minimum level of performance relative to the base flood. The State of California's and WSAFCA's target for the Southport project is to maintain and increase the level of flood protection beyond that of the base flood to a minimum 200-year event (0.5% chance).
- **Step 6: Reevaluate alternatives.** This EIS is part of a step-wise evaluation process to refine the alternatives through public review as well as through resource and regulatory agency input in consultation for compliance with CWA, ESA, and other project authorizations. The alternatives have been evaluated at the planning level for initial screening (Chapter 2) and for re-evaluation through project-level analysis (Chapter 3). The alternatives are also continuously evaluated on a technical basis through independent review of the design documents (i.e., plans and specifications) at several levels of design development, including expert peer review by a board of senior consultants. The recommendations and design refinements resulting from these reviews have been incorporated into the project descriptions and ECs (Chapter 2), resource analyses and findings (Chapter 3), and environmental effects analyses and mitigation measures (Chapters 3). To date, this level of screening analysis has demonstrated that the Alternative 5, the APA, is the most practicable alternative.
- **Step 7: Issue findings and a public explanation.** To conclude the NEPA process, a record of decision for the Southport project will be publically issued following the Final EIS. To conclude the CEQA process, findings will be publically issued following the Final EIR. A public workshop will be conducted during the draft document stage, and a public hearing will be held to decide on project adoption by WSAFCA as an action under CEQA.
- **Step 8: Implement the action.** WSAFCA intends to construct the Southport project as soon as possible based on conclusion of the project approval processes, targeted to be initiated in the 2014 construction season.

The project would reduce the effect of floods on human health, safety, and welfare through construction of flood risk–reduction measures. It would provide existing urban development with reduced flood risk and, while the present level of flood risk is not a current obstacle to growth, the project would prevent flood risk from becoming a potential obstacle to future growth. Because there is no reasonable and feasible alternative to the proposed action that would provide equivalent flood risk management for the existing property and population within the boundaries of the floodplain, it is not in conflict with Executive Order 11988.

This EIS further complies with Executive Order 11988 by identifying the most reasonable and feasible flood risk–reduction alternative and disclosing the potential effects of the project that might lead to growth or other direct and indirect effects. Additionally, Chapters 1 and 2 explain why flood risk–reduction measures are necessary for West Sacramento, regardless of how they might affect future development and growth.

4.2 Cumulative Effects

4.2.1 Introduction

The cumulative effects analysis determines the combined effect of the project and other closely related, reasonably foreseeable, projects. This section introduces the methods used to evaluate cumulative effects, lists related projects, and describes their relationship to the project, identifies cumulative effects by resource area, and recommends mitigation for significant cumulative effects.

4.2.2 Approach to Cumulative Effect Analysis

4.2.2.1 Legal Requirements

Both the CEQ NEPA implementing regulations and the State CEQA Guidelines require lead agencies to evaluate a proposed project's potential to contribute to a cumulative effect in the project area. Analysis of cumulative effects is needed to ensure that the project's effects are considered thoroughly in the context of effects resulting from other similar, related, and/or neighboring projects.

The State CEQA Guidelines define *cumulative effects* as two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts (Section 15355). Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time (State CEQA Guidelines 15355[b]). The cumulative effects of a project are to be addressed if the project's incremental effect is cumulatively considerable, meaning that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (State CEQA Guidelines Sections 15130[a][2] and 15065[a][3]).

Under NEPA, a cumulative effect is to be addressed if it is expected to be significant. The CEQ NEPA guidelines (CFR Section 1508.7) define a *cumulative effect* as:

> the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

For this purpose of this NEPA analysis, the NEPA terminology is primarily used, and cumulative impacts are identified as significant or less than significant. For CEQA purposes, a significant impact is also one to which the project's contribution is considerable.

The discussion of cumulative effects need not provide as much detail as the discussion of effects attributable to the project alone. According to the State CEQA Guidelines, the level of detail should be guided by what is practical and reasonable (Section 15130), and CEQ suggests that analysis should focus on truly meaningful effects. For those effects for which cumulative effects are identified, the contribution of the proposed project is evaluated to consider whether mitigation measures are available to reduce the potential effect. In cases where no cumulative effects are identified or when the proposed project would have no or only limited contribution to the cumulative effect, the potential effect is addressed briefly to the extent needed to support the effects conclusion.

4.2.2.2 Methods

According to the State CEQA Guidelines (Section 15130), an adequate discussion of significant cumulative effects should contain:

- An analysis of related future projects or planned development that would affect resources in the project area similar to those affected by the proposed project.
- A summary of the expected environmental effects to be produced by those projects with specific reference to additional information stating where that information is available.
- A reasonable analysis of the cumulative effects of the relevant projects. An EIR must examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects.

To identify the related projects, the State CEQA Guidelines (15130[b]) recommend either the list or projection approach. This analysis uses the list approach, which entails listing past, present, and probable future projects producing related or cumulative effects, including, if necessary, those projects outside the control of WSAFCA.

According to CEQ regulations, when determining the scope of the action assessment, similar actions must be considered. Similar actions are defined as actions that, when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography. An agency might want to analyze these actions in the same environmental assessment. It should do so when the best way to adequately assess the combined effects of similar actions or reasonable alternatives to such actions is to address them in a single environmental assessment (40 CFR §1508.25[a][3]). (Council on Environmental Quality 1997.) NEPA does not provide specific guidance regarding how to conduct a cumulative effect assessment; however, the list approach has been effective for disclosing cumulative effects under NEPA.

4.2.3 Projects Considered for the Cumulative Assessment

A list of past, current, and probable future projects was compiled for the cumulative setting. These projects (cumulative projects) include other flood management projects affecting the Sacramento River, recreation projects in the region, restoration and other water-related projects in and near the Sacramento River that could affect fish or vegetation on the waterside of levees, and development in the West Sacramento area that could result in effects and benefits similar to those of the proposed project. Other cumulative projects considered include:

- Potential flood risk–reduction projects requesting Section 408 approval.
- City of West Sacramento development projects.
- Projects affecting fish and wildlife that use the Southport project area.

In addition, regional plans were reviewed to characterize development trends and growth projections in Yolo County. These projects are considered with the Southport project to determine whether the combined effects of all of the projects would result in significant cumulative effects.

4.2.3.1 Flood Risk–Reduction Projects

The following descriptions of related or similar flood risk–reduction projects include those that are under active consideration, have been proposed, or have some form of environmental documentation complete. In addition, these projects have the potential to affect the same resources and fall within the same geographic scope and are therefore to be cumulatively considered. In particular, those resources are biological resources (riparian habitat and wildlife disturbance), hydrology, and geomorphology. The geographic scope of consideration for effects on those resources is the Sacramento Valley region and Sacramento River system, respectively.

West Sacramento Levee Improvements Program

WSAFCA developed the WSLIP to implement needed modifications to the 50-plus miles of levees in Yolo and Solano Counties that surround the city of West Sacramento. To reduce risks to human health and safety and prevent adverse effects on property and its economy, the City of West Sacramento, as part of WSAFCA and in partnership with DWR, embarked on a comprehensive evaluation of the condition of the levees in 2006. The evaluation was necessary to determine the level of performance provided by the existing levee system, identify the magnitude and severity of deficiencies, and propose potential flood risk–reduction measures. The results revealed several deficiencies that do not meet current flood risk management standards. Along with the WSLIP, WSAFCA launched a parallel process for identifying smaller-scale deficiencies that might be candidates for EIPs to address urgent needs and can be planned and designed in advance of or concurrent with the overall program. Three such projects have been constructed by WSAFCA: the I Street Bridge EIP in 2008 and the CHP Academy and The Rivers EIPs in 2011. The proposed project would be the fourth EIP by WSAFCA. Essentially, these projects cover critical areas where the levee deficiency is well defined and the most suitable treatments are known. It is anticipated that WSAFCA will pursue EIPs until USACE determines the Federal interest in a project being studied under the West Sacramento GRR (discussed in Chapter 1).

Central Valley Flood Protection Plan of 2012

The DWR comprehensive system-wide plan for the continued defense of lands currently protected from flooding by the SRFCP and the corresponding San Joaquin River watershed to the south is described under Central Valley Flood Protection Act, in Chapter 1.

Sacramento Area Flood Control Agency Levee Integrity Program

The SAFCA long-term program focusing on the Natomas Basin levee system is described in Chapter 1.

Upper Yuba River Levee Improvement Project

The Upper Yuba River Levee Improvement Project (UYLIP) constructed additional levee improvements to a segment of the upper Yuba River in Yuba County. The improvements included the installation of slurry walls and seepage berms (from Simpson Lane to the Yuba Goldfields). Previous repairs had occurred on this levee segment, and further studies determined additional work was necessary to provide the level of performance required relative to a 200-year flood event for 40,000 residents in south Yuba County. Environmental review and Section 408 permission for the UYLIP was finalized in 2010, and construction completed at the end of 2011.

Sutter Basin Feasibility Study

The Sutter Basin Feasibility Study was initiated in 2000. The study scope focuses on providing flood damage reduction to the urban areas of Yuba City, Live Oak, Gridley, and Biggs in the Sutter Bypass–Feather River Subbasin and developing a flood warning system for the outlying areas of the subbasin. The study process involves six planning steps, ranging from problem identification (e.g., geotechnical exploration) to the formulation, evaluation, and selection of alternatives. Problem identification studies were completed in 2010. Formulation and evaluation of alternatives began in 2010. The study was selected as a national pilot to apply concepts for expedited and efficient planning in 2012. Final environmental analysis was integrated with the planning study, which was completed in 2013. The study was led by USACE, SBFCA, and the State of California.

Feather River West Levee Project

SBFCA is planning the Feather River West Levee Project to address levee deficiencies in the west levee of the Feather River from the Thermalito Afterbay to approximately 4 miles north of the Sutter Bypass to meet Federal, state, and local level of performance standards and goals for flood risk reduction measures. The project focuses on addressing through- and under-seepage using a combination of slurry cutoff walls and seepage berms. Design and environmental work was completed in 2013. Early stages of construction started in mid-2013, with roject completion slated for late 2016.

Feather River Levee Repair Project

The Feather River Levee Repair Project is a multi-phased flood risk–reduction measure construction program on the east bank of the Feather River. It includes approximately 13 miles of levees within the Three Rivers Levee Improvement Authority area in south Yuba County. Construction of the Feather River Levee Repair Project was completed in 2011. Project features included seepage berms, cutoff walls, and 6-mile setback levee. It reduces flood stages in the river by approximately 1.5 feet and more than 40,000 residents benefit from the provision of a level of performance relative to a 200-year flood event.

Feather River Setback Levee at Star Bend

Levee District No. 1 of Sutter County has constructed the Feather River Setback Levee at Star Bend on the west bank of the Feather River near the eastern boundary of Sutter County. The project replaced a segment of the river's existing levee that constricted floodflows in the river and presented an unacceptably high risk for levee failure because of seepage. Construction of the setback levee removed the constriction and reduced water surface elevations in the region.

Yuba Basin Project

The Yuba Basin Project is an initiative to provide a 200-year level of protection and higher for communities in Yuba County. When complete, it will be the first community in California's Central Valley to achieve the State's requirement of 200-year flood protection.

The State and local interests (Yuba County, Yuba County Water Agency, and Three Rivers Levee Improvement Authority) began an advanced levee construction program in the southern portion of the county. Work is now complete on all of the 29.3 miles of levees, including the construction of two new setback levees on the east bank: the 2-mile-long Bear River setback and the 6-mile-long Feather River setback (downstream of, and unrelated to, the FRWLP). Besides providing greater regional flood risk reduction, these setback levees resulted in the creation of nearly 2,000 acres of wildlife habitat.

Yuba River Basin Project General Reevaluation Report

All of the advanced work described under the Yuba Basin Project is being evaluated by USACE in the Yuba River Basin Project GRR. The scheduled work for the 7.5-mile-long Marysville Ring Levee is the final piece to the entire project. In 2008, USACE approved a "separable element" for Marysville, so that work could begin while the GRR was underway. Construction in Marysville began in 2010 and several additional phases of the project are designed and ready for construction, pending additional appropriation.

West Sacramento Project

The West Sacramento Project is described in Chapter 1.

West Sacramento General Reevaluation

The West Sacramento General Reevaluation Report is described in Chapter 1.

American River Watershed (Common Features) General Reevaluation

The American River Watershed (Common Features) General Reevaluation is described in Chapter 1.

Sacramento River Bank Protection Project

The Sacramento River Bank Protection Project is described in Chapter 1.

Sacramento Urban Levee Program

DWR is evaluating sites similar to the USACE's Sacramento River Bank Protection Project. The state will repair 19 critical erosion sites, one of which is in West Sacramento at RM 55.8.

Flood Control and Coastal Storm Emergency Act

PL 84-99 is described in Chapter 1.

North Delta Flood Control and Ecosystem Restoration Project

The purpose of DWR's proposed North Delta Flood Control and Ecosystem Restoration (North Delta) Project is to implement flood risk-reduction measures in the northeast Delta in a manner that benefits aquatic and terrestrial habitats, species, and ecological processes. The North Delta project area includes the North and South Fork Mokelumne Rivers and adjacent channels downstream of I-5 and upstream of the San Joaquin River. Solution components being considered for flood management include bridge replacement, setback levees, dredging, island bypass systems, and island detention systems. The project will include ecosystem restoration and science actions in this area, and improving and enhancing recreation opportunities. In support of the environmental review process, an NOI was prepared and public scoping was held in 2003. An EIR was prepared in 2008, but the project is not currently funded for implementation.

CALFED Levee System Integrity Program

The goal of the CALFED Levee System Integrity Program is to reduce risk to land use and associated economic activities, water supply, agriculture and residential use, infrastructure and the ecosystem from the effects of catastrophic breaching of Delta levees. Estimates predict that 520 miles of levees need modification and maintenance to meet the PL 84-99 standard for Delta levees. The program continues to increase levee stability throughout the Delta.

Delta Islands and Levee Feasibility Study

USACE's Delta Islands and Levee Feasibility Study (Delta Study) addresses ecosystem restoration needs, flood risk management problems, and related water resources in the Delta and Suisun Marsh area. The Delta Study will result in a feasibility report that will make recommendations on construction projects and/or additional studies for authorization by Congress. Periodic agency coordination meetings have been held with associated Federal, State, and local agencies.

CALFED Levee Stability Program

The purpose of the CALFED Levee Stability Program is to identify and prioritize potential levee stability projects in the Delta. USACE has prioritized potential projects according to how well they met USACE environmental, economic, and other implementation criteria. The short-term strategy is to move to construction quickly on high priority levee projects in order to address Delta-wide levee system needs. The long-term strategy will be developed through the Delta Study process described above.

South River Pump Station Flood Protection Project

The Sacramento Regional County Sanitation District (SRCSD) owns and operates the South River Pump Station (SRPS) located south of the city of West Sacramento. SRCSD is proposing the South River Pump Station Flood Protection Project, which consists of constructing a new ring levee with relief wells around the SRPS. The new ring levee is intended to provide 200-year protection for the SRPS site. Three of the proposed borrow sites for the SRPS project are common to the Southport project. The public draft EIR was prepared in April 2012. Construction is expected to begin in the summer of 2015 and be completed by December 2015.

4.2.3.2 Potential Projects Requesting Section 408 Approval

A number of projects in the Central Valley may request Section 408 approval. Table 4-2 below summarizes potential projects with Section 408 requests. These projects are listed for context.

Table 4-2. Potential Projects Requesting Section 408 Approval

Project	Lead Agency/Agencies	Estimated Date for Section 408 Permission
Southport Project	WSAFCA	2015
River Islands Levee Alteration	City of Lathrop	2015
Reclamation District 17 (RD 17) 100-Year Levee Seepage Area Project	RD 17	2015

Note: Updated October 2014.

4.2.3.3 Relevant Land Use Plans

Relevant land use plans are included to assess past, present, or reasonably foreseeable development actions in the city that may affect the same resources as the WSLIP or provide for the restoration, preservation, or enhancement of those resources.

The Delta Plan

The Delta Plan has been developed by the Delta Stewardship Council (DSC), and is a legally enforceable comprehensive management plan designed to meet the two co-equal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The Delta Plan generally covers five topic areas and goals: increased water supply reliability, restoration of the Delta ecosystem, improved water quality, reduced risks of flooding in the Delta, and protection and enhancement of the Delta. The DSC does not propose constructing, owning, or operating any facilities related to these five topic areas. Rather, the Delta Plan sets forth regulatory policies and recommendations that seek to influence the actions, activities, and projects of cities and counties and state, federal, regional, and local agencies toward meeting the goals in the five topic areas. The Delta Plan could contribute to beneficial cumulative effects by setting forth regulatory policies and recommendations that influence projects in a manner which would improve water quality, water supply reliability, flood risk–reduction, and increase habitat for fish and wildlife species.

A revised Final Draft Delta Plan was presented to the DSC in September 2012, and the DSC adopted the Delta Plan May 16, 2013. The Plan's regulatory policies became effective on September 1, 2013. Consistency of the project alternatives with the Delta Plan is discussed in Section 5.4, State and Regional Plan Consistency.

Yolo Natural Heritage Program Habitat Conservation Plan

The Yolo Natural Heritage Program is a county-wide Natural Communities Conservation Plan/Habitat Conservation Plan for the 653,629-acre planning area that provides habitat for many special-status and at-risk species found in five dominant habitats/natural communities. The Yolo

Natural Heritage Program will describe the measures that will be undertaken to conserve important biological resources, obtain permits for urban growth and public infrastructure projects, and continue Yolo County's agricultural heritage (Yolo Natural Heritage Program 2008).

City of West Sacramento General Plan

The City of West Sacramento General Plan consists of two documents: the *General Plan Background Report* and the *General Plan Policy Document*. The General Plan Background Report inventories and analyzes existing conditions and trends in West Sacramento. The background report, which provides the formal supporting documentation for general plan policy, addresses 11 subject areas: land use, housing, population, economic conditions and fiscal considerations, transportation and circulation, public facilities and services, cultural and recreational resources, natural resources, health and safety, urban structure and design, and child care. The background report also includes as an appendix the West Sacramento General Plan Community Concerns Summary Report prepared following the issue identification process carried out in early 1988. The City of West Sacramento General Plan Policy Document includes the goals, policies, standards, implementation programs, quantified objectives, land use diagram, and circulation plan diagram that constitute the formal policy of the City of West Sacramento for land use, development, and environmental quality (City of West Sacramento 2000).

Southport Framework Plan

The Southport Framework Plan was adopted by the City of West Sacramento in 1995. Southport is a 7,180-acre site located in the southern portion of the city of West Sacramento. It is bounded by the DWSC on the north and west, the Sacramento River on the east, and the city limits on the south. The plan area is west of the project site with the Sacramento River as its eastern border. Proposed land use in this area includes a mixture of residential, commercial, industrial, public/quasi-public, and parks and open space uses. It outlines provisions for 14,050 residential dwelling units, 17.2 million square feet of commercial uses, 21.1 million square feet of office/business park, 7.7 million square feet of industrial uses, 544 acres of public/quasi-public uses, and 915 acres of parks and open spaces at build out. The Southport Framework Plan was developed to provide an overall vision for the development of Southport with a goal of encouraging a development pattern that is an alternative to urban sprawl.

Washington Specific Plan

Adopted in 1996, the Washington Specific Plan area covers the northeast area of the City of West Sacramento. The area includes plans for mixed use, residential, and commercial development. (PBR 1996.)

Triangle Plan

Adopted in 1993, the Triangle Plan includes primarily mid-rise to high-rise office, high-density multiple family residential, ancillary retail, government, and institutional uses. The Triangle Plan outlines the creation of a mixed-use community of local and regional significance (City of West Sacramento 2000). The Plan's implementation is ongoing, and its ultimate build-out date is unknown (City of West Sacramento 2009).

4.2.3.4 City of West Sacramento Development Projects

City development projects that have the potential to affect similar resource areas such as biological resources, air, and noise have been included for analysis.

Sacramento Riverfront Master Plan Improvement (River Walk)

This development will create a riverfront promenade, extending from The Rivers development on the north to the Stone Locks near the Port of Sacramento. The first five phases of the park, which extends from the Broderick Boat Ramp to the Pioneer Bridge, are completed. Phase 6 will continue the River Walk pathway to Pioneer Bluff.

Barge Canal Redevelopment

The City plans to enhance current use of the barge canal area for aquatic recreational activities such as sailing, rowing, kayaking, and canoeing, and supports the establishment of a multi-use aquatic facility along the barge canal. The City also promotes the development of important visual and scenic areas along the riverfront and barge canal for public access, including water-related activities and possible development of high-intensity and high-density urban uses.

City of West Sacramento Public Projects

The City of West Sacramento has a 25-year Capital Improvement Program that began in 2005. Several public projects are projected to occur over the next 20 years, depending on available funding. These projects are:

- New construction and improvements to bicycle, pedestrian, and transit facilities, including the Michael McGowan Bridge (formerly named Pioneer Bluff Bridge) project over the Barge Canal.
- Roadway capacity improvements, including street widening of streets and interchange improvements.
- Roadway signal and lighting improvements.
- Landscape plantings and street and sidewalk maintenance.
- Improvements and maintenance to water treatment, supply, storage, and pumping facilities.
- Improvements to sanitary sewer and storm drainage facilities.
- New construction and maintenance of municipal buildings such as City Hall, fire stations, and police stations.

City of West Sacramento Private Projects

Several private projects in the city of West Sacramento are in various stages of development and could occur over the next 20 years. Each of these projects falls within a specific plan area. The following proposed projects within the Southport Framework Plan Area are considered in this analysis.

- **Stone Lock District.** The Stone Lock District project is proposed to include up to 2,500 residential units, up to 800 hotel rooms, up to 890,000 square feet of retail space, up to 1.7 million square feet of office space, and 60 acres of parks and open space.

- **Linden Oaks Estates.** The Linden Oaks Estates project is proposed to subdivide 21.46 acres into 21 single family lots and a 0.65-acre remainder parcel. The project site is located west of the Sacramento River and south of Linden Road.
- **Yarbrough**. The Yarbrough project is proposed to include approximately 3,004 residential units, 150,000 square feet of retail uses, up to 25,000 square feet of office development, up to 40 live/work residential units, and up to 40,000 square feet of community facilities.
- **River Park.** The River Park project is proposed to include approximately 2,286 residential units, 50,000 square feet of commercial space, and a 40-acre regional park site with community facilities.
- **Liberty.** Specific details regarding the Liberty project are still under development but this project would likely be similar to that of Yarbrough or River Park.
- **Seaway International Trade Center.** Specific details regarding the Seaway International Trade Center are still under development, but this project would likely propose large-scale industrial and commercial development.

City of West Sacramento Parks Master Plan

The Parks Master Plan, prepared in 2003, outlines the City's goals and policies with regard to the provision of parks and related recreational facilities for West Sacramento residents and provides an inventory of current facilities (City of West Sacramento Parks and Community Services Department 2003). As of October 2012, the City had approximately 145 acres of developed parkland (City of West Sacramento 2012). Based on the 2011 population of 49,045, this represented a 100-acre shortfall from the standard of 5 acres per 1,000 residents established in the general plan. Based on this ratio, it is estimated that by 2025 population growth in West Sacramento would require the City to have a total of 375 acres of parkland available to meet this standard. The Parks Master Plan targets several areas as particularly well-suited for park development, including several locations on the city's waterfront (City of West Sacramento Parks and Community Services Department 2003). However, some of these sites may be unsuitable for use as park lands as discussed in Section 3.14, Recreation.

4.2.3.5 Projects Affecting Fish and Wildlife That Use the Project Area

As described in Section 3.9, Fish and Aquatic Resources, and Section 3.10, Wildlife, substantial long-term effects on vegetation, fish, and wildlife are related to the removal of vegetation in compliance with the USACE levee vegetation policy. Regarding wildlife, this could contribute to a cumulative effect when combined with other projects that adversely affect habitat for wildlife that use the West Sacramento levee vegetation. Regarding fish, this could contribute to a cumulative effect when combined with other projects within the geographic range of the fish that would be affected. Thus, this list includes projects that could also adversely affect the same species of fish or wildlife that would be affected by vegetation removal under the project.

CALFED Ecosystem Restoration Program

The goals of the CALFED Ecosystem Restoration Program are to:

- Recover 19 at-risk native species and contribute to the recovery of 25 additional species.

- Rehabilitate natural processes related to hydrology, stream channels, sediment, floodplains and ecosystem water quality.
- Maintain and enhance fish populations critical to commercial, sport, and recreational fisheries.
- Protect and restore functional habitats, including aquatic, upland, and riparian, to allow species to thrive.
- Reduce the negative effects of invasive species and prevent additional introductions that compete with and destroy native species.
- Improve and maintain water and sediment quality to better support ecosystem health and allow species to flourish.

The Ecosystem Restoration Program, which is divided into the Sacramento, San Joaquin, and Delta and Eastside Tributary regions, includes the following kinds of actions:

- Develop and implement habitat management and restoration actions, including restoration of river corridors and floodplains, reconstruction of channel-floodplain interactions, and restoration of Delta aquatic habitats.
- Restore habitat that would specifically benefit one or more at-risk species.
- Implement fish passage programs and conduct passage studies.
- Continue major fish screen projects and conduct studies to improve knowledge of their effects.
- Restore geomorphic processes in stream and riparian corridors.
- Implement actions to improve understanding of at-risk species.
- Develop understanding and technologies to reduce the effects of irrigation drainage on the San Joaquin River and reduce transport of contaminant (selenium) loads carried by the San Joaquin to the Delta and the Bay.
- Implement actions to prevent, control, and reduce effects from non-native invasive species.

Ecosystem Restoration Program actions contribute to cumulative benefits on fish and wildlife species, habitats, and ecological processes.

Bay Delta Conservation Plan

The BDCP is a plan with co-equal goals for water supply reliability of State Water Project and Central Valley Project and for conservation and restoration of endangered and sensitive species habitats in the Delta. The plan will identify and implement conservation strategies to improve the overall ecological health of the Delta; identify and implement more ecologically friendly ways to move fresh water through or around the Delta; address toxic pollutants, invasive species, and impairments to water quality; and provide a framework and funding to implement the plan over time.

Alternatives being evaluated under the BDCP include conveyance options of different infrastructure components and operational scenarios. At this time, no conveyance options are proposed within the Southport project area. The restoration options include various degrees of restoration in the Delta and Suisun Marsh and could propose activities in the Southport project area. The final plan and the final EIS/EIR are expected to be complete in 2015. The BDCP could contribute to beneficial cumulative effects by increasing suitable habitat for fish and wildlife species.

Long-Term Central Valley Project Biological Opinions

BOs issued by USFWS and NMFS for the Central Valley Project (CVP) and State Water Project (SWP) determined that the existing fish passage structure at Fremont Weir was inadequate to allow normal fish passage at most operational levels of the Sacramento River. As a result, the BOs required the U.S. Bureau of Reclamation and/or DWR to increase inundation of suitable acreage for fish habitat within the Yolo Bypass and to modify operations of the Sacramento Weir or Fremont weir to increase juvenile rearing habitat. The BOs also require restoration of 8,000 acres of tidal marsh habitat in the Delta to benefit Delta smelt and up to 20,000 acres of salmonid habitat restoration. The operations of the SWP and CVP are currently subject to the terms and conditions of these BOs until the new water conveyance infrastructure identified in the BDCP becomes operational. At that time, an integrated BiOp on coordinated long-term operation of the CVP and SWP will be completed by USFWS and NMFS. Implementation of the BOs is expected to be compatible with the Southport project, and the restored floodplain area created by a setback levee may contribute toward the restoration goals of the BOs.

4.2.4 Cumulative Effects by Resource

The following section describes the potential contribution to cumulative effects on each resource.

4.2.4.1 Flood Risk Management and Geomorphic Conditions

Implementation of the project, in combination with past, present, and reasonably foreseeable future local and regional projects, is not expected to contribute to significant cumulative effects on flood risk management or geomorphic conditions.

Hydraulic modeling was used to determine some of the cumulative effects of levee raises, including flood walls and setbacks. Although slight changes in upstream and downstream water surface-level conditions under various flood events are expected to result from project alternatives, these changes are less than significant. Upstream, water surface-level changes range from an increase of 0.10 foot to a decrease of 1.9 feet. Downstream, water surface-level changes range from an increase of 0.09 foot (which diminishes to 0.05 foot 26 miles downstream) to a decrease of 1.9 feet just upstream and persisting downstream. These values are all considered less than significant because of the extremely low values of the modeled increases and/or decreases. Furthermore, a decrease in water surface elevation is considered a beneficial effect because the 200-year event would not overtop the local levee or the levees in the downstream reaches, and the corresponding water surface elevation is lower than the present-day elevation.

Based on the quantitative results from the 2009 MBK Engineers modeling effort, upstream water levels would not be significantly affected by the proposed flood risk–reduction measures either, assuming that all upstream levee strengthening components[1] are eventually implemented.

Furthermore, as described in MBK Engineers (2009), modeling effort for the overall WSLIP, strengthening portions of the Federal project levee system in West Sacramento and implementing in-channel erosion protection measures would not result in any significant hydraulic effects on other subbasins protected as part of the SRFCP. These measures would be consistent with the principles that have guided the management of the SRFCP over the past century and with the policies adopted by the state legislature calling for an immediate and comprehensive effort to

[1] As described in the criteria listed on page 1 and in Table 1 by MBK Engineers (2009).

increase the level of flood risk reduction provided to West Sacramento and the other urban areas within the SRFCP.

Restoration in the Yolo Bypass as proposed in the current Bay Delta Conservation Plan, Delta Vision, and other projects potentially could further modify the flood capacity of the Sacramento River downstream of West Sacramento including altering the flow split between the American River and the Sacramento Weir. Such modifications could increase or decrease the Sacramento River flood capacity below West Sacramento. Because these projects have not been fully evaluated for hydraulic effects, the specific outcomes are unknown. It is also important to note that many of the areas adjacent to the West Sacramento levees (excluding the City of Sacramento) are rural and have been designed to flood as part of the overall Sacramento River flood management operation, such as the Yolo Bypass.

With respect to mean sea-level change and its effects on the project, the design water surface for the project areas is relatively insensitive to the rates of sea-level rise. Of all the scenarios analyzed, only the high sea-level rise rate 100 years after the project is constructed shows greater than one-tenth of a foot stage increase in the Sacramento River, Yolo Bypass, or Sacramento Bypass in the project area (MBK Engineers 2009).

The project area is not susceptible to the three main types of subsidence, and therefore the project would not contribute to a significant cumulative effect related to subsidence.

4.2.4.2 Water Quality and Groundwater Resources

The project is not expected to contribute to a significant cumulative effect on water quality or groundwater resources. In limited levee segments, groundwater resources would be affected by the project at an average decrease of 1.5-foot in the shallow aquifer in Segments A and B for all alternatives, and a 1.3-foot average decrease in Segment C in Alternatives 2 and 5. An average decrease of 1-foot in the deeper aquifer within the immediate proximity of deep slurry cutoff wall construction in Segment G would occur under all alternatives. The decrease in the deeper aquifer could trigger a negligible accompanying decrease in groundwater quality in Segment G. These effects diminish rapidly in areas not immediately adjacent to slurry cutoff wall installation. Because project effects are localized, and none of the projects discussed above are expected to affect groundwater levels in the Southport project area, the project would not contribute to a significant cumulative effect on groundwater resources.

The project alternatives could affect surface water quality during construction by increasing turbidity; thus, cumulative effects could occur if other projects were constructed at the same time. Many of the West Sacramento development projects could contribute to localized and temporary effects on water quality. As described in the water quality section, many minimization measures, including a SWPPP, would be implemented, turbidity would be monitored during construction to ensure it stays within the acceptable level identified by the RWQCB, and NPDES permit and WDRs would be obtained to limit discharge into the water table. These minimization measures are standard construction practices and it is assumed that other projects would also implement them.

There is potential for the project to contribute to a cumulative effect on water quality resulting from the increased risk of sedimentation in the floodplain areas. However, the project's contribution to any cumulative increase in sedimentation would be temporary; implementation of erosion control features such as rock slope protection and vegetation would have a long-term beneficial effect on cumulative water quality effects in the Sacramento River. On completion of construction, no additional effects on water quality would occur as part of the project. Therefore, there would be no significant cumulative effect.

4.2.4.3 Geology, Seismicity, Soils, and Mineral Resources

The project may contribute to a significant cumulative effect related to geology, seismicity, and soils. There would be no effect on mineral resources, and therefore no cumulative effects associated with the project.

Other earth-moving activities in the project area, such as development, could change the stability of soils, increase erosion and sedimentation, and expose structures to groundshaking and liquefaction. Soil stability is addressed through engineering design of structures, including levees, and ground-disturbing activities are required to stabilize soils on completion of construction or even between stages of construction. None of the project alternatives would increase the potential for earthquake damage to these flood-risk management facilities. Therefore, no significant cumulative effects related to soil stability are anticipated. A cumulative increase in erosion and sedimentation could occur if other levee projects on the Sacramento River are occurring at the same time. The potential for erosion and sedimentation resulting from the Southport project and other projects is limited by minimization measures and implementation of a SWPPP. As expansive soils are encountered, they would be accommodated into project design. Any cumulative effect would be temporary and minimal, and therefore less than significant. The project would replace or upgrade existing flood management facilities (i.e., levees), and there would be no change in risks due to seismicity. However, there could be cumulative effects related to construction of structures that could be subject to seismic activity. The program area is not located in an active seismic area, and therefore any cumulative increase in risk related to groundshaking would be less than significant.

However, the potential loss of soil productivity due to borrow of soil materials, and implications for future land use of borrow areas, are unknown. Any loss of soil productivity contributes to the long-term cumulative decline in the extent and conditions of soil resources in the Central Valley of California and would be considered a significant cumulative effect.

4.2.4.4 Transportation and Navigation

The project may contribute to a significant cumulative effect on transportation; no cumulative effects on navigation are anticipated.

Transportation systems in the region are expected to change as a result of past, present, and reasonably foreseeable future projects related to population growth and changes in economic activity. Many of the planned projects listed above consist of programs or policy development that may not result in activities that would add traffic to the transportation systems. Projects that could add traffic include the Sacramento Riverfront Master Plan Improvement (River Walk) and the various other public and private infrastructure projects planned for the city of West Sacramento.

Construction activities associated with the Southport project would result in a temporary increase in traffic volumes on the haul routes and would result in short-term lane and road closures on roads in and adjacent to the project sites, which would have the potential to increase road hazards, disrupt the alternative transportation on the affected roads, and degrade the operation of haul routes and the roads accessed or used for detours during construction.

Although it is difficult to determine when major infrastructure projects would be constructed, combined with other projects in West Sacramento, there could be significant cumulative effects on transportation if the Southport project and other projects are implemented during the same time frame and at the same location as the Southport project because the magnitude of effects would be greater. If these projects occurred sequentially, the construction-related effects could be drawn out for an extended period. If one local area experiences several large construction projects simultaneously, there could be substantial localized effects. Specifically, cumulative effects would occur if projects would use the same haul routes identified for the Southport project and currently operating at unacceptable LOS E. Although WSAFCA is committed to implementing the traffic control and road maintenance plan described in Chapter 2, Section 2.4, Environment Commitments, to reduce the effects of construction traffic on all haul routes, coordinating with the construction schedules of other large projects in the region is heavily dependent on availability. Construction of the project, combined with other projects in the area, would contribute to significant cumulative effects on construction traffic.

Under project operation, South River Road would be realigned to join Village Parkway at the north end of the project area, and Village Parkway would extend south from Lake Washington Boulevard to South River Road at Gregory Avenue, under Alternatives 2, 4, and 5. The new Village Parkway would be designed to meet traffic demands for both South River Road and the existing Village Parkway, but would maintain the reserved right-of-way to allow expansion to meet future circulation needs; therefore, the direct effect of the new road on traffic operation at existing Village Parkway would be less than significant.

However, the City is currently constructing Michael McGowan Bridge, which would extend South River Road from the north side of the barge canal to South River Road on the south side. Michael McGowan Bridge would provide an alternative route over the barge canal for the Southport area, which is primarily residential land uses. With completion of both Michael McGowan Bridge and new project road, it is expected that residents along existing Village Parkway and near the new Village Parkway would use Michael McGowan Bridge, through the realigned South River Road, to access their homes. These trips would increase the traffic volume on Village Parkway. Based on the traffic impact study prepared for the Michael McGowan Bridge project (Fehr & Peers 2013), with the extension of Village Parkway from Stonegate Drive to the bridge and from Lake Washington Boulevard to Davis Road, traffic operation at Village Parkway/South River Road would operate at an acceptable level with peak hour traffic volume of 490 vehicles on Village Parkway south of the bridge. The traffic volume on Village Parkway would be gradually reduce toward the south as residents reach their destinations, and is not expected to substantially degrade the operation of the Village Parkway to an unactable level. Traffic volume on new Village Parkway south of Linden Road would remain low because of the low-density residential uses in the area south of Linden Road. Consequence, the cumulative effect of Michael McGowan Bridge on the operation of the new project road would be would be less than significant.

4.2.4.5 Air Quality and Climate Change

The project may contribute to a significant cumulative effect on Air Quality and contribute to Climate Change.

The project would result in temporary construction-related emissions that would be mitigated by reducing vehicle and equipment emissions and implementing a fugitive dust plan. Other projects occurring in the YSAQMD, SMAQMD, and BAAQMD at the same time as the project construction would result in cumulative effects that would be significant, particularly related to NO_X and PM10. It is expected that projects generating these pollutants also would minimize emissions through dust control and exhaust emissions control. However, there still could be a significant cumulative effect.

The project would result in temporary construction-related GHG emissions. Other projects occurring in the YSAQMD at the same time as the project construction would result in a cumulative increase in GHG emissions. Even with emissions reduction mitigation that would be incorporated into the project and other projects, this cumulative effect is significant.

4.2.4.6 Noise

The project is not expected to contribute to cumulative noise and vibration effects.

Implementation of any of the project alternatives would result in temporary but significant direct effects related to construction noise and vibration at sensitive receptors in the project area. To assess the contribution of the project alternatives to cumulative noise and vibration conditions, noise and vibration from construction of the project is evaluated in conjunction with noise and vibration potentially generated by past, present, and reasonably foreseeable future projects within the region. Other projects in the vicinity of these receptors occurring at the same time could result in cumulative effects. However, because construction noise would be temporary and highly localized, implementation of any of the project alternatives is not anticipated to contribute to significant cumulative noise effects in the project area.

4.2.4.7 Vegetation and Wetlands

The project may contribute to a significant cumulative effect on vegetation and wetlands.

Implementation of any of the project alternatives would directly affect riparian woodlands, wetlands and other waters of the United States, protected trees, and, potentially, special-status plant species. Project alternatives, in combination with other local and regional projects, would contribute to the cumulative loss of these biological resources in the project vicinity, with the exception of Alternatives 2, 4, and 5, which would have a beneficial effect on riparian, wetland, and open water habitats and would not contribute to a significant cumulative effect on those resources.

Historical loss of riparian habitat, wetlands and other waters of the United States, native trees, and special-status plants in Yolo County has occurred because of habitat conversion for agriculture and development. Although riparian vegetation and native trees remain along the Sacramento River and some of the major streams in the county, these riparian corridors are substantially narrower than historically because of development. Project Alternatives 1 and 3 would contribute significantly to cumulative effects on riparian habitat in Yolo County by directly affecting up to 38.22 or 46.33 acres, respectively. Alternatives 2, 4 and 5 would beneficially affect riparian habitat, wetlands, and open water habitat within the offset floodplain area created by the setback levee.

Avoidance, minimization, and/or mitigation measures identified in Section 3.8, Vegetation and Wetlands, to avoid and minimize disturbance and to compensate for loss of riparian habitat, wetlands, open water, native trees, and special-status plants that would or could be affected by project alternatives would reduce these effects. The effects on wetlands, open water, native trees, and special-status plants could be mitigated to a less-than-significant level, but the effects on riparian habitat under Alternatives 1 and 3 would remain significant and unavoidable even with mitigation.

Other existing and reasonably foreseeable projects in the county have the potential to contribute to the cumulative loss of riparian habitat, wetlands and other waters of the United States, native trees, and special-status plants. To fully address the cumulative effect on these resources, other local agencies would need to require and implement mitigation to protect and restore riparian habitat, wetlands and other waters of the United States, native trees, and special-status plants affected by other existing and reasonably foreseeable projects in the project region.

4.2.4.8 Fish and Aquatic Resources

The project may contribute to a significant cumulative effect on fish resources and aquatic habitat.

The project results in construction-related temporary affects to floodplain habitat and the potential for construction-related degradation of fish habitat as a result of sedimentation and turbidity, accidental release of contaminants, or other disturbances. The project's contribution to these cumulative effects is temporary and minimized by implementing a SWPPP, SPPCP, and BSSCP; limiting construction activities to times when species are not present; and re-seeding and restoring temporarily affect floodplain habitat to pre-project conditions.

Under Alternatives 1 and 3, removal of riparian vegetation and SRA cover associated with levee construction and the use of rock revetment on levee slopes constitutes a contribution to a significant cumulative effect on fish resources and aquatic habitat based on historical losses and the importance of these habitats to the conservation of native fishes in the lower Sacramento River.

Under Alternatives 2, 4 and 5, WSAFCA would incorporate riparian and wetland vegetation into the design of the levee setback alternative. Compensation and enhancement of SRA cover would be important objectives of the final design. Native fishes also would benefit from restored access and increased availability of seasonal floodplain habitat within the levee offset area. Proposed reconnection of the floodplain to the Sacramento River through levee breaching and enhancement of riparian, wetland, and SRA cover within the levee offset area would be expected to fully mitigate project effects and result in net gains in habitat values for native fishes. Full compensation of SRA cover losses likely would take several years as vegetation matures, but SRA cover values in the breach areas likely would exceed within 10–15 years the values that would be lost on the existing levee. Therefore, these alternatives would not contribute to a significant cumulative effect associated with the loss of riparian and SRA cover on the existing levees, as a contribution would be temporary and offset by the proposed habitat compensation and enhancement measures in the levee offset area.

4.2.4.9 Wildlife

The project is not expected to contribute to a significant cumulative effect on wildlife.

Implementation of any of the project alternatives would result in temporary wildlife and habitat disturbance during construction and the permanent conversion of habitat for several special-status species, including valley elderberry longhorn beetle, giant garter snake, burrowing owl, and Swainson's hawk. These species are known to or have the potential to use the Sacramento River corridor or adjacent uplands for breeding, foraging, or resting.

Impacts on Swainson's hawk nesting habitat associated with the Michael McGowan Bridge project (permanent loss of 0.93 acre) were mitigated by purchasing 2.79 acres (3:1 ratio] of CDFW-approved riparian habitat credits from the Cosumnes Floodplain Mitigation Bank in June 2013; the

City determined that this mitigation reduced the project's effects to a less-than-significant level (California Department of Fish and Wildlife 2013).

While the project's incremental loss of foraging and nesting habitat for Swainson's hawk could be considered cumulatively considerable in combination with past, present, and future projects within the Southport area, implementation of mitigation measures VEG-MM-1 (Compensate for Loss of Woody Riparian Habitat), VEG-MM-6 (Compensate for Loss of Protected Trees), and WILD-MM-9 (Compensate for Permanent Removal of Swainson's Hawk Foraging Habitat) would reduce WSAFCA's contribution to this significant cumulative impact to a level that is less than cumulatively considerable.

4.2.4.10 Land Use and Agriculture

The project may contribute to a significant cumulative effect on land use and agriculture.

The Southport project alternatives would result in the conversion of some land use types to levees. Overall, the land use designation changes would be negligible as described in Section 3.11, Land Use and Agriculture, as the new land use would be public/quasi-public. However, in areas where levee treatments overlap areas of important farmland, a conversion of up to 26 acres of prime farmland in the construction area and up to 479 acres of prime farmland and 12 acres of farmland of statewide importance in the potential borrow areas could occur. Conversion of agricultural land in Yolo County is a primary concern related to land use, and it is a significant cumulative effect because it is an irretrievable loss of a finite resource. Buildout of the Southport Framework Plan would result in the irreversible conversion of farmland to urban development and is considered a significant cumulative effect. Although the proposed project would be constructed largely in areas that were identified for future conversion from agricultural uses, a small portion of the project area that was proposed for continued agricultural use would be converted at the southern end of the construction area. The project would result in the conversion of farmlands and would contribute to the cumulative conversion of farmlands.

The implementation of project-specific mitigation measures would reduce the project's contribution to this cumulative effect. However, when combined with the cumulative conversion of farmland related to other projects in the region, the Southport project results in a significant cumulative effect. None of the alternatives would avoid contributing to this effect.

4.2.4.11 Environmental Justice, Socioeconomics, and Community Effects

The project would not result in environmental justice effects and, therefore, there would be no cumulative effect.

The project would not be likely to contribute to a significant cumulative effect on socioeconomics or community effects.

Implementation of the project could result in permanent and temporary displacement of residents during construction. Similar projects implemented within the same timeframe could also affect the permanent or temporary displacement of residents as a result of construction activities. However, it is unlikely another project of sufficient construction activity to trigger resident relocation would occur in the same place at the same time. The effect of temporary relocation is individual in nature, and the temporary relocation of adjacent residents would not result in a significant cumulative effect. Thus, the project is not expected to contribute to a significant cumulative effect.

4.2.4.12 Visual Resources

The project may contribute to a significant cumulative effect on visual resources.

The project would result in temporary changes in the visual quality of construction areas and access roads as a result of construction activities and equipment in areas that do not normally include construction-associated views. This effect may contribute to a significant cumulative effect if other projects were occurring at the same time and affecting the same viewer groups along the Sacramento River corridor. However, this cumulative effect would be less than significant because the effect would be temporary and localized.

The proposed project would have adverse cumulative effects in conjunction with existing and proposed levee projects requiring that levee slopes be maintained free of woody vegetation in perpetuity, resulting in the loss of a highly valued regional aesthetic landscape component. The mature vegetation along the levees is characteristic of the region and is a striking, distinctive element in the landscape. The existing vegetation that is removed would be replaced with herbaceous vegetation. Maintaining the levees devoid of the characteristic riparian vegetation and mature landscaping and replacing it with grass and potentially rock would highly degrade the visual character and quality of the area and increase glare. Projects in the area would combine to slowly transform the vegetated waterways to channel-like water conveyance ways. This would lead to the eventual denuding of the waterway and be a severe effect on the visual environment. This cumulative effect, therefore, is significant.

4.2.4.13 Recreation

The project is not expected to contribute to a significant cumulative effect on recreation.

The project would result in both beneficial and adverse effects on recreation. Adverse effects would occur as a result of vegetation removal and other construction activities that could disrupt recreation along levees, bike paths, or other trails. Other projects affecting the same bike paths or trails could result in a cumulative effect on recreation. This cumulative effect would be less than significant because effects would be temporary and localized, and other facilities would be available for use during construction.

Construction of access roads that would be open for public recreation access would result in a cumulative beneficial effect on local recreation opportunities when considered with planned implementation of the City of West Sacramento Parks Master Plan, Southport Sacramento River Corridor Recreation Program (ICF International 2013), and the other private and public projects described above.

4.2.4.14 Utilities and Public Services

The project is not expected to contribute to a significant cumulative effect on utilities and public services.

The project combined with other proposed projects could result in cumulative effects on utilities and public services related to temporary disruption of domestic water supply, irrigation/drainage facilities, and utility services, as well as a potential increase in emergency response times. Other projects affecting the same services could result in a cumulative effect. This cumulative effect would not be significant because effects would be temporary and localized, and would be minimized through application of mitigation measures and standard ECs limited the duration of service interruptions. It is expected that other projects occurring at the same time would minimize their potential for disruption similarly.

Cumulative effects related to solid waste generation would occur only during construction. Effects resulting from solid waste generation are expected to be less than significant because much of the materials removed from existing levees would be reused, construction would be temporary, and the Central Landfill has available capacity to support additional similar projects. Therefore, there would be no significant cumulative effects.

Cumulative effects on domestic and irrigation water supply wells are discussed in Section 4.2.4.2, Water Quality and Groundwater Resources, above.

4.2.4.15 Public Health and Environmental Hazards

The project is not expected to contribute to a significant cumulative effect on public health or result in environmental hazards.

The Southport project has the potential to increase risks to the public slightly during construction as a result of equipment and fuel usage, and potential sources of hazardous materials in the project area. These risks would be minimized through implementation of the SWPPP and other ECs. As these are standard practice for construction projects, it is expected that other projects would implement them, and the overall cumulative effect would be less than significant.

The Southport project would provide flood-risk reduction for West Sacramento. Other projects that include flood risk–reduction features that reduce stress on the West Sacramento levee system could result in a beneficial cumulative effect by reducing the overall public risk resulting from levee failure.

4.2.4.16 Cultural Resources

There is a historical trend towards losses of historic properties and archaeological resources as a result of agricultural and urban development and infrastructure projects such as highways, pipelines, and flood risk-reduction projects. Cumulative impacts to cultural resources would primarily be related to other construction projects that would occur during the same timeframe and within the same vicinity considered for this study, and that could result in ground disturbance at archaeological sites, impairment of the historical integrity of historic properties, or physical disturbance or demolition of portions of a larger resource such as an historic district, multi-component site, or ethnographic landscape.

At the time of this analysis there are several ground disturbing construction projects occurring along the Sacramento River and in West Sacramento that may result in similar impacts to those identified for the project (see Section 4.2.3 for the list of cumulative projects). Even in instances where historic properties are mitigated or archaeological resources are removed concurrent with scientific study, data collection, and recordation, cultural values could be lost or degraded since they can only be fully maintained when resources are retained in their original location (e.g., Native American occupation sites). Due to the multiple known incidents of damage to non-renewable cultural resources sites and associated losses of both cultural and scientific values in the region, there is a continuing cumulative impact on cultural resources. However, individual projects would implement separate mitigation measures that would address the effects caused by these projects.

The project could result in disturbance of one known archaeological resource and it is possible that currently unknown archaeological resources could be disturbed and cultural resources damaged or destroyed during construction activities. There are no impacts identified to non-archaeological historic properties. Mitigation would be implemented to minimize effects of this project to cultural resources (refer to section 3.17 "Cultural Resources"). Resolution of all adverse effects across multiple projects is unlikely considering the nature of finite cultural resources that may be lost or damaged by the implementation of these cumulative projects. Although mitigation would minimize these impacts, there would still remain an overall cumulative impact to cultural resources. The project's contribution to this trend of cumulative impacts along the Sacramento River and its tributaries would not be considerable, in light of the small proportion of the Sacramento River represented by the project area and the extensive amount of impacts being caused by several of the cumulative projects.

Chapter 5
Regulatory Framework and Compliance

5.1 Introduction

This chapter identifies the major permitting, environmental review, and consultation required before the proposed Southport project may be constructed. Certain Federal, state, and local regulations require issuance of permits before project implementation; other regulations require agency consultation but may not require issuance of any authorization or entitlements before project implementation.

5.2 Federal Regulations

5.2.1 National Environmental Policy Act (42 USC 4321 et seq.)

NEPA is the nation's broadest environmental law, applying to all Federal agencies and most of the activities they manage, regulate, or fund that have the potential to affect the environment. It requires Federal agencies to disclose and consider the environmental implications of their proposed actions. NEPA establishes environmental policies for the nation, provides an interdisciplinary framework for Federal agencies to prevent environmental damage, and contains action-forcing procedures to ensure that Federal agency decision makers take environmental factors into account.

NEPA requires the preparation of an appropriate document to ensure that Federal agencies accomplish the law's purposes. The President's CEQ has adopted regulations and other guidance that provide detailed procedures that Federal agencies must follow to implement NEPA. This law applies to all environmental resources.

Compliance Status: Partial

This document is the instrument for NEPA compliance for the Southport project under the USACE's authority, as described in Chapter 1, "Introduction." This Final EIS has incorporated public comments to support a ROD. Compliance will be complete once the ROD is issued.

5.2.2 River and Harbors Appropriation Act of 1899

The River and Harbors Appropriation Act of 1899 addresses activities that involve the construction of dams, bridges, dikes, and other structures across any navigable water, or that place obstructions to navigation outside established Federal lines and excavate from or deposit material in such waters. Such activities require permits from USACE. *Navigable waters* are defined in Section 329.4 of the act as:

> Those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the water body, and is not extinguished by later actions or events which impede or destroy navigable capacity.

5.2.2.1 Section 10

Section 10 (33 USC 403) prohibits the unauthorized obstruction or alteration of any navigable water of the United States. This section provides that the construction of any structure in or over any navigable water of the United States, or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters, is unlawful unless the work has been authorized by the Chief of Engineers.

5.2.2.2 Section 14 (Section 408)

Under Section 14 of the Rivers and Harbors Appropriation Act (33 USC 408, commonly referred to as Section 408), temporary or permanent alteration, occupation, or use of any public works, including levees, for any purpose is only allowable with the permission of the Secretary of the Army. Under the terms of 33 USC 408, any proposed levee modification requires a determination by the Secretary that the proposed alteration, permanent occupation, or use of a Federal project is not injurious to the public interest and will not impair the usefulness of the levee. The authority to make this determination and approve modifications to Federal works under 33 USC 408 has been delegated to the Chief of Engineers, USACE.

Compliance Status: Partial

The Southport project would affect waters of the United States, as it includes activities in navigable waters and activities that may change the hydraulic capacity of the floodway or the authorized geometry of the Federal project. As described in Chapter 1, WSAFCA is seeking approval under 33 USC § 408 and Section 10, supported by this document. The CVFPB is requesting Section 408 permission from USACE for the Southport project on behalf of WSAFCA. USACE is also reviewing the Southport project for Section 10 of the Rivers and Harbors Appropriation Act for effects on navigability, coincident with review under Clean Water Act, Section 404 (discussed below). Compliance will be complete upon approval by USACE.

5.2.3 Clean Water Act (33 USC 1251 et seq.)

5.2.3.1 Section 404

Section 404 of the CWA requires that a permit be obtained from USACE for the discharge of dredged or fill material into "waters of the United States, including wetlands."

Waters of the United States include wetlands and lakes, rivers, streams, and their tributaries. *Wetlands* are defined for regulatory purposes, at 33 CFR § 328.3 as:

> (1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of tide; (2) All interstate waters, including interstate wetlands; (3) All other waters such as intrastate lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce; (4) All impoundments of waters otherwise defined as waters of the United States under the definition; (5) Tributaries of waters identified in paragraphs 1–4 in this section; (6) The territorial seas; and (7) Wetlands adjacent to waters identified in paragraphs 1–6 in this section.

CWA Section 404(b) requires that USACE process permits in compliance with guidelines developed by EPA. These guidelines (404[b][1] Guidelines) require that there be an analysis of alternatives available to meet the project purpose and need, including those that avoid and minimize discharges of dredged or fill materials in waters. Once this first test has been satisfied, the project that is permitted must be the least environmentally damaging practicable alternative before USACE may issue a permit for the proposed activity.

[Note: Section 404 does not apply to authorities under the Rivers and Harbors Appropriation Act of 1899, except that some of the same waters may be regulated under both statutes; the USACE typically combines the permit requirements of Section 10 and Section 404 into one permitting process.]

Coordination between WSAFCA and USACE regulatory staff regarding the presence of waters of the United States in the Southport project area is complete. A wetland delineation was submitted for verification and jurisdictional determination on September 28, 2012. The delineation was verified on February 7, 2013 and indicates that the Southport project will affect waters of the United States, and that a permit will be required.

Compliance Status: Partial

WSAFCA submitted a Department of the Army permit application to USACE regulatory staff on January 25, 2013. At USACE regulatory staff request, additional information was provided on March 29, 2013. Approval of the permit application is pending completion of the 404(b)(1) analysis and adoption of the Final EIS by USACE. A copy of the Standard Department of the Army permit application and the Revised Permit Application Materials that were submitted to USACE are provided in Appendix I.

Following a determination by USACE regulatory staff that the Village Parkway construction component of the Southport project was a separate and complete action with independent utility, WSAFCA submitted a Department of the Army Nationwide Permit Pre-Construction Notification Form to USACE regulatory staff on December 19, 2014. The form notified USACE of its intent to fill waters of the United States in conjunction with its construction of the Village Parkway in advance of construction of any flood risk-reduction measures.

5.2.3.2 Section 401

Under the CWA Section 401, applicants for a Federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Therefore, all projects that have a Federal component and may affect state water quality (including projects that require Federal agency approval [such as issuance of a Section 404 permit]) must also comply with CWA Section 401. In California, the authority to grant water quality certification has been delegated to the State Water Board, and applications for water quality certification under CWA Section 401 are typically processed by the RWQCB with local jurisdiction. Water quality certification requires evaluation of potential impacts in light of water quality standards and CWA Section 404 criteria governing discharge of dredged and fill materials into waters of the United States.

As Section 408 permission and the granting of a Section 10/404 permit for the Southport project constitute a Federal action that may affect state water quality, a request for certification under CWA Section 401 will be submitted.

Compliance Status: Partial

USACE and WSAFCA will ensure that the project complies with the CWA, including Sections 404, 401, and 402. Some placement of fill within jurisdictional wetlands and waters of the United States is required for the project, under USACE jurisdiction for Section 404. This is detailed in Section 3.8, Vegetation and Wetlands. WSAFCA will submit an application to USACE for a Section 10/404 permit. A Section 401 State Water Quality Certification for activities associated with implementation of the proposed project is required as a condition of Section 404, and WSAFCA will submit a Section 401 certification application to the RWQCB. The project would also require an NPDES permit through the development of a SWPPP because the project would disturb more than 1 acre of ground. Water quality issues are discussed in Section 3.2, Water Quality and Groundwater Resources.

5.2.4 Clean Air Act (42 USC 1857 et seq.), as Amended and Recodified (42 USC 7401 et seq.)

The Federal CAA was enacted to protect and enhance the nation's air quality in order to promote public health and welfare and the productive capacity of the nation's population. The CAA requires an evaluation of any Federal action to determine its potential impact on air quality in the project region. California has a corresponding law, which also must be considered during the EIR process.

For specific projects, Federal agencies must coordinate with the appropriate air quality management district as well as with EPA. This coordination would determine whether the project conforms to the CAA and the SIP.

Section 176 of the CAA prohibits Federal agencies from engaging in or supporting in any way an action or activity that does not conform to an applicable SIP. Actions and activities must conform to a SIP's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards and in attaining those standards expeditiously. EPA promulgated conformity regulations (codified in 40 CFR 93.150 et seq.).

Compliance Status: Partial

The project construction falls under the jurisdiction of the YSAQMD, SMAQMD, and BAAQMD. The districts determine whether project emission levels significantly affect air quality, based on Federal standards established by EPA and ARB. The districts would first issue a permit to construct, followed by a permit to operate, which would be evaluated to determine whether all facilities have been constructed in accordance with the authority to construct permit. USACE and WSAFCA have prepared a draft conformity analysis and are in coordination with the districts to determine that the project would have no significant effects on the future air quality of the area and is in compliance with this act. The potential air quality impacts of the Southport project resulting from construction (such as equipment emissions and fugitive dust) are discussed in Sections 3.5 and 3.6, Air Quality and Climate Change, which analyze and document compliance with the CAA.

5.2.5 Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance

Executive Order 13514 requires Federal agencies to set a 2020 GHG emissions reduction target within 90 days; increase energy efficiency, reduce fleet petroleum consumption, conserve water, and reduce waste; support sustainable communities; and leverage Federal purchasing power to promote environmentally responsible products and technologies.

Compliance Status: Full

USACE is requiring lower emission–producing equipment for use in construction and electric batch plants.

5.2.6 Executive Order 11990 (Protection of Wetlands)

Executive Order 11990 (May 24, 1977) requires Federal agencies to prepare wetland assessments for proposed actions located in or affecting wetlands. Agencies must avoid undertaking new construction in wetlands unless no practicable alternative is available and the proposed action includes all practicable measures to minimize harm to wetlands.

Compliance Status: Partial

The project has been designed to avoid and minimize effects on wetlands, and all wetland effects would be compensated. Permitting under CWA Section 404 for wetlands is in progress. Section 3.8, Vegetation and Wetlands, describes effects on wetlands and mitigation measures for reducing significant effects for the Southport project.

5.2.7 Endangered Species Act (16 USC 1531 et seq.)

Section 7 of the ESA requires Federal agencies, in consultation with USFWS and/or NMFS, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species. The required steps in the Section 7 consultation process are as follows.

- Agencies must request information from USFWS and/or NMFS on the existence in a project area of special-status species or species proposed for listing.
- Agencies must initiate formal consultation with USFWS and/or NMFS if the proposed action may adversely affect special-status species.

ESA Section 7 compliance applies to the following environmental resources:

- Vegetation and wetlands
- Fish and aquatic resources
- Wildlife

Compliance Status: Full

To ensure that the proposed project is in full compliance, USACE has coordinated with USFWS and NMFS to determine consultation and documentation needs. Initial consultation with USFWS and NMFS for the Southport project occurred independently. On April 21, 2014 an interagency meeting was held to discuss the consultation for both the Southport project and the West Sacramento Project. As a result of that meeting, the consultations were combined into a single consultation based on a determination by USFWS and NMFS that the two projects were interrelated. A copy of the combined consultation Biological Assessment submitted to USFWS and NMFS is provided as

Appendix J, along with the formal consultation initiation letters that were sent to USFWS and NMFS. A BO was issued by USFWS on January 6, 2015, that covers both Alternative 5 of the Southport project and the West Sacramento Project. A copy of the USFWS BO is provided in Appendix J. A BO was issued by NMFS on April 23, 2015 for Alternative 5 of the Southport project. A copy of the NMFS BO is also provided in Appendix J. USACE and WSAFCA will comply with all terms and conditions of the USFWS and NMFS BOs, as well as the Reasonable and Prudent Measures, which include:

- Measures shall be taken to maintain, monitor, and adaptively manage all conservation measures as described in the MMP to ensure their effectiveness.
- Measures shall be taken to minimize the impacts of bank protection and setback levee construction by implementing integrated onsite and offsite conservation measures that provide beneficial growth and survival conditions for salmonids, and the sDPS of North American green sturgeon.
- Measures shall be taken to ensure that contractors, construction workers, and all other parties involved with these projects implement the projects as proposed in the biological assessment and the BO.

Discussions of Federally listed species have also been included in Section 3.9, Fish and Aquatic Resources, and Section 3.10, Wildlife, of this Final EIS.

5.2.8 Fish and Wildlife Coordination Act of 1958, as amended (16 USC 661 et seq.)

The Fish and Wildlife Coordination Act in general requires Federal agencies to coordinate with USFWS and state fish and game agencies whenever streams or bodies of water are controlled or modified. This coordination is intended both to promote the conservation of wildlife resources by providing equal consideration for fish and wildlife in water project planning and to provide for the development and improvement of wildlife resources in connection with water projects. Federal agencies undertaking water projects are required to include recommendations made by USFWS and state fish and game agencies in project reports, and give full consideration to these recommendations. This law applies to the following environmental resources:

- Vegetation and wetlands
- Fish and aquatic resources
- Wildlife

Compliance Status: Full

As discussed under Section 1.6.2.3, Fish and Wildlife Coordination Act, USFWS has developed a CAR, with input from NMFS and CDFW, that is included as Appendix K. The CAR was released by USFWS on April 20, 2015. The CAR was considered in development of this Final EIS and will be considered in the preparation of the Record of Decision. Effects on wildlife and fish are described in Section 3.9, Fish and Aquatic Resources, and Section 3.10, Wildlife, of this Final EIS.

5.2.9 Migratory Bird Treaty Act of 1936, as amended (16 USC 703 et seq.)

The MBTA implements a series of international treaties that provide for migratory bird protection. The MBT A authorizes the Secretary of the Interior to regulate the taking of migratory birds; the act provides that it is unlawful, except as permitted by regulations, "to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird..." (16 USC 703). This prohibition includes both direct and indirect acts, although harassment and habitat modification are not included unless they result in direct loss of birds, nests, or eggs. The current list of species protected by the MBTA includes several hundred species and essentially includes all native birds. Permits for take of non-game migratory birds can be issued only for specific activities, such as scientific collecting, rehabilitation, propagation, education, taxidermy, and protection of human health and safety and personal property.

Compliance Status: Full

USACE has communicated with USFWS via ESA consultation and development of the CAR to ensure that the proposed project does not significantly affect migratory birds, and has coordinated with CDFW. Compliance with the MBTA was achieved with the release of the CAR and the issuance of the BO from USFWS. Effects on avian species are described in Section 3.10, Wildlife. The Southport project has incorporated mitigation measures that would help ensure that construction and operation activities do not result in the take of migratory birds, as discussed in Section 3.10, Wildlife.

5.2.10 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act establishes a management system for national marine and estuarine fishery resources. This legislation requires that all Federal agencies consult with NMFS regarding all actions or proposed actions permitted, funded, or undertaken that may adversely affect EFH. EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The legislation states that migratory routes to and from anadromous fish spawning grounds are considered EFH. The phrase *adversely affect* refers to the creation of any effect that reduces the quality or quantity of essential fish habitat. Federal activities that occur outside of an essential fish habitat but that may, nonetheless, have an impact on essential fish habitat waters and substrate must also be considered in the consultation process.

Under the Magnuson-Stevens Act, effects on habitat managed under the Pacific Salmon Fishery Management Plan must also be considered. The Magnuson-Stevens Act states that consultation regarding essential fish habitat should be consolidated, where appropriate, with the interagency consultation, coordination, and environmental review procedures required by other Federal statutes, such as NEPA, Fish and Wildlife Coordination Act, CWA, and ESA. EFH consultation requirements can be satisfied through concurrent environmental compliance if the lead agency provides NMFS with timely notification of actions that may adversely affect EFH and if the notification meets requirements for essential fish habitat assessments.

Compliance Status: Partial

As described above under ESA compliance, USACE and WSAFCA have coordinated with USFWS and NMFS; consultation has been completed under Section 7. That consultation process included consideration of and compliance with the Magnuson-Stevens Act to determine effects on EFH. NMFS has proposed EFH Conservation Recommendations, and USACE has 30 days to respond to the recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Act. Additional description of the act is found in Section 3.9, Fish and Aquatic Resources.

5.2.11 Sustainable Fisheries Act

In response to growing concern about the status of United States fisheries, Congress passed the Sustainable Fisheries Act of 1996 (PL 104-297) to amend the Magnuson-Stevens Fishery Conservation and Management Act (PL 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 EFH. EFH includes 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. The Sacramento River has been designated as EFH by the Pacific Fishery Management Council.

Compliance Status: Partial

As described above under ESA compliance, USACE and WSAFCA have coordinated with USFWS and NMFS; consultation has been completed under Section 7. That process includes consideration of and compliance with the Magnuson-Stevens Act to determine effects on EFH. NMFS has proposed EFH Conservation Recommendations, and USACE has 30 days to respond to the recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Act. Additional description of the act is found in Section 3.9, Fish and Aquatic Resources.

5.2.12 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the take, possession, and commerce of such birds. The BGEPA applies to wildlife resources.

Compliance Status: Full

The Southport project study area does not contain bald eagle or golden eagle nesting habitat, and the project would not result in the take of bald or golden eagles. The Southport project incorporates mitigation measures that would ensure that construction activities do not result in the take of any raptors, as discussed in Section 3.10, Wildlife.

5.2.13 Wildlife Hazards on or Near Airports

The Federal Aviation Administration addresses control of hazardous wildlife in Advisory Circular 150/5200-33B, *Hazardous Wildlife Attractants on or near Airports*. The Federal Aviation Administration provides direction on where public-use airports should restrict land uses that have the potential to attract hazardous wildlife. The Federal Aviation Administration recommends a distance of 10,000 feet separating wildlife attractants and aircraft movement areas. The area within a 10,000-foot radius of the Airport Operations Area is designated as the Critical Zone. The definition of wildlife attractants in Advisory Circular 150/5200-33A includes human-made or natural areas, such as poorly drained areas, retention ponds, agricultural activities, and wetlands. Advisory Circular 150/5200-33A recommends against the use of airport property for agricultural production within a 5-mile radius of the Airport Operations Area unless the income from the agricultural crops is necessary for the economic viability of the airport.

Compliance Status: Full

The Federal Aviation Administration has a regulatory interest in managing wildlife attractants within 5 miles of the edge of the Sacramento International Airport's Area of Operations. If potential borrow sites are identified within the 10,000-foot Airport Critical Zone, management of the grasslands created by borrow operations would be consistent with the Airport's *Wildlife Hazard Management Plan* (Sacramento County Airport System 2007). This policy applies to public health and environmental hazards.

No portion of the project area is within the 10,000-foot Airport Critical Zone or within 5 miles of the edge of Sacramento International Airport's area of operations.

5.2.14 Farmland Protection Policy Act (7 USC 4201 et seq.) and Memoranda on Farmland Preservation

A National Agricultural Land Study conducted in the early 1980s found that millions of acres of farmland were being converted to other uses each year in the United States. As a result, a need for Congress to implement programs and policies to protect farmland was identified. Congress then passed the Agriculture and Food Act of 1981, which contained the FPPA. The purpose of the FPPA is to minimize the extent to which Federal programs contribute to the irreversible conversion of farmland to non-agricultural uses, and to ensure that Federal programs are administered in a manner that will be compatible with state, local, Federal, and private programs and policies to protect farmland. For the purpose of the FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be used currently for agriculture. These lands may contain forest land, pasture land, cropland, or other land but may not have water or urban built-up land.

The FPPA, dated August 30, 1976, and the Memoranda on Farmland Preservation, dated August 11, 1980, require Federal agencies to include assessments of the potential effects of a proposed project on prime and unique farmland. Under requirements set forth in these policies, Federal agencies must determine these effects before taking any action that could result in converting designated prime or unique farmland for non-agricultural purposes. If implementing a project would adversely affect farmland preservation, the agencies must consider alternative actions to lessen those effects. Federal agencies also must ensure that their programs, to the extent feasible, are compatible with state, local, and private programs to protect farmland. NRCS is the Federal agency responsible for ensuring that these laws and policies are followed.

Compliance Status: Partial

NRCS is authorized to review Federal projects to determine whether a project is regulated under the act and establish the farmland conversion impact rating for the project. Coordination with NRCS is in progress. The Southport project may have a significant and unavoidable effect on farmland, as discussed in Section 3.11, Land Use and Agriculture. Where such effects cannot be avoided, WSAFCA will provide conservation easements on farmland of equal quality in order to minimize the effect on farmland.

5.2.15 Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations)

Executive Order 12898 (February 11, 1994) requires Federal agencies to identify and address adverse human health or environmental effects of Federal programs, policies, and activities that could be disproportionately high on minority and low-income populations. Federal agencies must ensure that Federal programs or activities do not directly or indirectly result in discrimination on the basis of race, color, or national origin. Federal agencies must provide opportunities for input into the NEPA process by affected communities and must evaluate the potentially significant and adverse environmental effects of proposed actions on minority and low-income communities during environmental document preparation. Even if a proposed Federal project would not result in significant adverse impacts on minority and low-income populations, the environmental document must describe how Executive Order 12898 was addressed during the NEPA process.

Compliance Status: Full

Environmental justice issues are discussed in Section 3.12, Environmental Justice, Socioeconomic, and Community Effects. In summary, the Southport project would not result in any significant effects on minority or low-income populations. The Southport project would reduce flood risk for nearby established diverse communities of mixed income and ethnicity.

5.2.16 Uniform Relocation Assistance and Real Property Acquisition Policies Act

All or portions of parcels within the Southport project footprint may need to be acquired to construct either of the action alternatives. Federal, state, local government agencies, and others receiving Federal financial assistance for public programs and projects that require the acquisition of real property must comply with the policies and provisions set forth in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended in 1987 (42 USC 4601 et seq.) (Uniform Act), and implementing regulation, Title 49 CFR Part 24. Relocation advisory services, moving costs reimbursement, replacement housing, and reimbursement for related expenses and rights of appeal are provided for in the Uniform Act.

Compliance Status: Full

If necessary, property acquisition and relocation services, compensation for living expenses for temporarily relocated residents, and negotiations regarding any compensation for temporary loss of business would be accomplished in accordance with the Uniform Act and California Government Code Section 7267 et seq. This topic is discussed in Section 3.12, Environmental Justice, Socioeconomic, and Community Effects.

5.2.17 Wild and Scenic Rivers Act (16 USC 1271 et seq.)

The Wild and Scenic Rivers Act (16 USC 1271 et seq.) establishes a National Wild and Scenic Rivers System for the protection of rivers with important scenic, recreational, fish and wildlife, and other values. Rivers are classified as wild, scenic, or recreational. The act designates specific rivers for inclusion in the System and prescribes the methods and standards by which additional rivers may be added. The lower American River is included in the system and is designated as Recreational.

Compliance Status: Full

None of the internal water features of the Southport project study area are tributary to the lower American River or any other river included in the system. Therefore, the Southport project would have no effect on Wild or Scenic Rivers.

5.2.18 Federal Water Project Recreation Act

The Federal Water Project Recreation Act requires Federal agencies with authority to approve water projects to include recreation development as a condition of approving permits. Recreation development must be considered along with any navigation, flood management, reclamation, hydroelectric, or multi-purpose water resource project. The act states that,

> consideration should be given to opportunities for outdoor recreation and fish and wildlife enhancement whenever any such project can reasonably serve either or both purposes consistently.

Compliance Status: Full

Recreation improvements would be included in the Southport project where they can be accomplished in concert with anticipated flood risk–reduction project elements. Expected recreation benefits and effects, such as temporary loss to river access, are described in Section 3.14, Recreation.

5.2.19 Resource Conservation and Recovery Act

Under the Federal Resource Conservation and Recovery Act, the EPA regulates the full life cycle of hazardous materials, including the generation, transportation, treatment, storage, and disposal of hazardous waste at all facilities and sites in the nation. .

Compliance Status: Full

No materials classified as hazardous are proposed to be used for the Southport project. Public health and environmental hazards are discussed in Section 3.16, Public Health and Environmental Hazards.

5.2.20 Comprehensive Environmental Response, Compensation, and Liability Act

CERCLA (also known as Superfund) was passed to facilitate the cleanup of the nation's toxic waste sites. In 1986, the act was amended by the Superfund Amendment and Reauthorization Act Title III (community right-to-know laws). Title III states that past and present owners of land contaminated with hazardous substances can be held liable for the entire cost of the cleanup, even if the material was dumped illegally when the property was under different ownership.

Compliance Status: Full

No CERCLA hazardous waste sites were identified in the project area during reconnaissance surveys and record searches (Appendix G). The potential effects on public health from exposure to hazardous substances, and measures necessary to mitigate such risks, are discussed in Section 3.16, Public Health and Environmental Hazards.

5.2.21 National Historic Preservation Act of 1966, as amended (16 USC 470 et seq.)

Section 106 of the NHPA requires Federal agencies to evaluate the effects of their undertakings on historic properties, which are those properties listed or eligible for listing on the NRHP. Implementing regulations at 36 CFR Part 800 require that Federal agencies, in consultation with SHPO, identify historic properties within the APE of the Southport project and make an assessment of adverse effects if any are identified. If the project is determined to have an adverse effect on historic properties, the Federal agency is required to consult further with SHPO and the Advisory Council on Historic Preservation to develop methods to resolve the adverse effects. The Section 106 process has five basic steps.

1. Initiate the Section 106 process, including the identification of consulting parties, such as Native American tribes.
2. Identify and evaluate cultural resources to determine whether they are historic properties.
3. Assess the effects of the undertaking on historic properties within the APE.
4. If historic properties may be subject to an adverse effect, the Federal agency, the SHPO, and any other consulting parties (including Native American tribes and the ACHP) continue consultation to seek ways to avoid, minimize, or mitigate the adverse effect. An MOA is usually developed to document the measures agreed upon to resolve adverse effects. Alternatively, the Federal agency may prepare and execute a PA with the aforementioned parties to comply with 36 CFR 800, particularly in the context of complex undertakings that entail years of implementation actions or where the undertaking's effects on historic properties cannot be well characterized during the planning phase.
5. Proceed in accordance with the terms of the MOA or PA.

Compliance Status: Partial

The evaluation of cultural resources presented in this Final EIS complies with the NHPA. Research (literature and archival research) and field surveys in the APE are summarized in Section 3.17, Cultural Resources. USACE has prepared a draft PA to provide guidelines for compliance with the Section 106 process when the effects on historic properties are unknown, to be reviewed by SHPO.

Ongoing coordination and communication will be maintained by USACE with signatories, concurring parties, and other key stakeholders as planned follow-on efforts are undertaken and the proposed project proceeds. By carrying out the terms of the PA, USACE will fulfill its responsibilities under Section 106 of the NHPA and ACHP regulations. This would constitute full compliance with this act.

5.2.22 American Indian Religious Freedom Act of 1978

The American Indian Religious Freedom Act of 1978 is also applicable to Federal undertakings. This act established "the policy of the United States to protect and preserve for American Indians their inherent right of freedom to believe, express, and exercise the traditional religions, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites" (Public Law 95-431). The American Indian Religious Freedom Act applies to cultural resources.

Compliance Status: Full

It is not anticipated that actions related to the Southport project will conflict with the American Indian Religious Freedom Act. Consultation with the Native American Heritage Commission and the Sacred Lands database was negative for findings in the project areas, which is discussed in Section 3.17, Cultural Resources.

5.2.23 Executive Order 13007 (Indian Sacred Sites) and April 29, 1994, Executive Memorandum

Executive Order 13007 (May 24, 1996) requires Federal agencies with land management responsibilities to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies are to maintain the confidentiality of sacred sites. Among other things, Federal agencies must provide reasonable notice of proposed actions or land management policies that may restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites. The agencies must comply with the April 29, 1994, Executive Memorandum, *Government-to-Government Relations with Native American Tribal Governments*.

Compliance Status: Full

Based on the analysis described in Section 3.17, Cultural Resources, no sacred sites would be significantly affected by the implementation of the Southport project.

5.2.24 Executive Order 11988 (Floodplain Management)

This Executive Order requires USACE to provide leadership and take action to (1) avoid development in the base (1-in-100 annual event) floodplain (unless such development is the only practicable alternative); (2) reduce the hazards and risk associated with floods; (3) minimize the effect of floods on human safety, health, and welfare; and (4) restore and preserve the natural and beneficial values of the base floodplain.

Compliance Status: Full

To comply with this Executive Order, the policy of USACE is to formulate projects that, to the extent possible, avoid or minimize significant effects associated with use of the without-project floodplain, and avoid inducing development in the existing floodplain unless there is no practicable alternative. None of the remediation measures proposed as part of the Southport project would induce development within the floodplain. The project would provide increased stability to existing levees in selected areas that have been determined to require reinforcement. This would decrease the risk of flooding and hazards associated with floods. It would not create development in the base floodplain but would preserve the natural and beneficial values associated with the present agricultural uses. A more detailed discussion is provided in Chapter 4, "Growth Inducing and Cumulative Effects."

5.3 State Regulations

5.3.1 California Environmental Quality Act (PRC Section 21000 et seq.)

CEQA requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. The environmental review required imposes both procedural and substantive requirements. At a minimum, an initial review of the project and its environmental effects must be conducted. CEQA's primary objectives are to:

- Disclose to decision makers and the public the significant environmental effects of proposed activities.
- Identify ways to avoid or reduce environmental damage.
- Prevent environmental damage by requiring implementation of feasible alternatives or mitigation measures.
- Disclose to the public reasons for agency approval of projects with significant environmental effects.
- Foster interagency coordination in the review of projects.
- Enhance public participation in the planning process.

CEQA applies to all discretionary activities proposed to be carried out or approved by California public agencies, including state, regional, county, and local agencies, unless an exemption applies. The act requires that public agencies comply with both procedural and substantive requirements. Procedural requirements include the preparation of the appropriate public notices (including notices of preparation), scoping documents, alternatives, environmental documents (including mitigation measures, mitigation monitoring plans, responses to comments, findings, and statements of overriding considerations), completion of agency consultation and State Clearinghouse review, and provisions for legal enforcement and citizen access to the courts.

CEQA's substantive provisions require agencies to address environmental impacts disclosed in an appropriate document. When avoiding or minimizing environmental damage is not feasible, CEQA requires agencies to prepare a written statement of overriding considerations when they decide to approve a project that will cause one or more significant effects on the environment that cannot be mitigated. CEQA establishes a series of action-forcing procedures to ensure that agencies accomplish the purposes of the law. In addition, under the direction of CEQA, the California Resources Agency has adopted regulations, known as the State CEQA Guidelines, which provide detailed procedures that agencies must follow to implement the law.

Compliance Status: Full

The Final EIR document is the instrument for CEQA compliance for the Southport project under WSAFCA's authority, as described in Chapter 1. The Final EIR was adopted by WSAFCA on August 14, 2014, and the NOD was filed with the Yolo County Clerk, thereby completing CEQA compliance.

5.3.2 Porter-Cologne Water Quality Control Act of 1969

In 1967, the Porter-Cologne Act established the State Water Board and nine RWQCBs as the primary state agencies with regulatory authority over California water quality and appropriative surface water rights allocations. Under this act (and the CWA), the state is required to adopt a water quality control policy and waste discharge requirements (WDRs) to be implemented by the State Water Board and nine RWQCBs. The State Water Board also establishes Basin Plans, which designate beneficial uses for specific surface water and groundwater resources and establish water quality objectives to protect those uses. The RWQCBs carry out State Water Board policies and procedures throughout the state.

Pursuant to the Porter-Cologne Act, the Central Valley RWQCB prepares and updates the Basin Plan for the Sacramento and San Joaquin River basins every 3 years; the most recent update was completed in February 2007 (Central Valley Regional Water Quality Control Board 2007). The Basin Plan describes the officially designated beneficial uses for specific surface water and groundwater resources and the enforceable water quality objectives necessary to protect those beneficial uses. The Southport project is located within the Central Valley RWQCB jurisdiction and is subject to the Basin Plan.

The Basin Plan includes numerical and narrative water quality objectives for physical and chemical water quality constituents. Numerical objectives are set for temperature, DO, turbidity, and pH; TDS, electrical conductivity, bacterial content, and various specific ions; trace metals; and synthetic organic compounds. Narrative objectives are set for parameters such as suspended solids, biostimulatory substances (e.g., nitrogen, phosphorus), oil and grease, color, taste, odor, and aquatic toxicity. Narrative objectives are often precursors to numeric objectives. The primary method used by the Central Valley RWQCB to ensure conformance with the Basin Plan's water quality objectives and implementation policies and procedures is to issue WDRs for projects that may discharge wastes to land or water. WDRs specify terms and conditions that must be followed during the implementation and operation of a project. This regulation applies to water quality and groundwater.

Compliance Status: Partial

The project has the potential to affect water quality in surface water or groundwater in the project area, which is governed by the Central Valley RWQCB. A Section 401 State Water Quality Certification for activities associated with implementation of the proposed project is required as a condition of Section 404, and WSAFCA will submit a 401 certification application to the RWQCB (as discussed above under Section 5.2.3, Clean Water Act). The Southport project will comply with the Basin Plan.

5.3.3 Surface Mining and Reclamation Act of 1975 (PRC Section 2710 et seq.)

The California Surface Mining and Reclamation Act of 1975 (PRC Section 2710 et seq.) (SMARA) addresses surface mining. Activities subject to SMARA include, but are not limited to, mining of minerals, gravel, and borrow material. The SMARA statute requires mitigation to reduce adverse impacts on public health, property, and the environment. Because SAFCA would require borrow material for project construction, SAFCA must comply with SMARA. SMARA applies to an individual or entity that would disturb more than 1 acre or remove more than 1,000 cubic yards of material through surface mining activities, including the excavation of borrow pits for soil material. SMARA is implemented through ordinances for permitting developed by local government lead agencies that provide the regulatory framework under which local mining and reclamation activities are conducted. The State Mining and Geology Board reviews the local ordinances to ensure that they meet the procedures established by SMARA. This law applies to geology, seismicity, soils, and minerals.

Compliance Status: Partial

The Southport project would use borrow material from several sources, including on-site areas. WSAFCA will develop a reclamation plan for the borrow areas and ensure it is implemented as construction activities begin. If any SMARA reclamation plans are required, they will be consistent with this plan.

5.3.4 California Streets and Highways Code (Section 660)

Caltrans is responsible for ensuring the safety and integrity of the State of California's highway system. Under California law, any encroachment on a state route must be approved by Caltrans.

Compliance Status: Partial

WSAFCA is leading coordination with Caltrans for any construction permitting. Effects on roadways are presented in Section 3.4, Transportation and Navigation.

5.3.5 California Clean Air Act of 1988

Compliance Status: Partial

As discussed above under Section 5.2.4, Clean Air Act, the YSAQMD, SMAQMD, and BAAQMD determine whether project emission sources and emission levels significantly affect air quality based on Federal standards established by EPA and state standards set by ARB. The project is in compliance with all provisions of Federal and state Clean Air Acts. USACE and WSAFCA have prepared a draft conformity analysis and are coordinating with the districts to determine that the project would have no significant effects on the future air quality of the area and is in compliance with this act. Air quality analysis is presented in Section 3.5, Air Quality.

5.3.6 California Climate Solutions Act

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Climate Solutions Act of 2006. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that is being phased in starting in 2012. To effectively implement the cap, AB 32 directs ARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that ARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves the reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

Compliance Status: Partial

Contributions of GHG emissions related to the Southport project are discussed in Section 3.6, Climate Change. Compliance will be complete upon coordinating with the AQMDs.

5.3.7 California Fish and Game Code

5.3.7.1 Streambed Alteration (Section 1600 et seq.)

CDFW regulates work that will substantially affect resources associated with rivers, streams, and lakes in California, pursuant to CFGC Sections 1600 to 1616. Any action from a public project that substantially diverts or obstructs the natural flow or changes the bed, channel, or bank of any river, stream, or lake, or uses material from a streambed must be previously authorized by CDFW in a lake or streambed alteration agreement under Section 1602 of the CFGC. This requirement may in some cases apply to any work undertaken within the 100-year floodplain of a body of water or its tributaries, including intermittent streams and desert washes. As a general rule, however, it applies to any work done within the annual high-water mark of a wash, stream, or lake that contains or once contained fish and wildlife, or that supports or once supported riparian vegetation. This law applies to the following environmental resources:

- Vegetation and wetlands
- Fish and aquatic resources
- Wildlife

Compliance Status: Partial

An application for a Streambed Alteration Agreement will be submitted to CDFW to authorize the Southport project under Section 1602.

5.3.7.2 Natural Community Conservation Planning Act (Section 2800 et seq.)

The NCCPA (CFGC Section 2800 et seq.) was enacted to support broad-based planning for effective protection and conservation of the state's wildlife heritage, while continuing to allow appropriate development and growth. The purpose of natural community conservation planning is to sustain and restore those species and their habitat identified by CDFW that are necessary to maintain the continued viability of biological communities affected by human changes to the landscape. An NCCP identifies and provides for those measures necessary to conserve and manage natural biological diversity within the plan area while allowing compatible use of the land. CDFW may authorize the take of any identified species, including listed and non-special-status species, pursuant to Section 2835 of the NCCPA, if the conservation and management of such species is provided for in an NCCP approved by CDFW. This law applies to the following environmental resources:

- Vegetation and wetlands
- Wildlife

Compliance Status: Partial

The Southport project may affect several state-listed species. Effects on biological resources are discussed in Sections 3.8, Vegetation and Wetlands, and 3.10, Wildlife. Compliance will be complete upon consultation with CDFW.

5.3.7.3 Protection of Bird Nests and Raptors (Sections 3503 and 3503.5)

Section 3503 of the CFGC states that 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 (species in the orders *Falconiformes* and *Strigiformes*), including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Section 3503.5 also could include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for the issuance of any type of incidental take permit.

Compliance Status: Partial

If it is determined that the proposed Southport project will result in take of a state-listed species, an incidental take permit or consistency determination will be obtained through consultation with CDFW. Effects related to bird nests and raptors are discussed in Section 3.10, Wildlife. Compliance will be complete upon consultation with CDFW.

5.3.7.4 Fully Protected Species (Section 3511, 4700, 5050, and 5515)

Protection of fully protected species is described in Sections 3511, 4700, 5050, and 5515 of the CFGC. These statutes prohibit take or possession of fully protected species and do not provide for authorization of incidental take of fully protected species. CDFW has informed non-Federal agencies and private parties that their actions must avoid take of any fully protected species.

Compliance Status: Full

The Southport project will avoid take of any fully protected species. Compliance is discussed in Sections 3.8, Vegetation and Wetlands, 3.9, Fish and Aquatic Resources, and 3.10, Wildlife.

5.3.8 California Endangered Species Act of 1984

CESA (CFGC Sections 2050–2116) states that all native species or subspecies of a fish, amphibian, reptile, mammal, or plant and their habitats that are threatened with extinction and those experiencing a significant decline that, if not halted, would lead to a threatened or endangered designation, will be protected or preserved.

CESA is similar to ESA but pertains only to state-listed endangered and threatened species. CESA requires state agencies to consult with CDFW when preparing documents under CEQA to ensure that the actions of the state lead agency do not jeopardize the continued existence of listed species. CESA directs agencies to consult with CDFW on projects or actions that could affect listed species, directs CDFW to determine whether there would be jeopardy to listed species, and allows CDFW to identify "reasonable and prudent alternatives" to the project consistent with conserving the species. Agencies can approve a project that affects a listed species if the agency determines that there are "overriding considerations"; however, the agencies are prohibited from approving projects that would cause the extinction of a listed species.

Mitigating impacts on state-listed species involves avoidance, minimization, and compensation (listed in order of preference). Unavoidable impacts on state-listed species typically are addressed in a detailed mitigation plan prepared in accordance with CDFW guidelines. CDFW exercises authority over mitigation projects involving state-listed species, including those resulting from CEQA mitigation requirements.

Under Section 2081 of the CFGC, a permit from CDFW is required for projects that could result in the take of a species that is state-listed as threatened or endangered. Under CESA, take is defined as an activity that would directly or indirectly kill an individual of a species. The definition does not include harm or harass, as the definition of take under ESA does. As a result, the threshold for take under CESA is higher than that under ESA. For example, habitat modification is not necessarily considered take under CESA.

Section 2090 of CFGC requires state agencies to comply with endangered species protection and recovery and to promote conservation of these species. CDFW administers the act and authorizes take through CFGC Section 2081 incidental take agreements (except for species designated as fully protected) and Section 2080.1 consistency determinations.

This law applies to the following environmental resources:

- Vegetation and wetlands
- Fish and aquatic resources
- Wildlife

Compliance Status: Partial

The Southport project may affect several state-listed species. CESA compliance is discussed in Sections 3.8, Vegetation and Wetlands, 3.9, Fish and Aquatic Resources, and 3.10, Wildlife. Compliance will be complete upon consultation with CDFW.

5.3.9 California Land Conservation Act of 1965 (Williamson Act)

The California Land Conservation Act of 1965, commonly referred to as the Williamson Act, enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agriculture or related open space use. In return, landowners receive property tax assessments that are much lower than normal because they are based on farming and open space uses as opposed to full market value. Local governments receive an annual subvention of forgone property tax revenues from the state via the Open Space Subvention Act of 1971.

The Williamson Act was amended in August 1998 to establish Farmland Security Zones. Under this Farm Bureau–sponsored Super Williamson Act, landowners can receive an additional 35% reduction in the land's value for property tax purposes. This additional tax reduction can be earned only if farmers and ranchers keep their property in the conservation program for at least 20 years. Farmland Security Zone contracts are comparable to the Williamson Act contracts in that each year another year is added to the agreement unless the landowner or county does not renew the contract. The legislation prohibits the annexation of land enrolled in a 20-year contract to a city, or a special district that provides non-agricultural services, or for use as a public school site.

Compliance Status: Full

There are no Williamson Act lands in the project area. Section 3.11 discusses land use and agriculture.

5.3.10 California Regulations for Environmental Justice

Most state governments have plans and policies intended to protect and expand the local and regional economies affecting the communities within their jurisdictions. State plans and policies also frequently address other social and economic impact topics, including fiscal conditions and related public services that affect local residents' quality of life.

In California, SB 115 (Chapter 690, Statutes of 1999) was signed into law in 1999. The legislation established OPR as the coordinating agency for state environmental justice programs (California Government Code, Section 65040.12[a]) and defined environmental justice in statute as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies" (Government Code Section 65040.12(e). SB 115 further required the CalEPA to develop a model environmental justice mission statement for boards, departments, and offices within the agency by January 1, 2001 (Public Resources Code, Sections 72000–72001).

In 2000, SB 89 (Chapter 728, Statutes of 2000) was signed, which complemented SB 115 by requiring the creation of an environmental justice working group and an advisory group to assist CalEPA in developing an intra-agency environmental justice strategy (PRC Sections 72002–72003). SB 828 (Chapter 765, Statutes of 2001) added and modified due dates for the development of CalEPA's intra-agency environmental justice strategy and required each board, department, and office within CalEPA to identify and address, no later than January 1, 2004, any gaps in its existing programs, policies, and activities that may impede environmental justice (PRC, Sections 71114–71115).

Cal/EPA adopted its environmental justice policy in 2004 (California PRC, Sections 71110–71113). This policy (or strategy) provides guidance to its resource boards, departments, and offices. It is intended to help achieve the state's goal of "achieving fair treatment of people of all races, cultures and incomes with respect to the development, adoption, implementation and enforcement of environmental laws and policies."

AB 1553 (Chapter 762, Statutes of 2001) required OPR to incorporate environmental justice considerations in the General Plan Guidelines. AB 1553 specified that the guidelines should propose methods for local governments to address:

- Planning for the equitable distribution of new public facilities and services that increase and enhance community quality of life.
- Providing for the location of industrial facilities and uses that pose a significant hazard to human health and safety in a manner that seeks to avoid over-concentrating these uses in proximity to schools or residential dwellings.
- Providing for the location of new schools and residential dwellings in a manner that avoids proximity to industrial facilities and uses that pose a significant hazard to human health and safety.
- Promoting more livable communities by expanding opportunities for transit-oriented development.

Although environmental justice is not a mandatory topic in the general plan, OPR is required to provide guidance to cities and counties for integrating environmental justice into their general plans. The 2003 edition of the *General Plan Guidelines* included the contents required by AB 1553 (see pages 8, 12, 20–27, 40, 114, 142, 144, and 260 of the revised *General Plan Guidelines*).

Compliance Status: Full

Environmental justice issues are discussed in Section 3.12, Environmental Justice, Socioeconomic, and Community Effects. In summary, the Southport project would not result in any significant effects on minority or low-income populations. In reality, the Southport project would reduce flood risk for nearby established diverse communities of mixed income and ethnicity.

5.3.11 Relocation Assistance and Property Acquisition

The State of California's Government Code Section 7260 et seq. brings the California Relocation Act into conformity with the Federal Uniform Act. In the acquisition of real property by a public agency, both the Federal and state acts seek to (1) ensure consistent and fair treatment of owners of real property, (2) encourage and expedite acquisition by agreement to avoid litigation and relieve congestion in the courts, and (3) promote confidence in public land acquisition.

The Relocation Assistance and Real Property Acquisition Guidelines were established by 25 CCR 1.6. The guidelines were developed to assist public entities with developing regulations and procedures implementing Title 42, Chapter 61 of the USC, the Uniform Act, for Federal and federally assisted programs. The guidelines are designed to ensure that uniform, fair, and equitable treatment is given to people displaced from their homes, businesses, or farms as a result of the actions of a public entity. Under the act, persons required to relocate temporarily are not considered displaced, but must be treated fairly. Such persons have a right to temporary housing that is decent, safe, and sanitary, and must be reimbursed for all reasonable out-of-pocket expenses. In accordance with these guidelines, people may not suffer disproportionate injury as a result of action taken for the benefit of the public as a whole. Additionally, public entities must ensure consistent and fair treatment of owners of such property, and encourage and expedite acquisitions by agreement with owners of displaced property to avoid litigation.

Compliance Status: Full

If necessary, property acquisition and relocation services, compensation for living expenses for temporarily relocated residents, and negotiations regarding any compensation for temporary loss of business would be accomplished in accordance with the Uniform Act and California Government Code Section 7267 et seq. (noted above, under Section 5.2.16). This topic is discussed in Section 3.12, Environmental Justice, Socioeconomic, and Community Effects.

5.3.12 California Register of Historic Resources

The CRHR includes resources that are listed in or formally determined eligible for listing in the NRHP (see Section 3.17, Cultural Resources) as well as some California State Landmarks and Points of Historical Interest (PRC Section 5024.1, 14, CCR Section 4850). Properties of local significance that have been designated under a local preservation ordinance (local landmarks or landmark districts) or that have been identified in a local historical resources inventory may be eligible for listing in the CRHR and are presumed to be significant resources for purposes of CEQA unless a preponderance of evidence indicates otherwise (State CEQA Guidelines Section 15064.5[a][2]). The eligibility criteria for listing in the CRHR are similar to those for NRHP listing but focus on the importance of the resources to California history and heritage. A cultural resource may be eligible for listing 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 person 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 individual, or possesses high artistic values; or
4. has yielded, or may be likely to yield, information important in prehistory or history.

Compliance Status: Partial

See Section 3.17, Cultural Resources, for a discussion of the CRHR. Compliance will be complete upon consultation with SHPO.

5.3.13 Public Trust Doctrine

When planning and allocating water resources, the State of California is required to consider the public trust and preserve for the public interest the uses protected by the trust. The public trust doctrine embodies the principle that certain resources, including water, belong to all and, thus, are held in trust by the state for future generations.

In common law, the public trust doctrine protects navigation, commerce, and fisheries uses in navigable waterways. However, the courts have expanded the doctrine's application to include protecting tideland, wildlife, recreation, and other public trust resources in their natural state for recreational, ecological, and habitat purposes as they affect birds and marine life in navigable waters. *The National Audubon Society v. Superior Court of Alpine County* (1983) 33 Cal 3d 419 decision extended the public trust doctrine's limitations on private rights to appropriative water rights, and also ruled that longstanding water rights could be subject to reconsideration and could possibly be curtailed. The doctrine, however, generally requires the court and the State Water Board to perform a balancing test to weigh the potential value to society of a proposed or existing diversion against its impact on trust resources.

The 1986 Rancanelli decision applied the public trust doctrine to decisions by the State Water Board and held that this doctrine must be applied by the State Water Board in balancing all the competing interests in the uses of Bay-Delta waters (*United States v. State Water Resources Control Board* [1986] 182 Cal. App. 3d 82).

Compliance Status: Full

The Southport project is consistent with the public trust doctrine, as the primary goals include improved flood risk management.

5.3.14 California State Lands Commission

The California State Lands Commission (CSLC) has jurisdiction and management control over public trust lands of the State. These lands include all ungranted tidelands and submerged lands, beds of navigable rivers, streams, lakes, bays, estuaries, inlets, and straits. CSLC manages these lands for the benefit of the people of the State, subject to the Public Trust for water related commerce, navigation, fisheries, recreation, open space, and other recognized Public Trust uses. CSLC's Land Management Division, located in Sacramento, administers the leasing of these lands. The issuance of any lease, permit, or other entitlement for use of State lands by the CSLC requires review for compliance with CEQA, and no proposed project may be approved until the requirements of CEQA are met.

Compliance Status: Partial

The proposed project would involve the placement of permanent fill within the Sacramento River, a navigable waterway. WSAFCA will therefore ensure that the project complies with CSLC regulations by submitting an application to CSLC for a lease for the use of public trust lands, as applicable.

5.4 State and Regional Plan Consistency

5.4.1 Clean Water Act, Section 303(d)

Under CWA Section 303(d), the RWQCB and the State Water Board list water bodies as impaired when not in compliance with designated water quality objectives and standards. A TMDL program must be prepared for waters identified by the state as impaired. A TMDL is a quantitative assessment of a problem that affects water quality. The problem can include the presence of a pollutant, such as a heavy metal or a pesticide, or a change in the physical property of the water, such as DO or temperature. A TMDL specifies the allowable load of pollutants from individual sources to ensure compliance with water quality standards. Once the allowable load and existing source loads have been determined, reductions in allowable loads are allocated to individual pollutant sources.

Compliance Status: Full

The Southport project would have no effect on TMDL issues for the Sacramento River.

5.4.2 Water Rights

The State of California recognizes riparian and appropriative surface water rights. Riparian rights are correlative entitlements to water that are held by owners of land bordering natural watercourses. California requires a statement of diversion and use of natural flows on adjacent riparian land under a riparian right. Appropriative water rights allow the diversion of a specified amount of water from a source for reasonable and beneficial use during all or a portion of the year. In California, previously issued appropriative water rights are superior to and take precedence over newly granted rights. The State Water Board has authority to issue permits to grant appropriative water rights.

Compliance Status: Full

The Southport project is consistent with current water rights.

5.4.3 Delta Plan

As described in Section 4.2.3.3, Relevant Land Use Plans, the Delta Plan is a legally enforceable comprehensive management plan designed to meet the two coequal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The Southport project, located on the Sacramento River in the secondary Delta zone, is expected to be considered a "covered action," as defined in the Delta Reform Act (California Water Code Section 85057.5(a)). Per Water Code Section 85225, a state or local agency that proposes to undertake a covered action, prior to initiating the implementation of that covered action, is required to submit a written certification to the Delta Stewardship Council, with detailed findings demonstrating that the covered action is consistent with the Delta Plan.

The Certificate of Consistency will discuss with specificity the following Delta Plan Policies applicable to the Southport project. Preliminary consistency determinations have been made as follows.

- Delta Plan Policy DP P2 (23 CCR Section 5011) calls for siting flood management infrastructure to avoid or reduce conflicts with local land uses when feasible. Section 3.11, Land Use and Agriculture, analyzes the alternatives' consistency with current local land uses. Each alternative was found in to be inconsistent with current land uses, resulting in significant and unavoidable effects to current land use designations. Implementation of Alternatives 1 and 3, which do not utilize a setback levee approach, represent a reduced effect on existing land use as these alternatives employ a reduced footprint and require the acquisition of less property. However, these alternatives do not feasibly reduce local land use conflicts as they do not achieve WSAFCA's objective of ensuring the project includes ecosystem and habitat restoration, as well as preserves and enhances riparian and other native habitats. Alternative 5, the APA, is sited to reduce conflict with existing local land uses to the extent feasible and is consistent with Delta Plan Policy DP P2.
- Delta Plan Policy ER P2 (23 CCR Section 5006) calls for restoring habitats at appropriate elevations. The setback alternatives, Alternatives 2, 4, and 5, are each consistent with this policy.

The offset floodplain area, described in detail in Section 2.2.5, Alternative 2—Setback Levee, would include varying elevations from approximately +7.0 feet NAVD 88 to +20.0 feed NAVD 88 in order to provide broad habitat variability for a range of environmental and hydrodynamic conditions. Target habitats in the offset floodplain area would be selected for suitability at these varied elevations and would include riparian forest, shaded riverine aquatic habitat, seasonal wetlands, and upland grasslands. Alternative 5, the APA, and Alternatives 2 and 4, are consistent with Delta Plan Policy ER P2.

- Delta Plan Policy ER P4 (23 CCR Section 5008) states that levee projects must evaluate and, where feasible, incorporate alternatives, including the use of setback levees, to increase floodplains and riparian habitats. As three of the analyzed alternatives utilize a setback levee component (Alternatives 2, 4, and 5), the project is consistent with Delta Plan Policy ER P4.

Compliance Status: Partial

WSAFCA has determined the Southport project is likely a covered action under the Delta Plan. The project has been determined to be consistent with the Delta Plan's policies and objectives. In accordance with the Delta Plan, WSAFCA will prepare and submit a Certificate of Consistency through the DSC's website prior to implementation of the project.

5.5 Local Regulations and Ordinances

In addition to the Federal and state regulatory and local plan requirements, the project may be subject to certain zoning or other ordinances and general plans of Yolo County and the City of West Sacramento. For more discussion on local plans and requirements applicable to the project, refer to the Regulatory Setting parts of the specific resource sections of interest in this document.

Chapter 6
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Chapter 7
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Stephanie Monzon	M.A. English, B.A. English; 6 years' experience	Editor
Christine McGeever	B.A. Journalism; 29 years' experience	Editor
Jennifer Greenman	M.A. English Composition, B.A. English Literature; 20+ years' experience	Editor

7.4 Other Contributors

Name	Education/Experience	Responsibility
Ric Reinhardt, P.E. (MBK Engineers)	M.S. Civil Engineering, B.S. Civil Engineering; 15 years' experience	Program Manager (consultant to WSAFCA)
Scott Shapiro, J.D., (Downey Brand)	J.D., B.S. Environmental Planning and Design; 18 years' experience	Co-Program Manager (consultant to WSAFCA)
Derek Larsen, P.E. (MBK Engineers)	Master of Business Administration, B.S. Environmental Engineering; 14 years' experience	Program Coordinator (consultant to WSAFCA)
Ben Tustison, P.E. (MBK Engineers)	M.S. Civil Engineering, B.S. Geological Engineering; 11 years' experience	Hydraulic Analyst (consultant to WSAFCA)
Blake Johnson, P.E. (HDR)		Engineering Project Manager (consultant to WSAFCA)
Michael Vecchio, P.E. (HDR)	M.S. Civil Engineering, B.S. Geological Sciences, B.A. English; 13 years' experience	Engineering Lead Designer (consultant to WSAFCA)
Christopher Bowles, P.E. (cbec)	B.S. Civil Engineering, Ph.D. Civil Engineering; 18 years' experience.	Geomorphology Lead Designer (consultant to WSAFCA)
Glenn Browning (Luhdorff & Scalmanini, Consulting Engineers)	M.S. Earth Sciences & Resources, B.A. Geology; 23 years' experience	Senior Hydrologist (consultant to WSAFCA)

Chapter 8
List of Recipients

The following elected officials and representatives, Federal, state, local agencies, private organizations, businesses, and residents of the city of West Sacramento will receive either a copy of the Final EIS or notification of document availability. Individuals who may be affected by the project or have expressed interest through the public involvement process also will be notified.

8.1 Government Departments and Agencies

8.1.1 Federal Agencies

- Federal Emergency Management Agency, Region IX
- National Marine Fisheries Service
- U.S. Army Corps of Engineers, Sacramento District
- U.S. Bureau of Reclamation, Mid-Pacific Region
- U.S. Coast Guard
- U.S. Environmental Protection Agency, Environmental Review Office (CED-2)
- U.S.D.A. Natural Resources Conservation Service
- U.S. Fish and Wildlife Service
- United States Postal Service

8.1.2 Native American Contacts

- Buena Vista Rancheria of Me-wuk Indians
- Cachil DeHe Band of Wintun Indians
- Chicken Ranch Rancheria of Me-wuk Indians
- Cortina Band of Indians
- Enterprise Rancheria of Maidu Indians
- Ione Band of Miwok Indians
- Jackson Rancheria of Me-Wuk Indians
- Shingle Springs Band of Miwok Indians
- Tsi-Akim Maidu
- United Auburn Indian Community of the Auburn Rancheria
- Wilton Rancheria
- Wintun Environmental Protection Agency
- Yocha Dehe Wintun Nation

8.1.3 State Agencies

- Air Resources Board
- California Department of Boating and Waterways
- California Department of Conservation
- California Department of Fish and Wildlife
- California Department of Parks and Recreation
- California Department of Toxic Substances Control
- California Department of Transportation, District 3
- California Department of Water Resources
- California Highway Patrol
- California Native American Heritage Commission
- Central Valley Flood Protection Board
- Central Valley Regional Water Quality Control Board
- Governor's Office of Planning and Research
- Office of Historic Preservation
- State Lands Commission

8.1.4 Elected Officials

- Christopher Cabaldon, City of West Sacramento Mayor
- Honorable Barbara Boxer, U.S. Senator
- Honorable Dianne Feinstein, U.S. Senator
- Honorable Doris Matsui, U.S. Congresswoman, District 6
- Honorable Darrell Steinberg, California State Senator, District 6
- Honorable Roger Dickinson, California Assembly member, District 7

8.1.5 Regional, County, and City

- City of West Sacramento
- City of West Sacramento City Council
- City of West Sacramento Agriculture and Natural Resources Commission
- City of West Sacramento Economic Development Advisory Council
- City of West Sacramento Planning Commission
- City of Sacramento Planning Department
- Delta Protection Commission
- Reclamation District 537
- Reclamation District 900
- Sacramento Area Flood Control Agency

- Sacramento County Clerk Recorder
- Sacramento County Planning and Environmental Review
- Sacramento Regional County Sanitation District
- Sacramento-Yolo Mosquito and Vector Control District
- West Sacramento Area Flood Control Agency
- Yolo County Agricultural Commissioner
- Yolo County Board of Supervisors
- Yolo County Clerk-Recorder
- Yolo County Environmental Health Services
- Yolo County Library
- Yolo County Planning Department
- Yolo County Transit District
- Yolo-Solano Air Quality Management District

8.2 Other Interested Parties

- American Rivers
- AT&T
- Baker Williams Engineering Group
- Blackburn Consulting
- cbec eco engineering
- Chevron Pipe Line Company
- Crocker & Crocker
- Crown Castle
- Day Carter Murphy LLP
- Defenders of Wildlife
- Downey Brand Attorneys LLP
- Embarcadero Realty Services LP
- Fenocchio Properties LLC
- Forecast Land Investment LLC
- Friends of the River
- Friends of the Swainson's Hawk
- HDR, Inc.
- Larsen, Wurzel & Associates, Inc.
- Luhdorff and Scalmanini Consulting Engineers
- MBK Engineers
- Miller Starr Regalia

- Pacific Gas and Electric Company
- Pacific-TEAC Development
- PMA, Inc.
- Sacramento Area Bicycle Advocates
- Seecon Financial and Construction Co
- Sun M Capital LLC
- Tuleyome
- Yokoyama Farm
- Yolo Audubon Society

8.3 Members of the Public

All members of the general public who requested information about the project will receive either an electronic version of the Draft EIS/EIR or notification of document availability. Additionally, those who submitted comments during the scoping process and provided complete mailing addresses and those who may be affected by the proposed project will receive notification of document availability.

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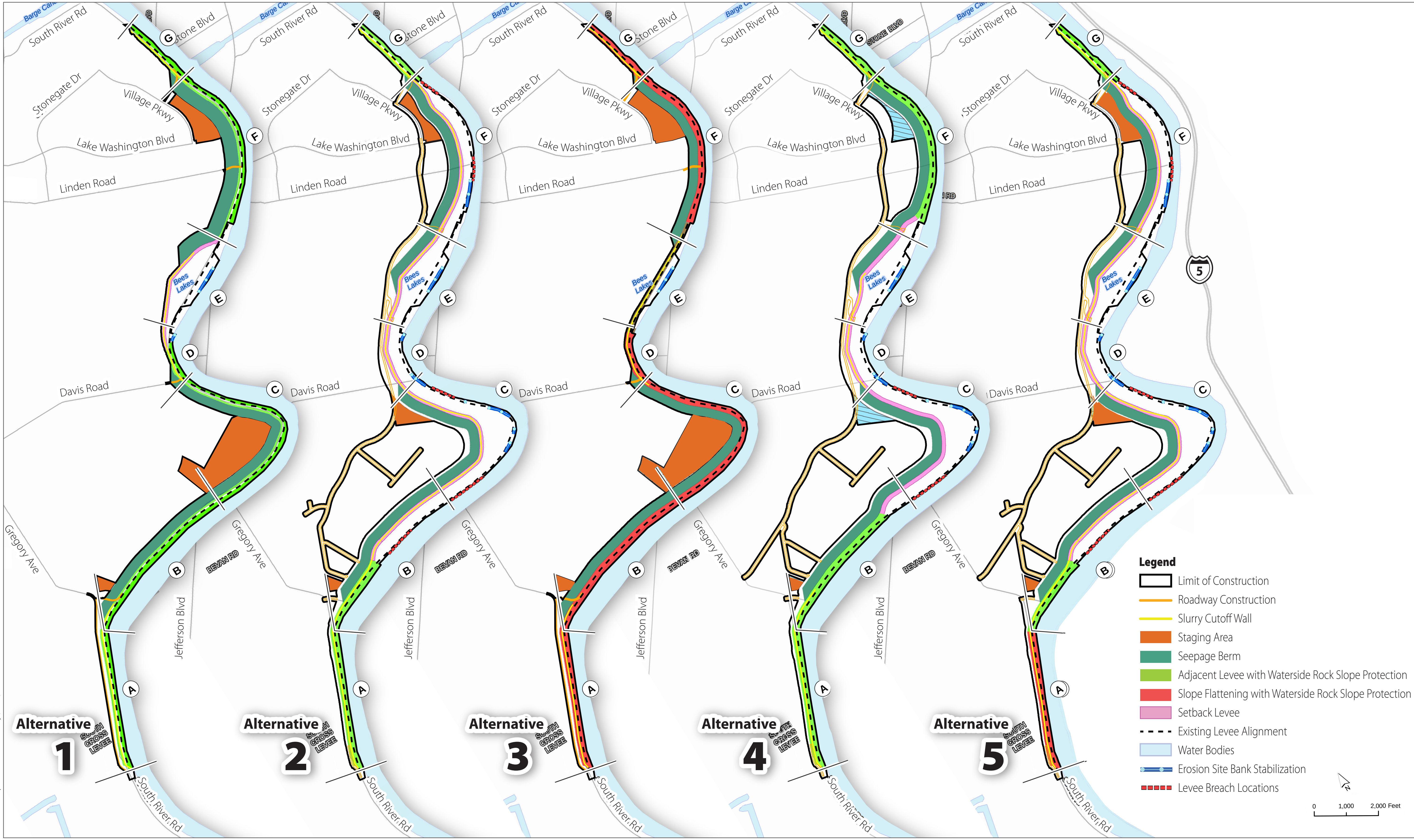
Plates



00071.11 Southport/Executive Summary (06-14) SS

Plate ES-1 (revised)
Project Alternatives

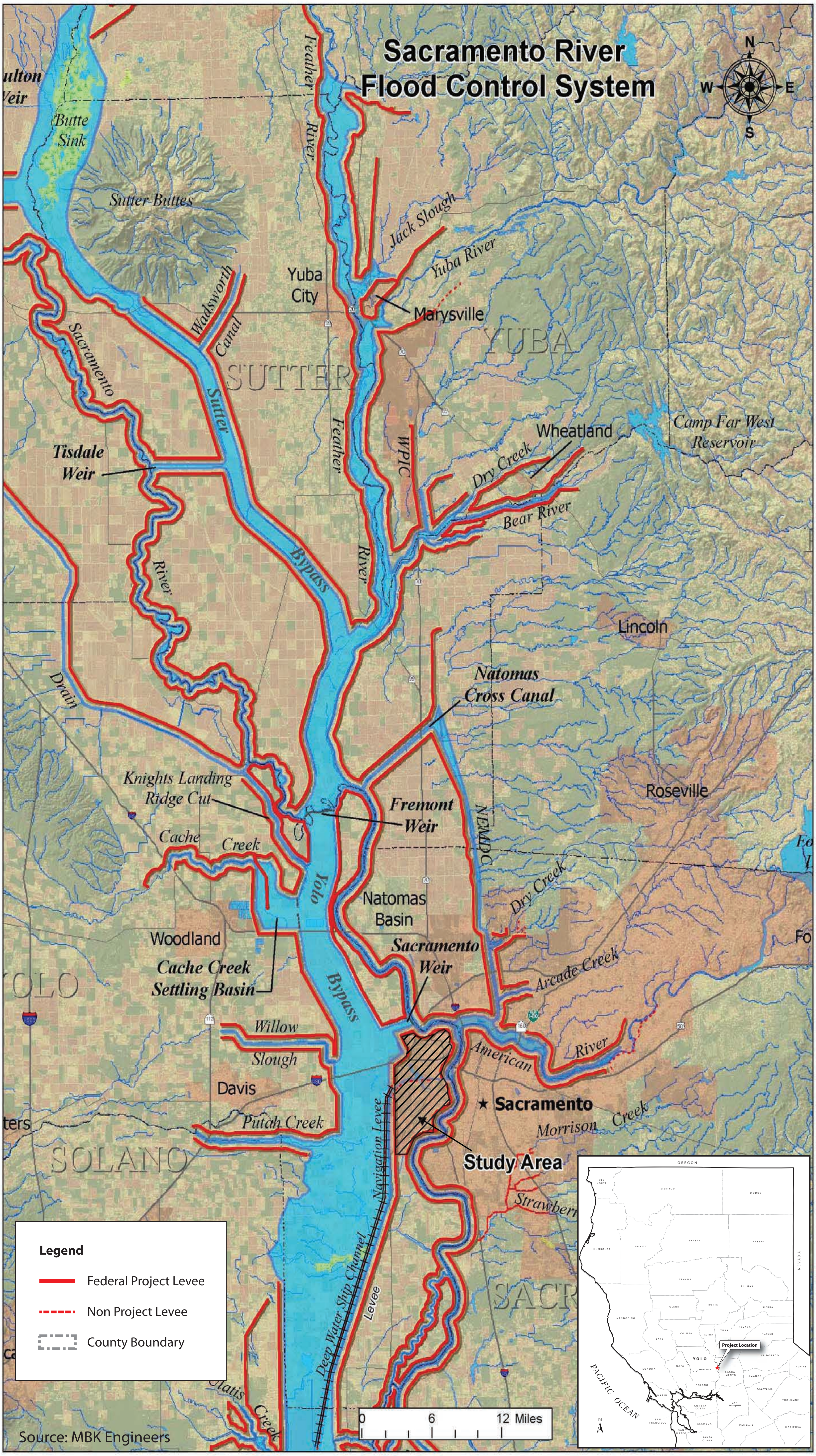


Plate 1-1
Sacramento River Flood Control Project and Regional Setting for the Study Area

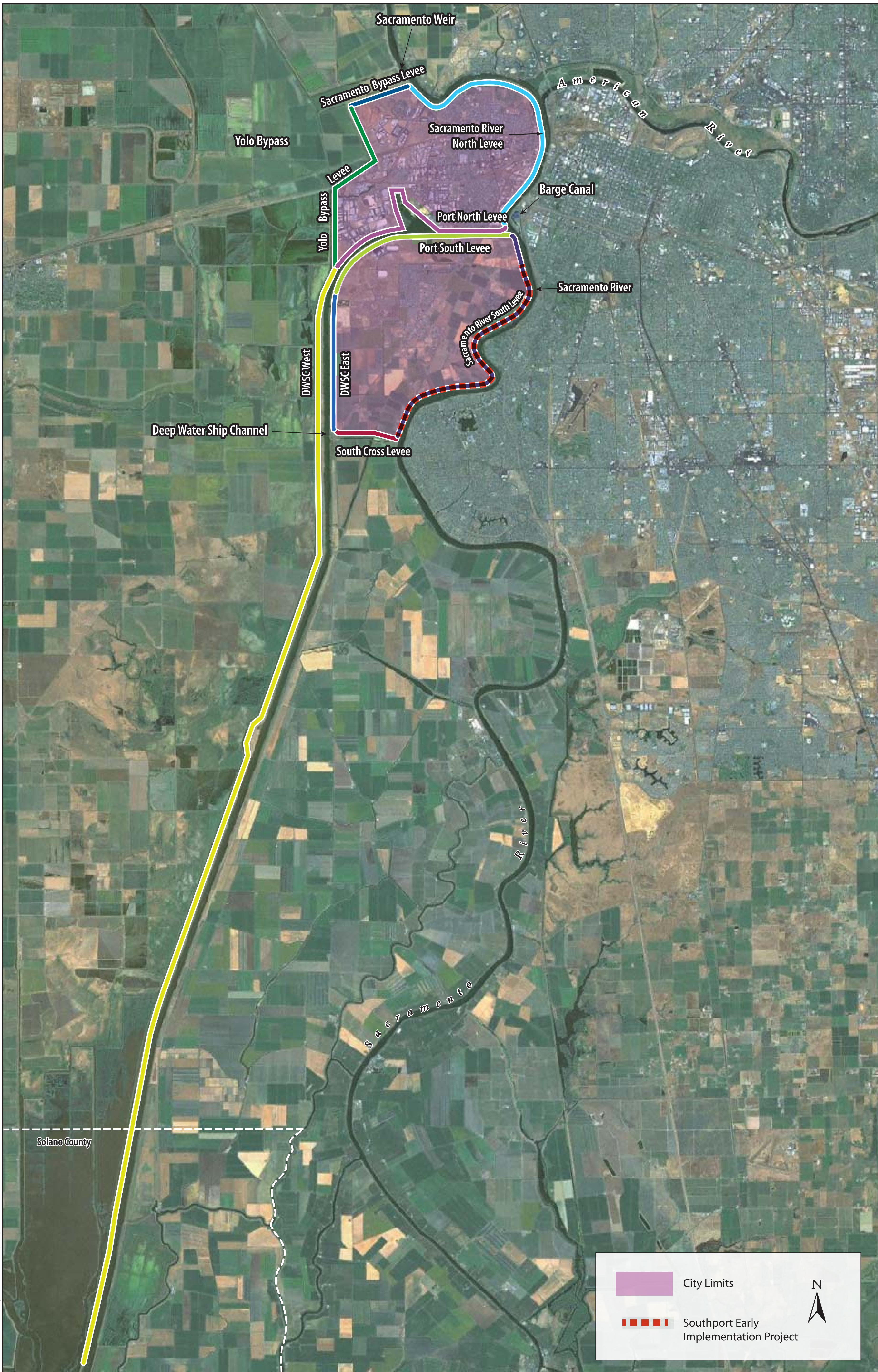


Plate 1-2
Levees Within WSAFCA Jurisdiction

State Plan of Flood Control

Lead Agency: DWR
Location: Central Valley
Goal: Guide flood management expenditures under Propositions 84 & 1E
Timeline: Complete Plan by 2014

Sacramento – San Joaquin River Basins Comprehensive Study

Lead Agency: USACE and DWR
Location: Central Valley
Goal: Flood damage reduction and ecosystem restoration
Phase: Study completed in 2002; laid groundwork for several current efforts, including State Plan of Flood Control

Sutter Basin Feasibility Study

Lead Agency: USACE, CVFPB and SBFCA
Location: Sutter and Butte counties
Goal: Reduce flood risk for communities in Sutter and Butte counties
Phase (Timeline): Feasibility Study and EIS (2013)

Natomas Levee Improvement Program

Lead Agency: SAFCA
Location: Natomas Area, Sacramento
Goal: Achieve 200-year flood protection for the Natomas Basin
Timeline: Construct 100-year protection by 2014, 200-year protection by 2016

West Sacramento Levee Improvements Program

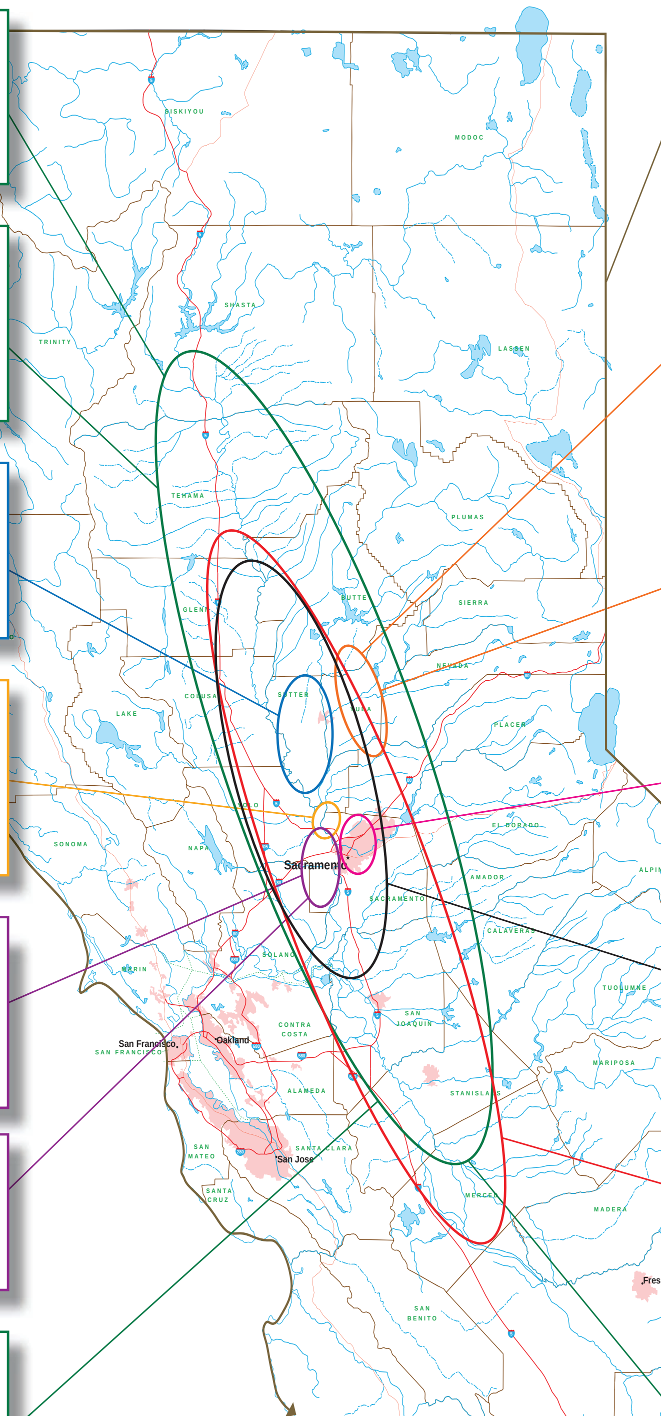
Lead Agency: WSAFCA
Location: West Sacramento
Goal: Achieve 200-year flood protection for the City of West Sacramento
Phase (Timeline): 3 projects completed in 2008 and 2011; next project targeted to begin construction in 2014

West Sacramento Project

Lead Agency: USACE, CVFPB, and WSAFCA
Location: West Sacramento
Goal: Comprehensive analysis of the City's levee system
Phase (Timeline): GRR (2013)

Central Valley Flood Protection Plan

Lead Agency: DWR and CVFPB
Location: Central Valley and Sacramento-San Joaquin Delta
Goal: Develop strategies for comprehensive system-wide flood improvements
Timeline: Plan adopted in 2012; complete protection measures by 2025



FloodSAFE

Lead Agency: DWR
Location: State-wide, but primarily Central Valley
Definition: Multi-faceted program to improve public safety through integrated flood management.
Timeline: Complete foundational objectives by 2025

Yuba Basin Project

Lead Agency: USACE, DWR, and YCWA
Location: Yuba, Feather, Bear rivers Watershed
Goal: Increase flood protection for communities of Linda, Olivehurst, Arboga, Marysville, and unincorporated areas of Yuba County
Phase (Timeline): GRR (2013)

Three Rivers Levee Improvement Authority Projects

Lead Agency: TRLIA
Location: Southern Yuba County
Goal: Increase flood protection for communities in southern Yuba County
Phase (Timeline) The work was completed in 2010

American River Common Features Project

Lead Agency: USACE, DWR, and SAFCA
Location: Sacramento metropolitan area
Goal: Reduce flood risks for the City of Sacramento
Phase (Timeline): GRR (2013)

Sacramento River Bank Protection Project

Lead Agency: USACE and DWR
Location: SRFCP
Goals: Federal program to correct levee erosion issues
Phase (Timeline): Phase II EIS (2013)

PL 84-99 Rehabilitation Assistance of Flood Control Works

Lead Agency: USACE and DWR
Location: Central Valley and Sacramento-San Joaquin Delta
Goals: Federal program to provide emergency levee repairs
Timeline: Ongoing

Levee Collaborative

Lead Agency: USACE and DWR
Location: Central Valley
Goals: Develop short- and long-term plans to achieve system-wide compliance with Corps standards for the State Flood System in the Central Valley
Timeline: Ongoing

ACRONYMS

WSAFCA - West Sacramento Area Flood Control Agency
USACE - U.S. Army Corps of Engineers
SBFCA - Sutter-Butte Flood Control Agency
DWR - Department of Water Resources
SAFCA - Sacramento Area Flood Control Agency
SRFCP - Sacramento River Flood Control Project
YCWA - Yuba County Water Agency
CVFPB - Central Valley Flood Protection Board
TRLIA - Three Rivers Levee Improvement Authority

Graphics ... 00071.11 HDR Southport\Admin Draft III (04-13)SS

Plate 1-3
Major Flood Risk Management Efforts in the Sacramento Valley

Looking northeast from S. River Road toward a rural residence and agricultural lands

Looking southwest from S. River Road toward agricultural lands.

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Plate 1-4
Southport Project Site Photos

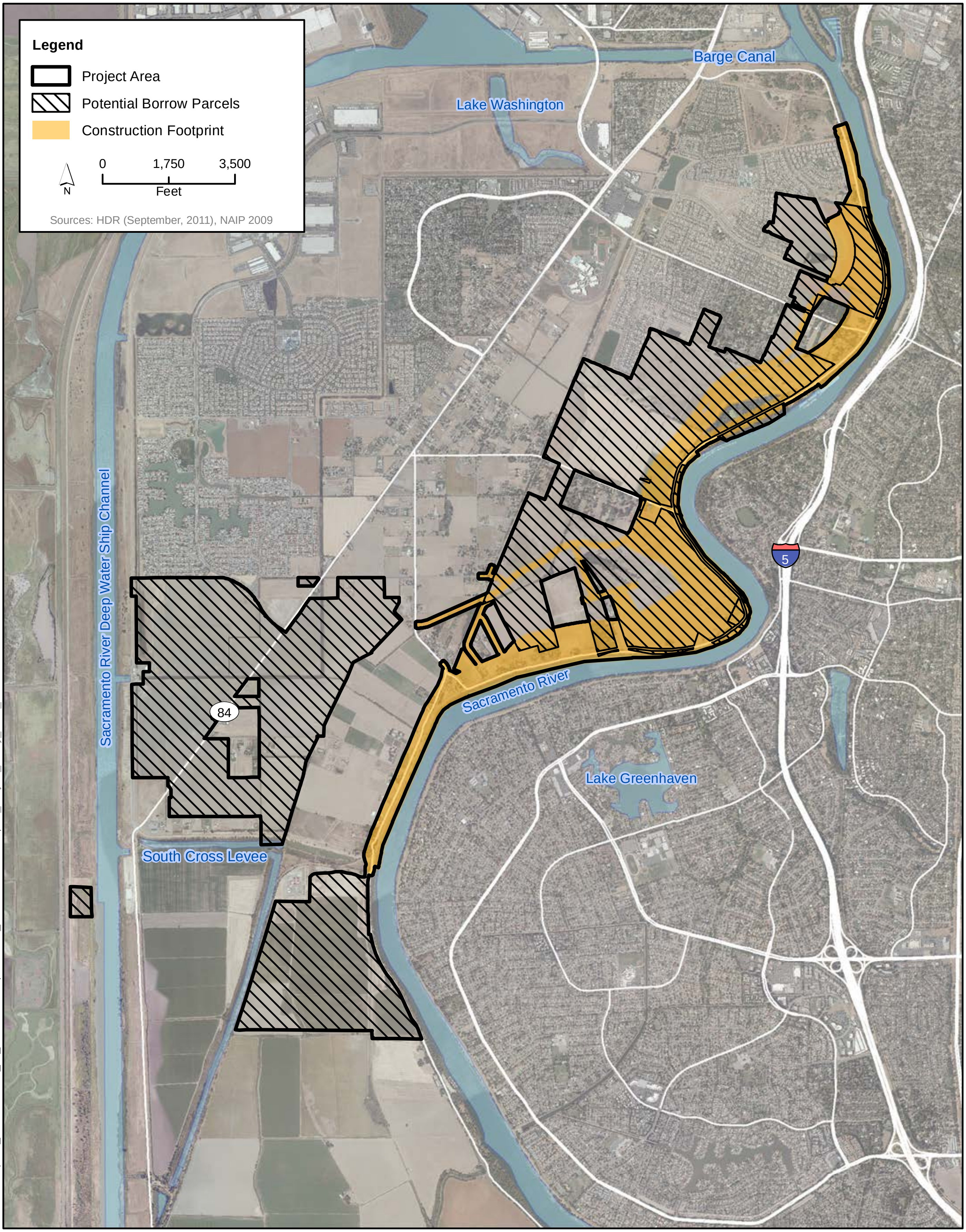

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Plate 1-5
Southport Project Area

Levee seepage is when water moves away from the river channel, either below or through the levee and surrounding land surface (see diagram below). Two main factors contribute to seepage:

- high water pressure within the river (such as during periods when the river is near flood-stage), and
- pervious earth material within and underlying the levee.

The combination of high water pressure and pervious material can be evident in sand boils and water seepage on the land-side of the levee. Under severe conditions, the clay blanket on the land side may be ruptured and the increased flow of the under-seeping water undermines the levee, causing the levee to breach or collapse.

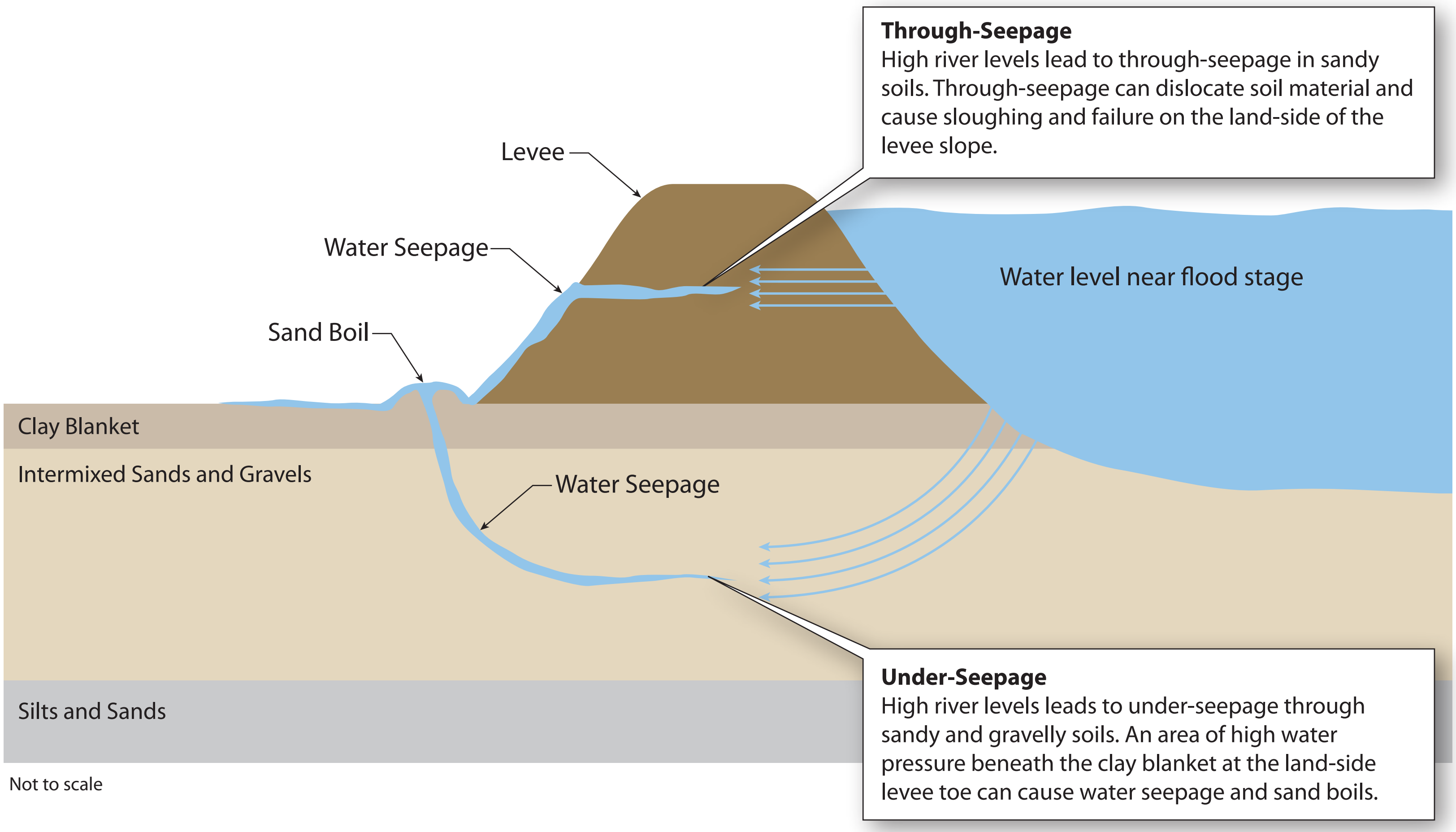

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Plate 2-1a
Levee Seepage

Typical Levee Deficiencies

- Unstable Slopes - irregular or overly steepened slopes compromise the levee structure
- Erosion - water flow, wakes, and waves damage the levee by removing soil
- Vegetation and other Encroachments - this can hinder levee monitoring and maintenance, and raise water surface elevation

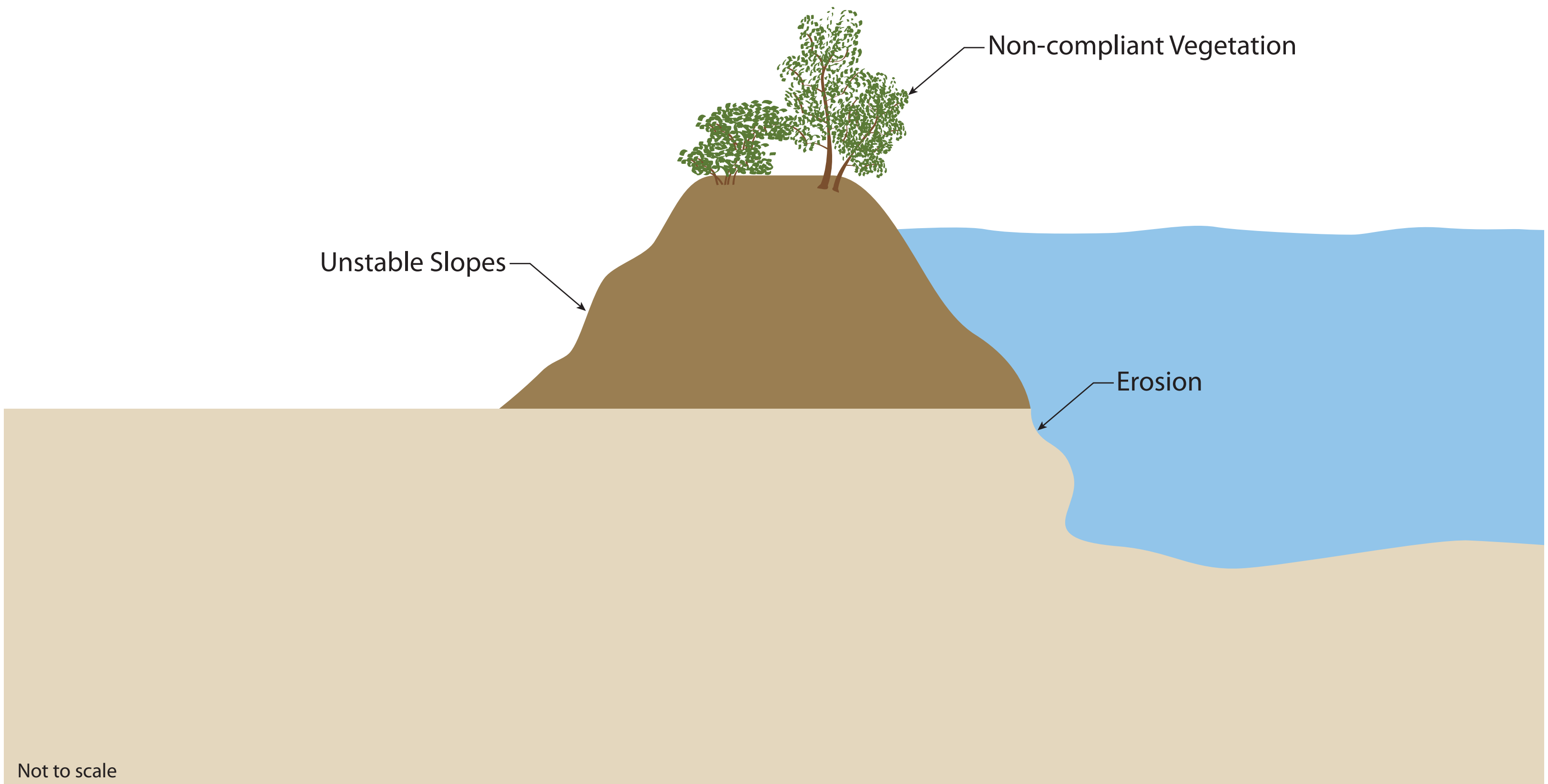

Plate 2-1b
Other Typical Levee Deficiencies

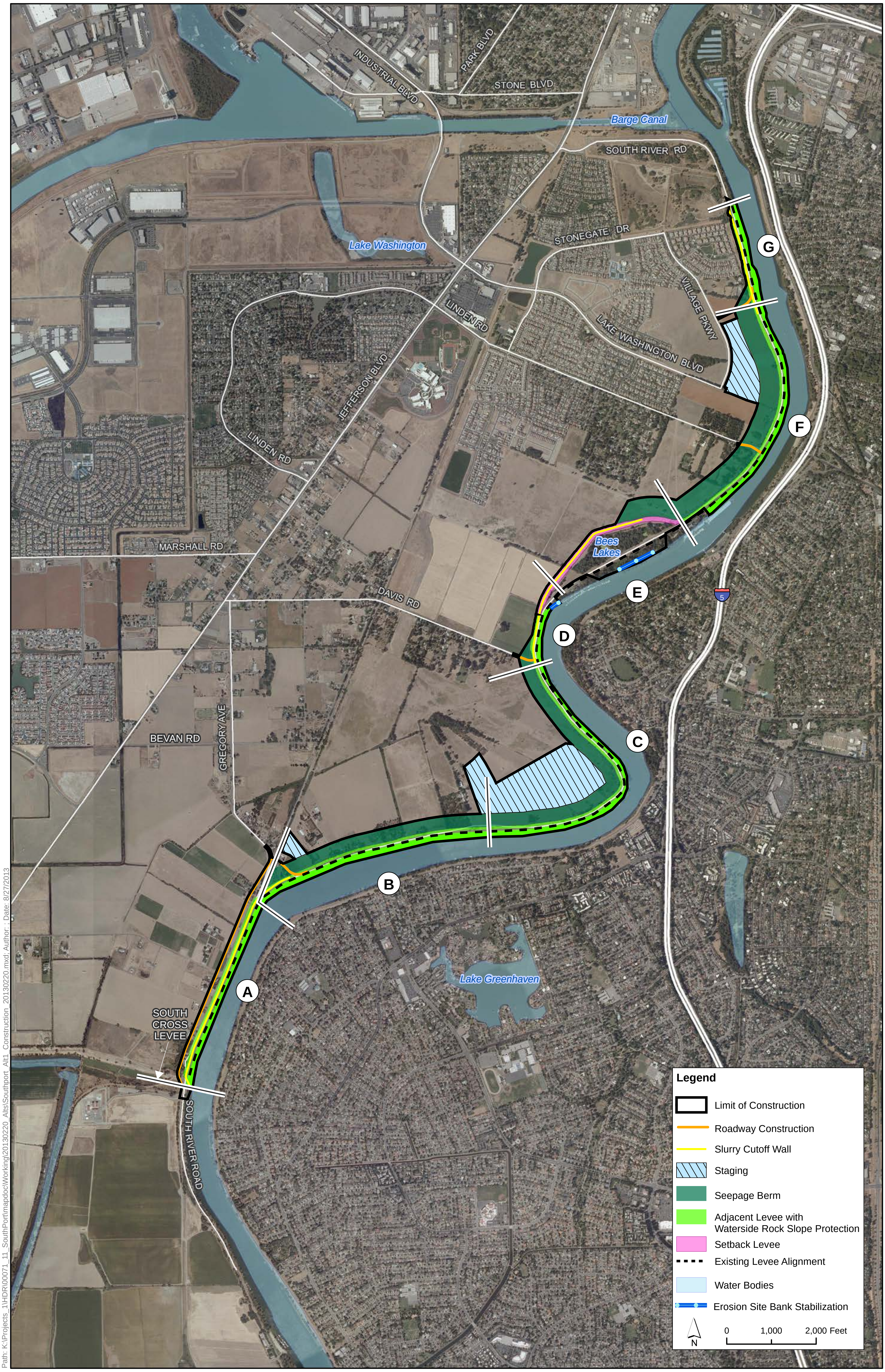

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Plate 2-2a
Southport Sacramento River Early Implementation Project Construction Components - Alternative 1

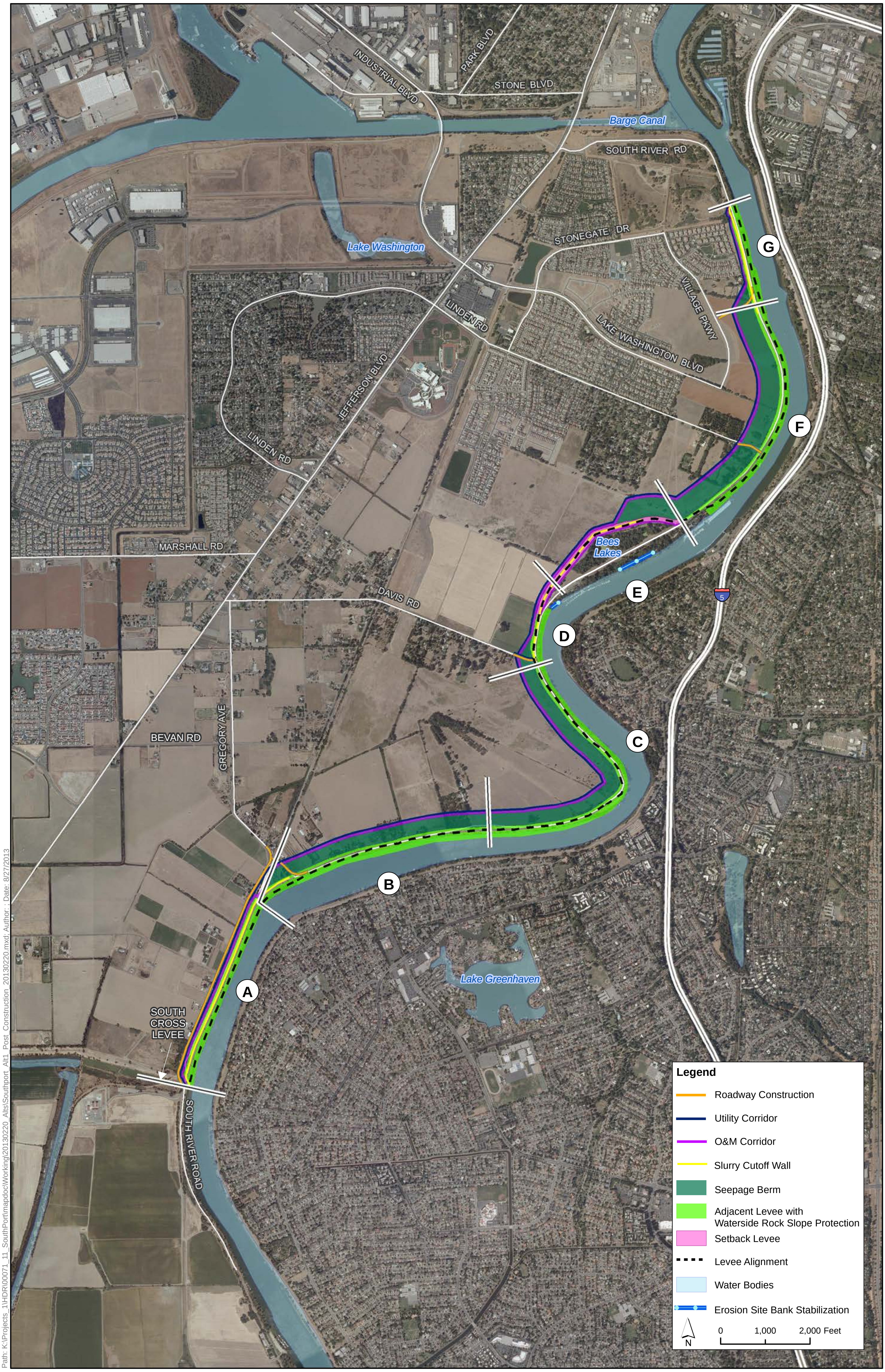

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Plate 2-2b
Southport Sacramento River Early Implementation Project Post-Construction Conditions - Alternative 1

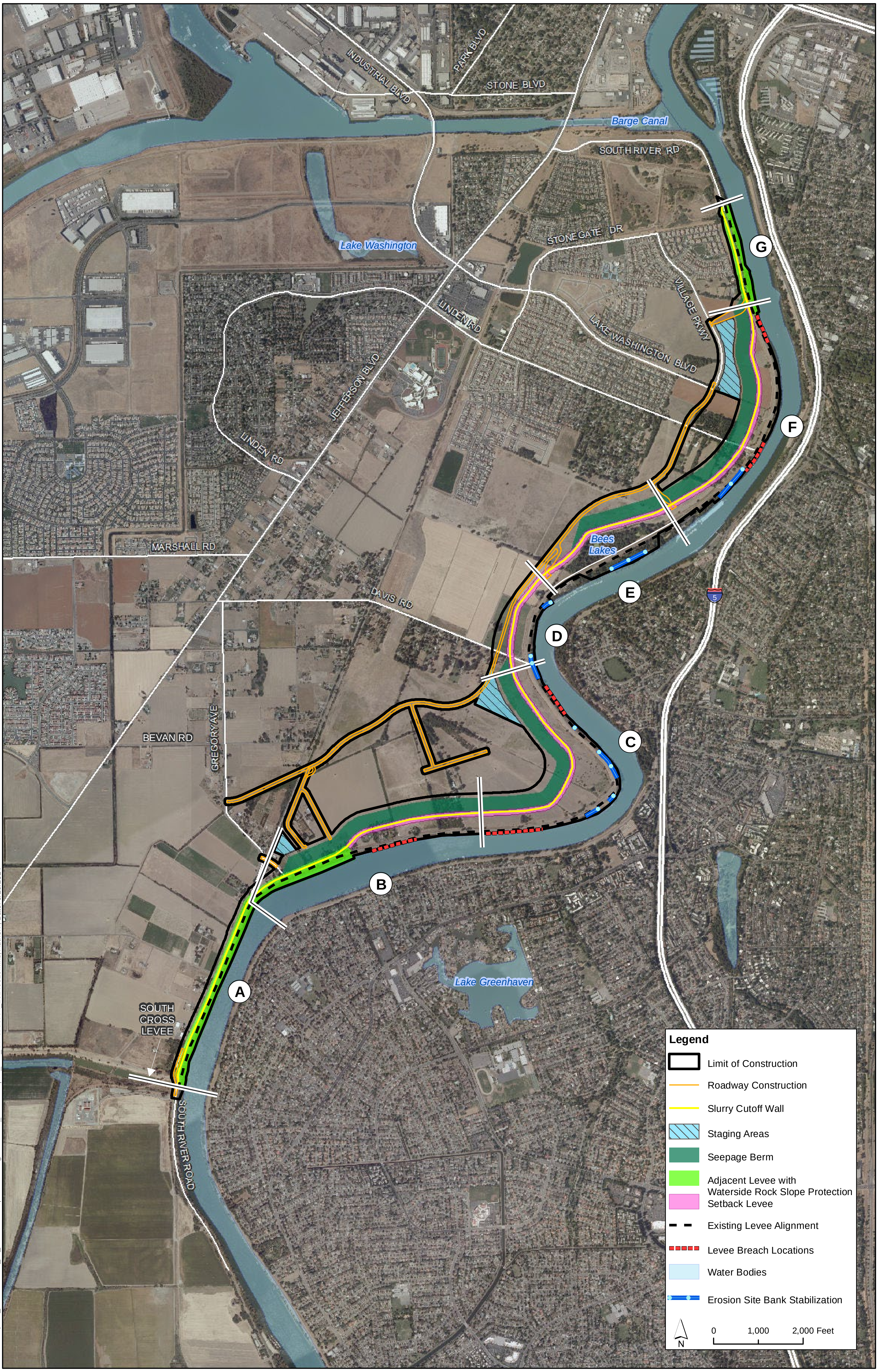

Plate 2-3a (revised)
Southport Sacramento River Early Implementation Project Construction Components - Alternative 2

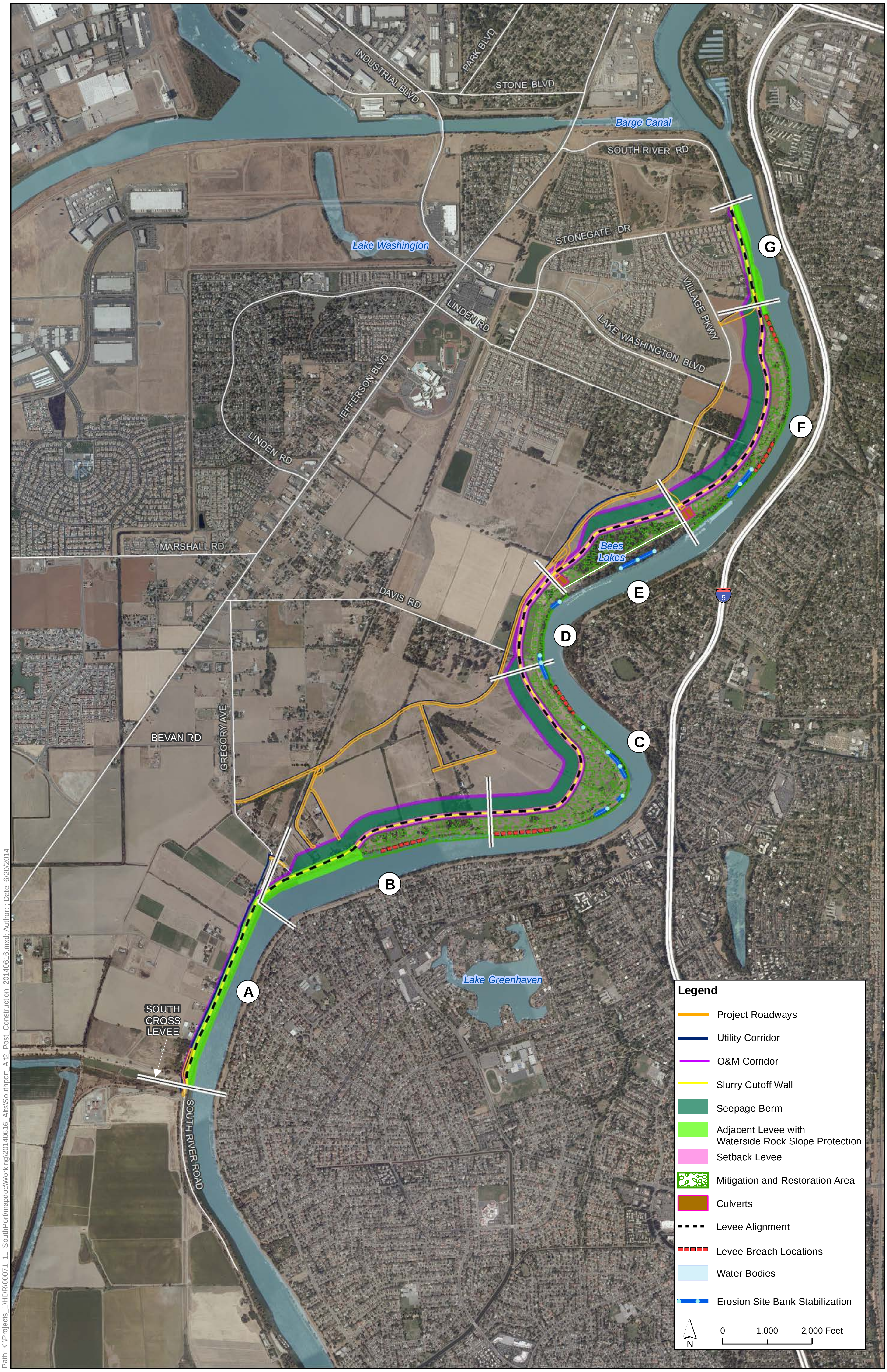

Plate 2-3b (revised)
Southport Sacramento River Early Implementation Project Post-Construction Conditions - Alternative 2

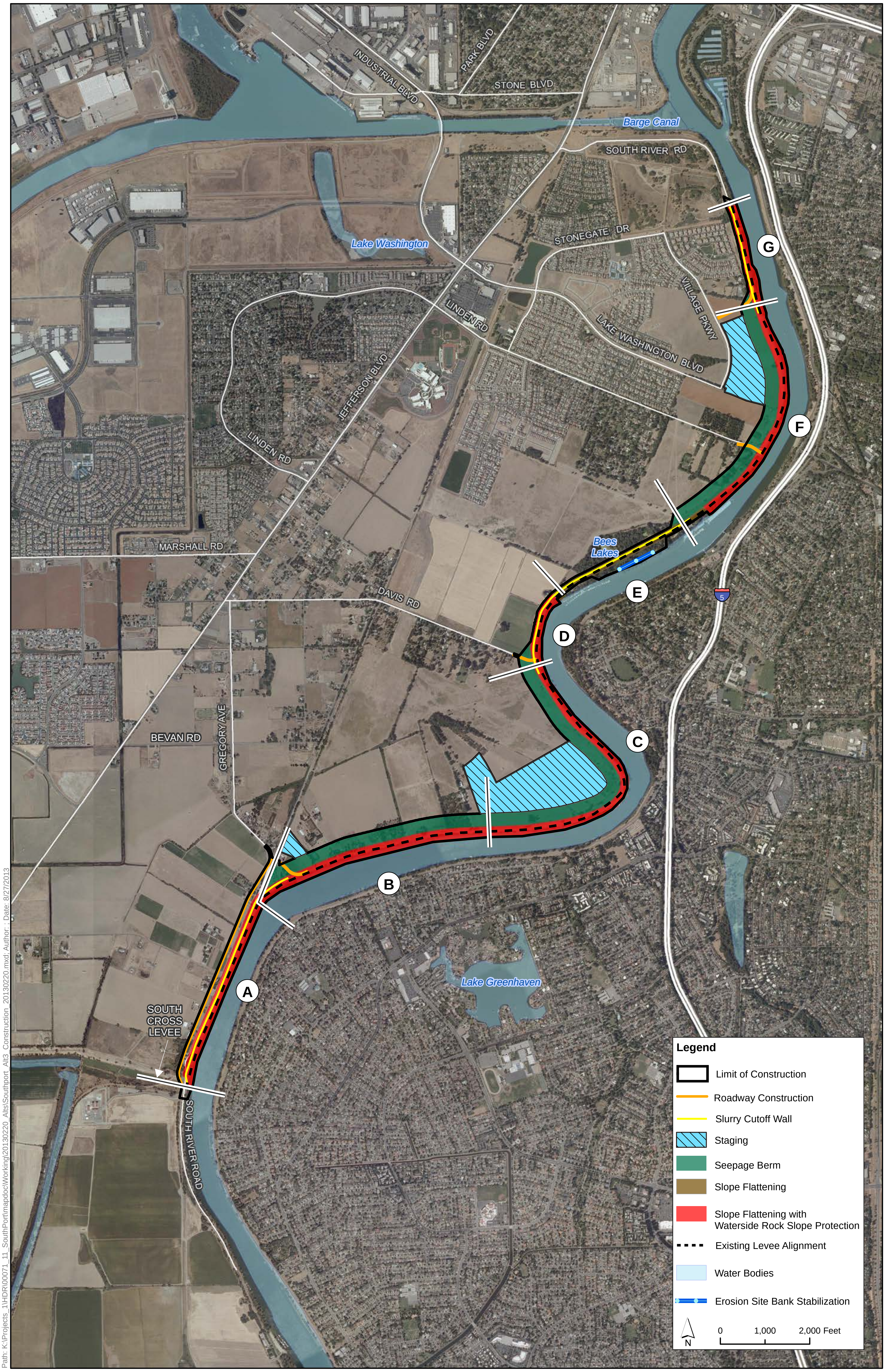

Plate 2-4a
Southport Sacramento River Early Implementation Project Construction Components - Alternative 3

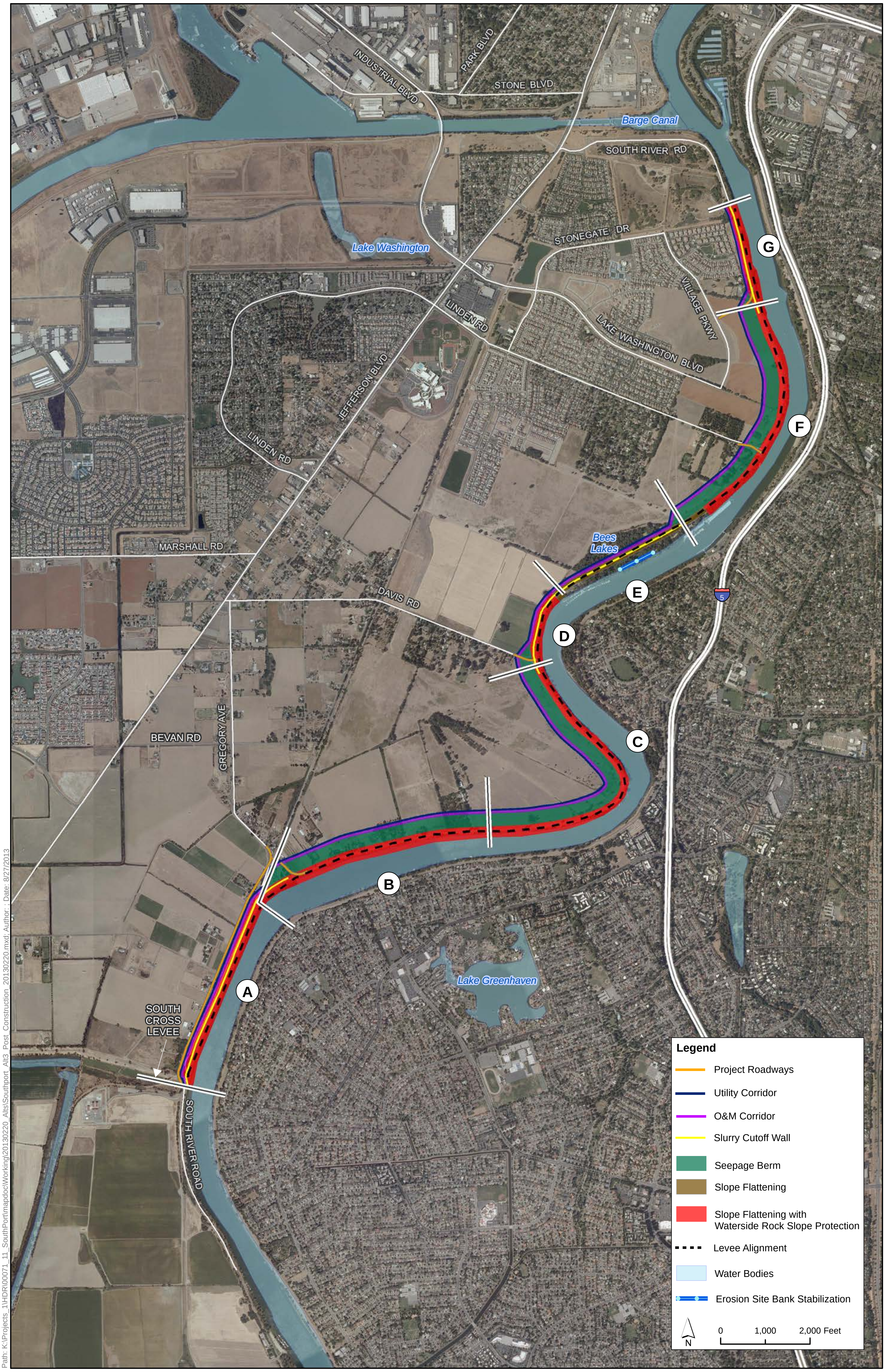

Plate 2-4b
Southport Sacramento River Early Implementation Project Post-Construction Conditions - Alternative 3

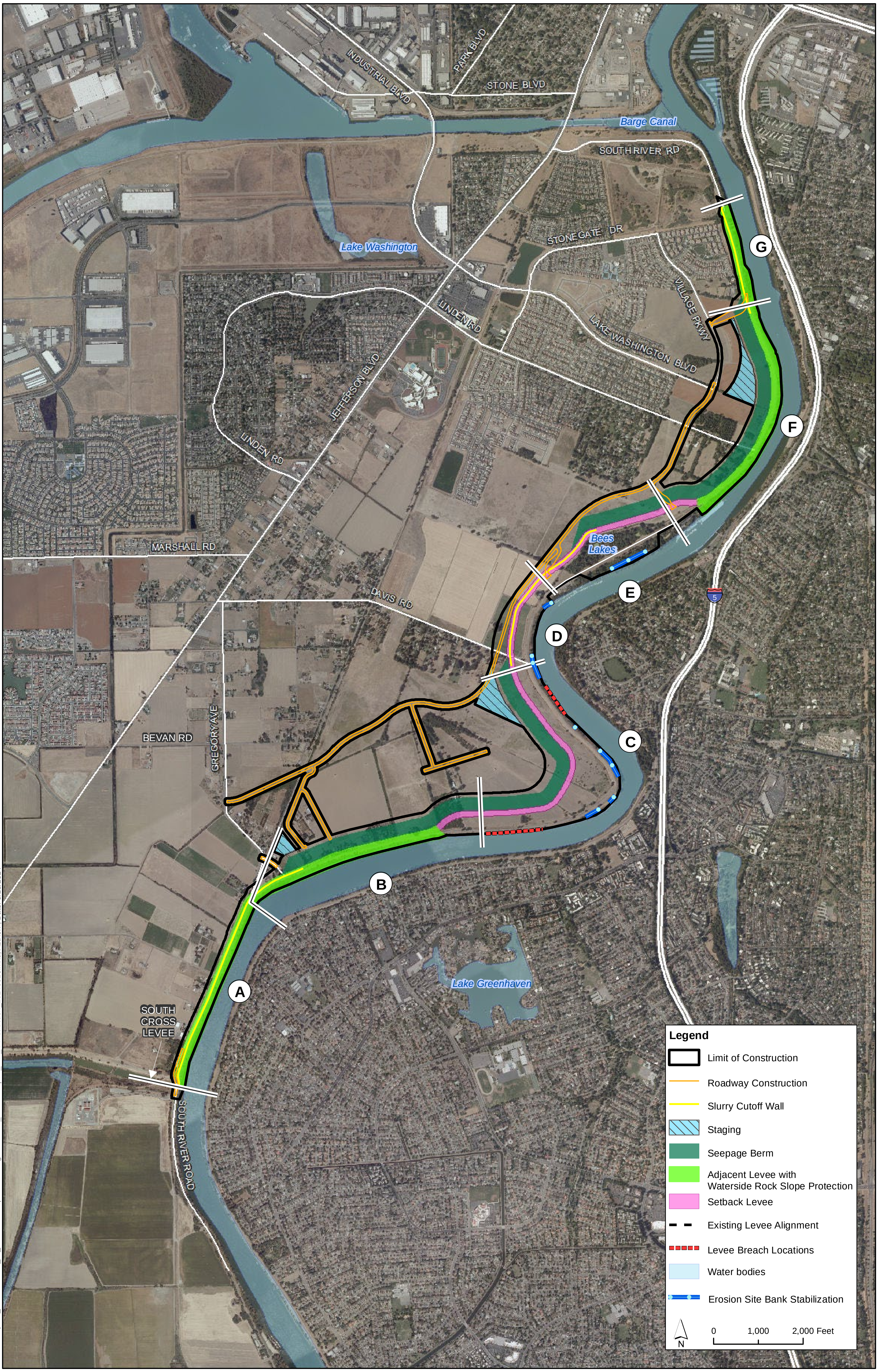

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Plate 2-5a (revised)
Southport Sacramento River Early Implementation Project Construction Components - Alternative 4

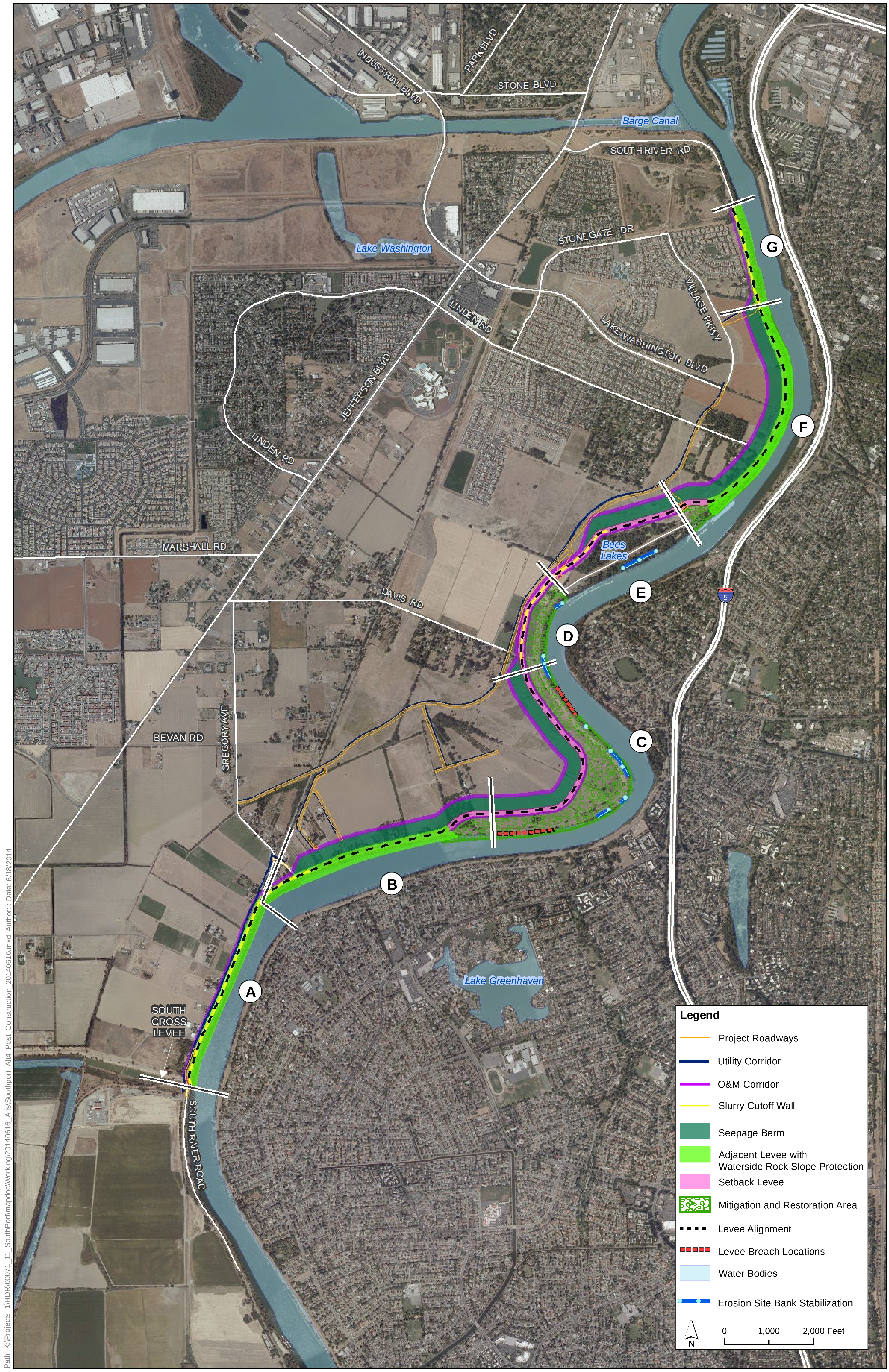

Plate 2-5b (revised)

Southport Sacramento River Early Implementation Project Post-Construction Conditions - Alternative 4

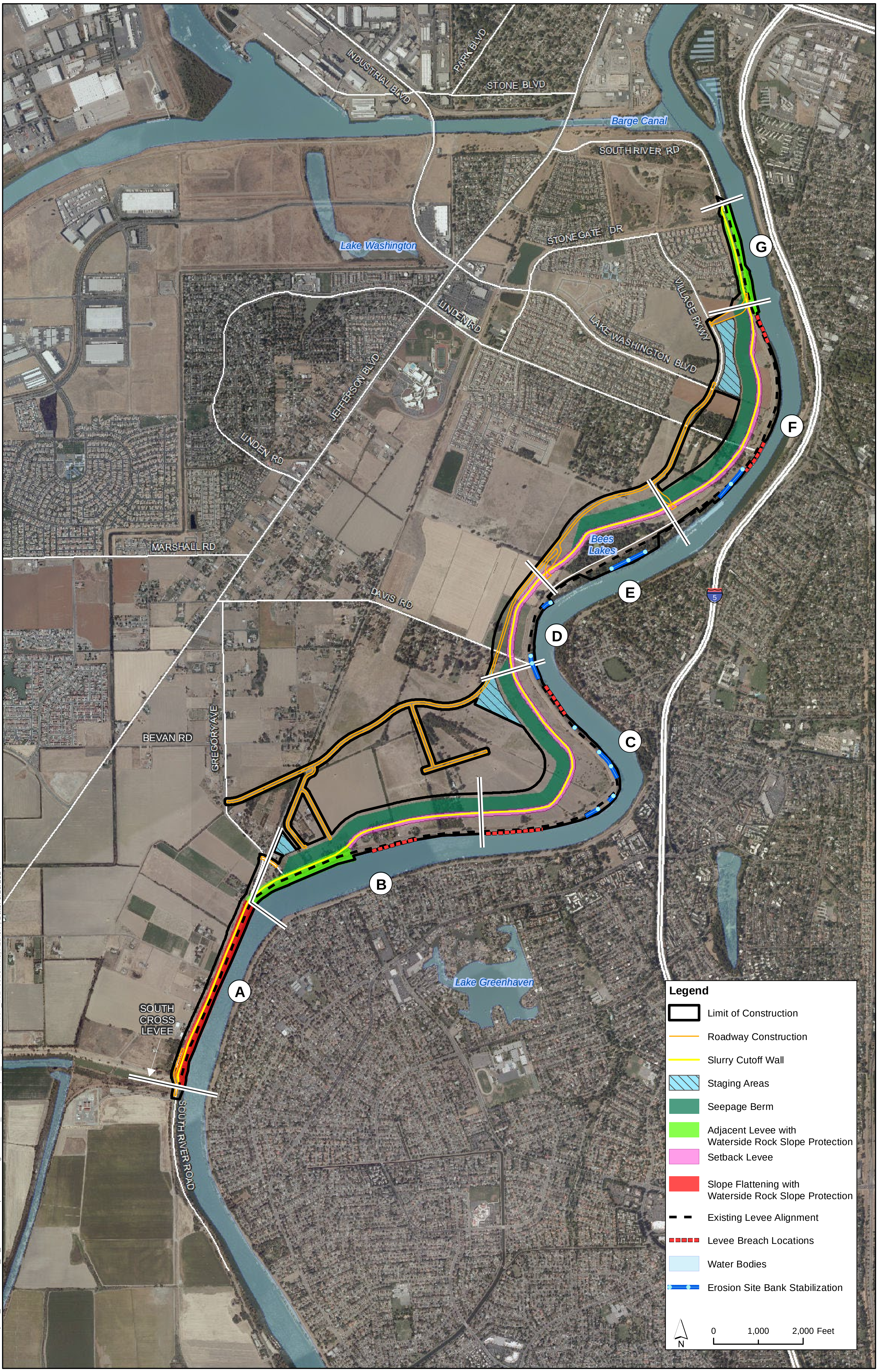

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Plate 2-6a (revised)
Southport Sacramento River Early Implementation Project Construction Components - Alternative 5

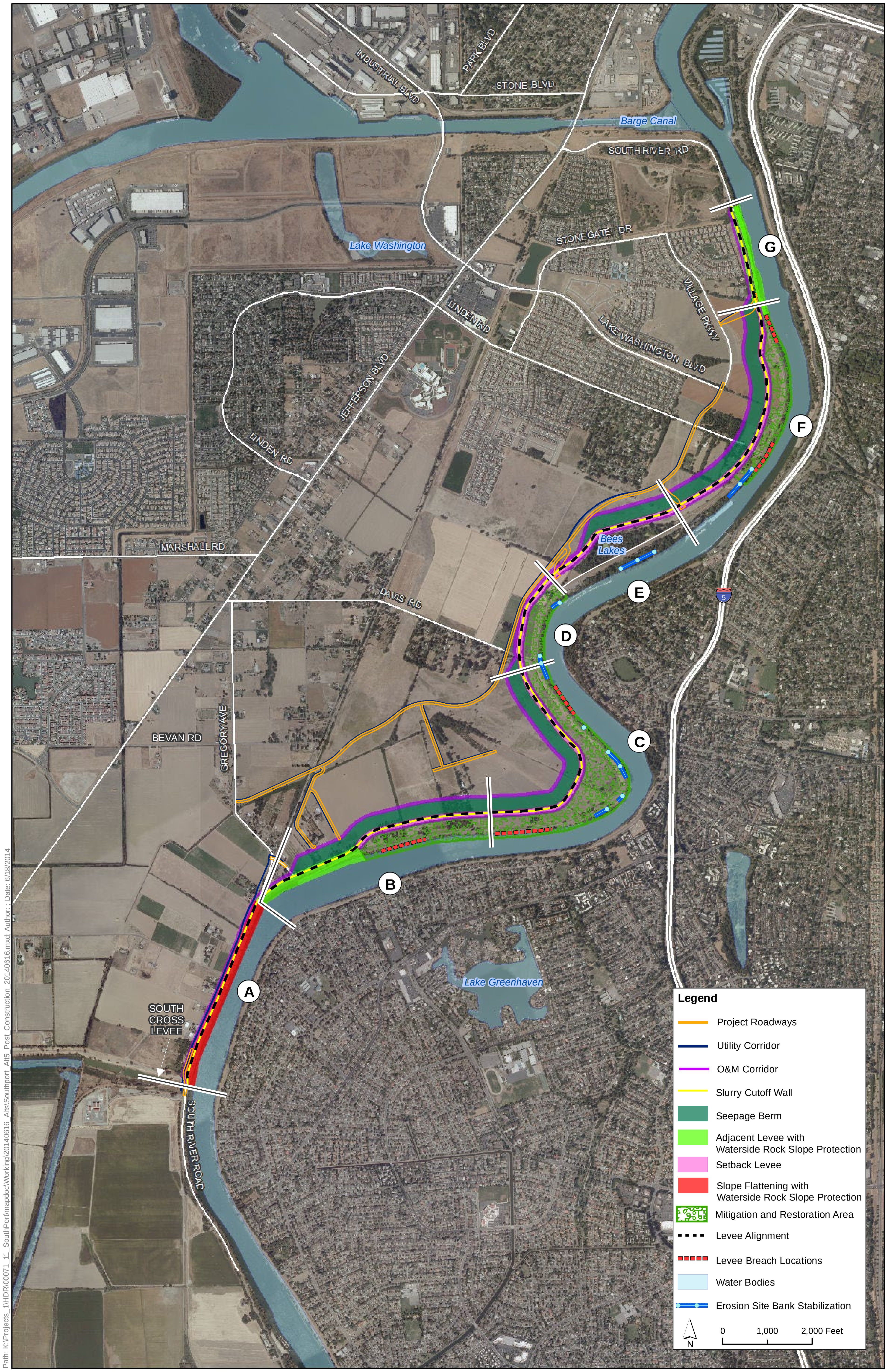


Plate 2-6b (revised)
Southport Sacramento River Early Implementation Project Post-Construction Conditions - Alternative 5

Concept

Water pressure is contained and dispersed by a thickened soil layer.

Details

- Berm is typically one-fourth the height of the levee.
- Berm may extend 300′ from the levee.
- Landside toe of berm may include optional relief trench.

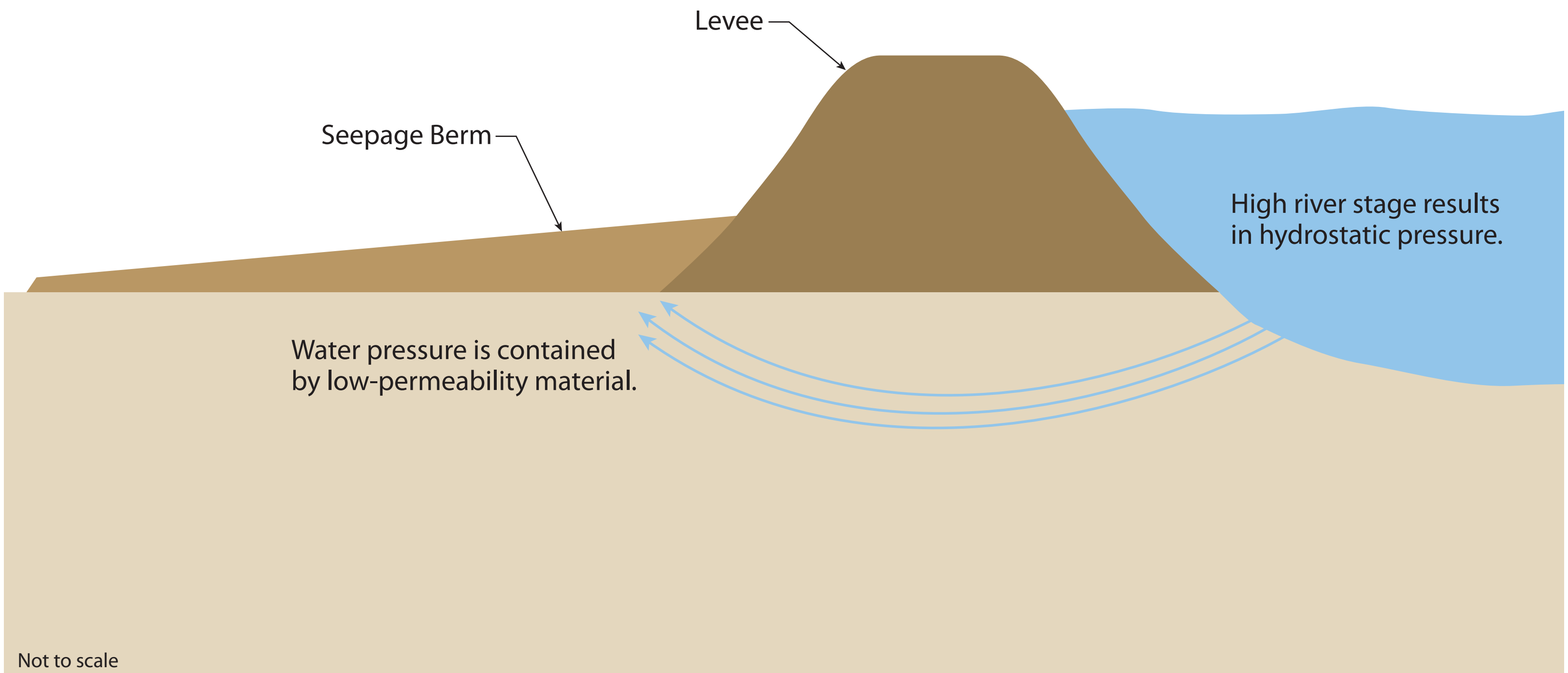


Plate 2-7
Seepage Berm

Concept

Through-seepage is controlled by a low-permeability wall constructed within the levee cross section.

Details

- Constructed via conventional slot trench, deep soil mixing or jet grouting method.
- Wall is approximately 3′ wide and up to 140′ deep.
- Wall is often capped with a clay core.

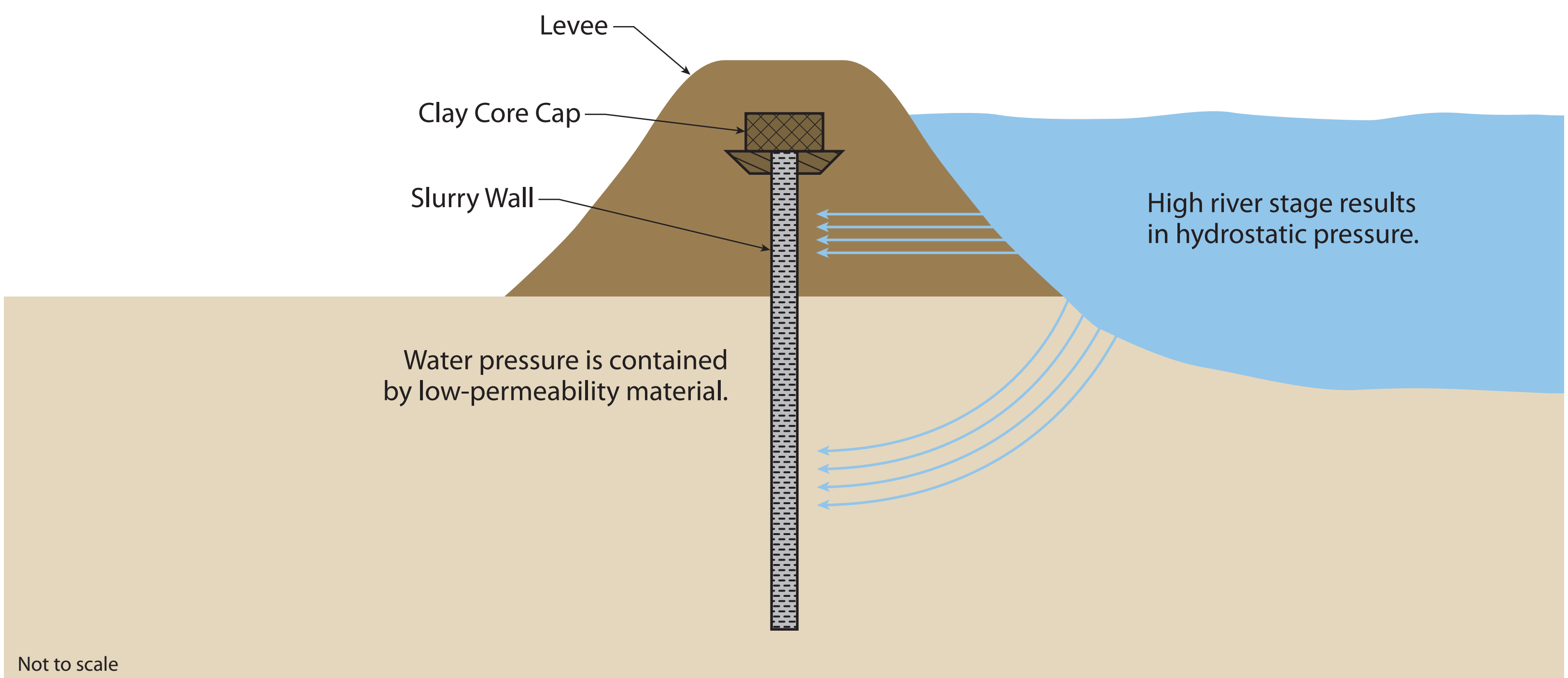


Plate 2-8
Slurry Cutoff Wall

Plate 2-9
Deep Soil Mixing

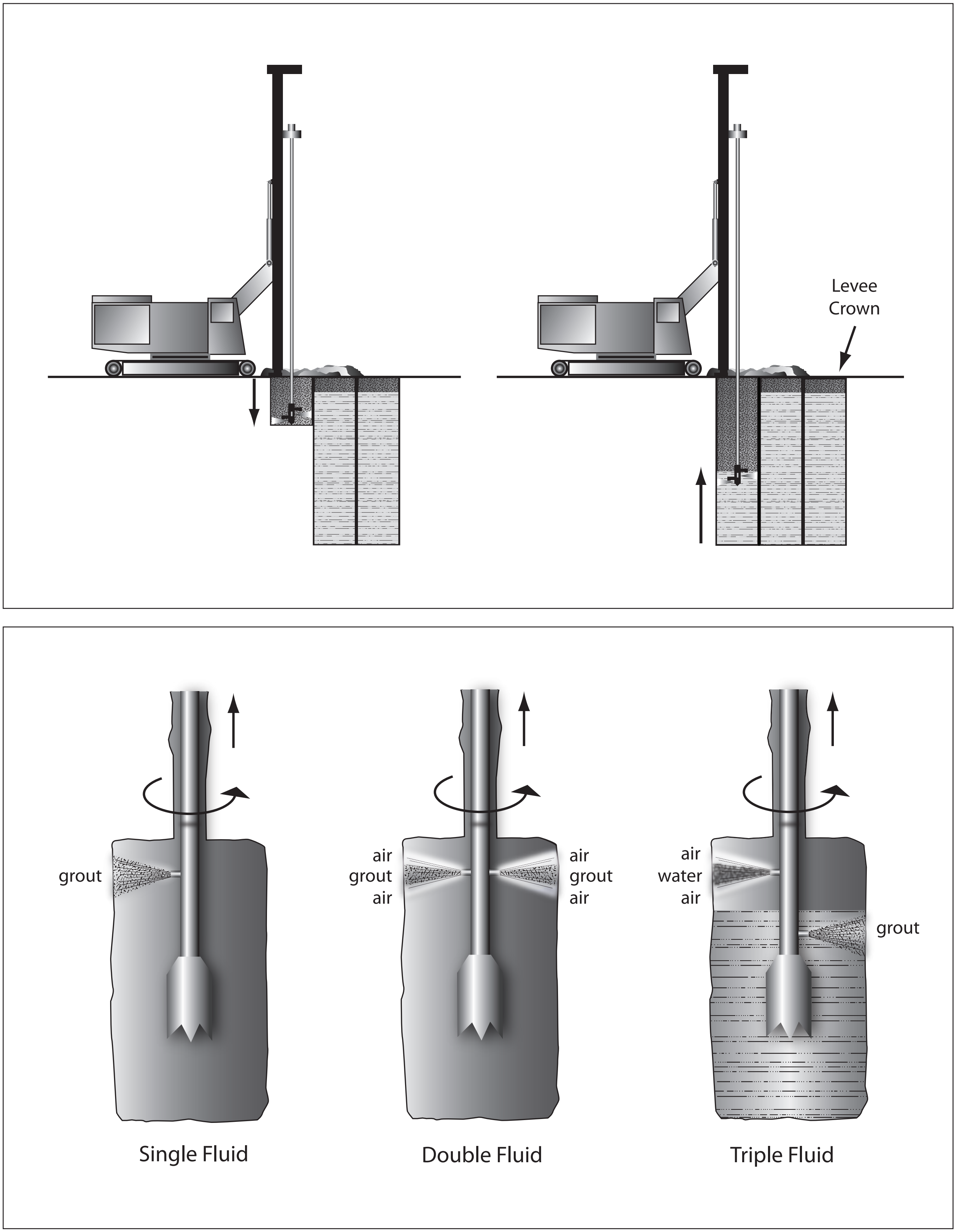


Plate 2-10
Jet Grouting Diagrams

Concept

Water pressure is relieved via passive wells, which direct water discharge into a collection system.

Details

- Wells are drilled near levee toe, approximately 80′ deep.
- Well spacing is approximately 50′-100′.

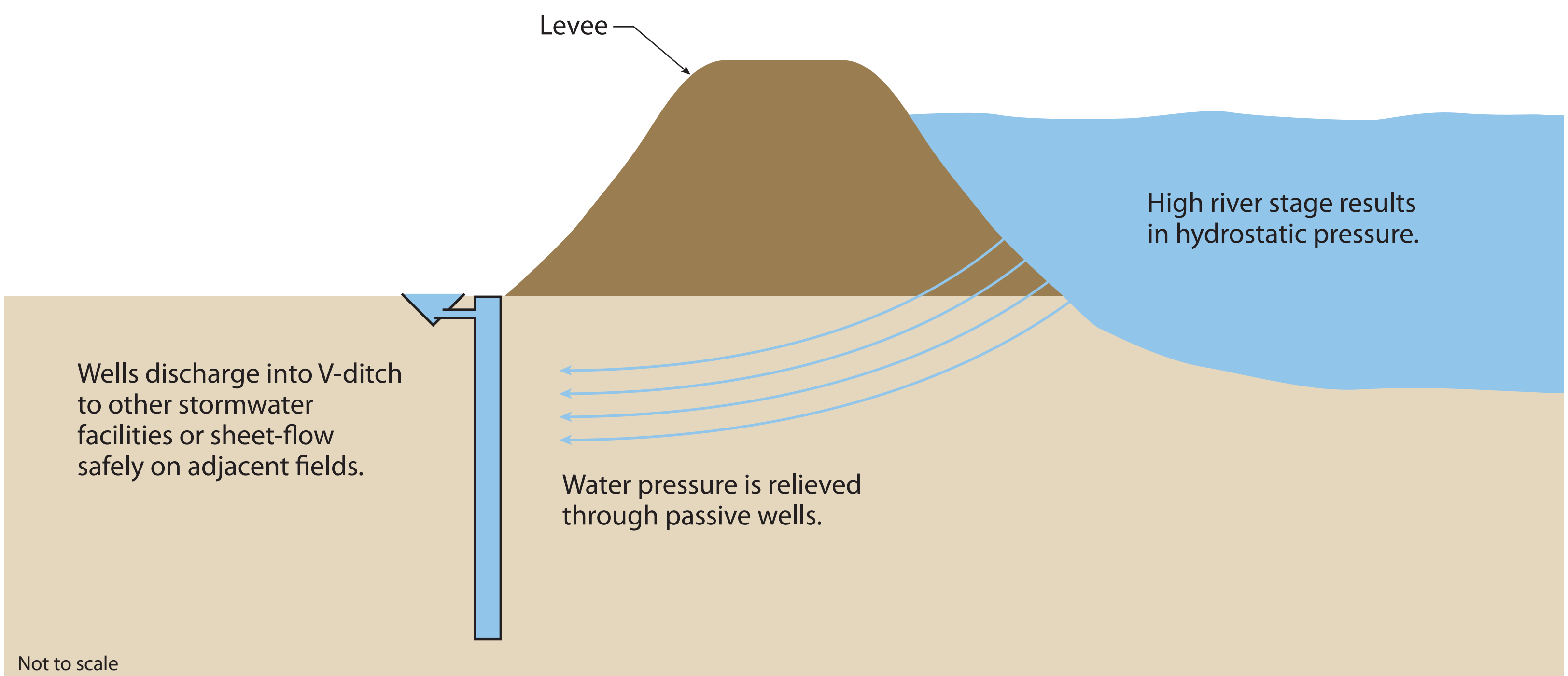


Plate 2-11
Relief Well

Concept

Flatter slopes are more stable and less susceptible to erosion.

Details

- Slopes are repaired by reforming material on the landside (and waterside if necessary) to create flatter slopes.
- New material will meet current standards.

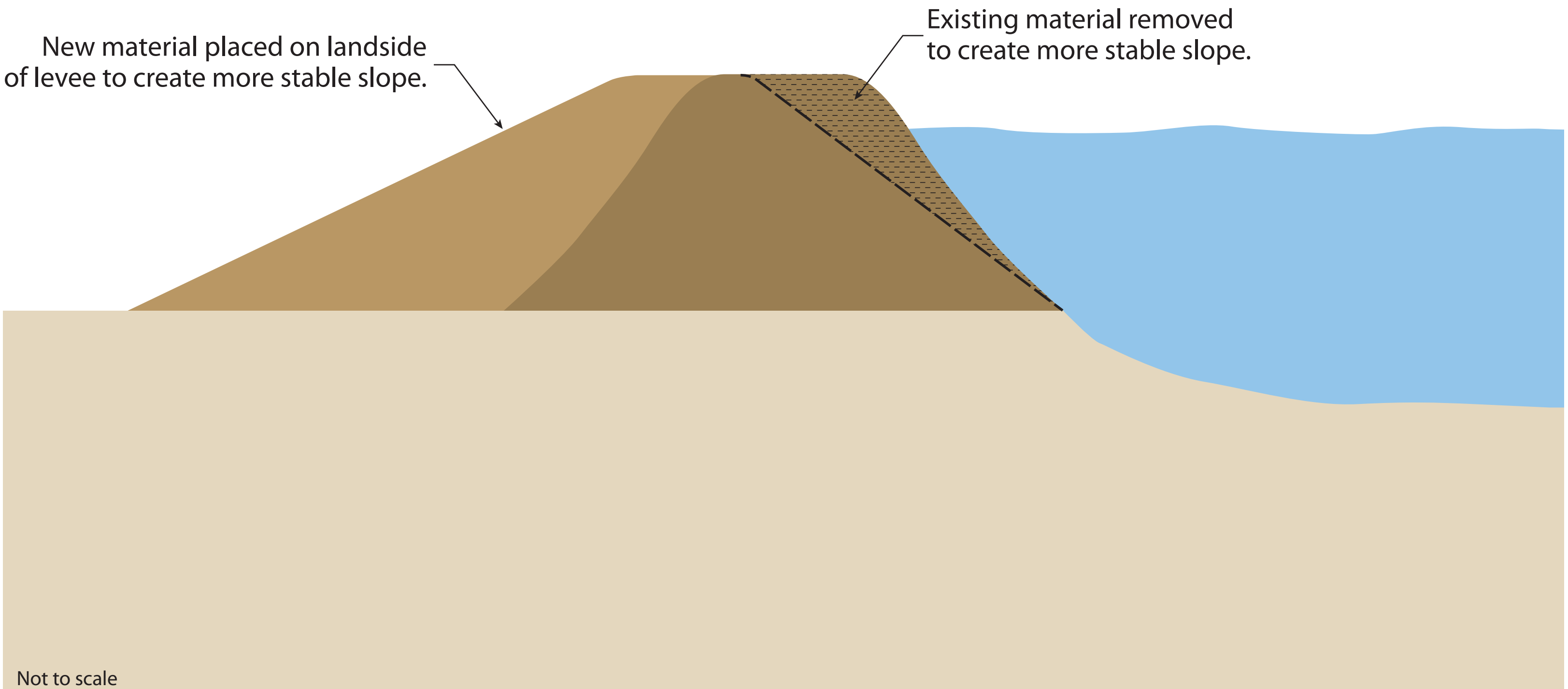


Plate 2-12
Slope Flattening

Concept

A new embankment strengthens the existing levee and enlarges the slopes.

Details

- The crown of the levee would increase landside, with a 3:1 slope to existing ground.
- When the new embankment is added, the levee centerline shifts landward

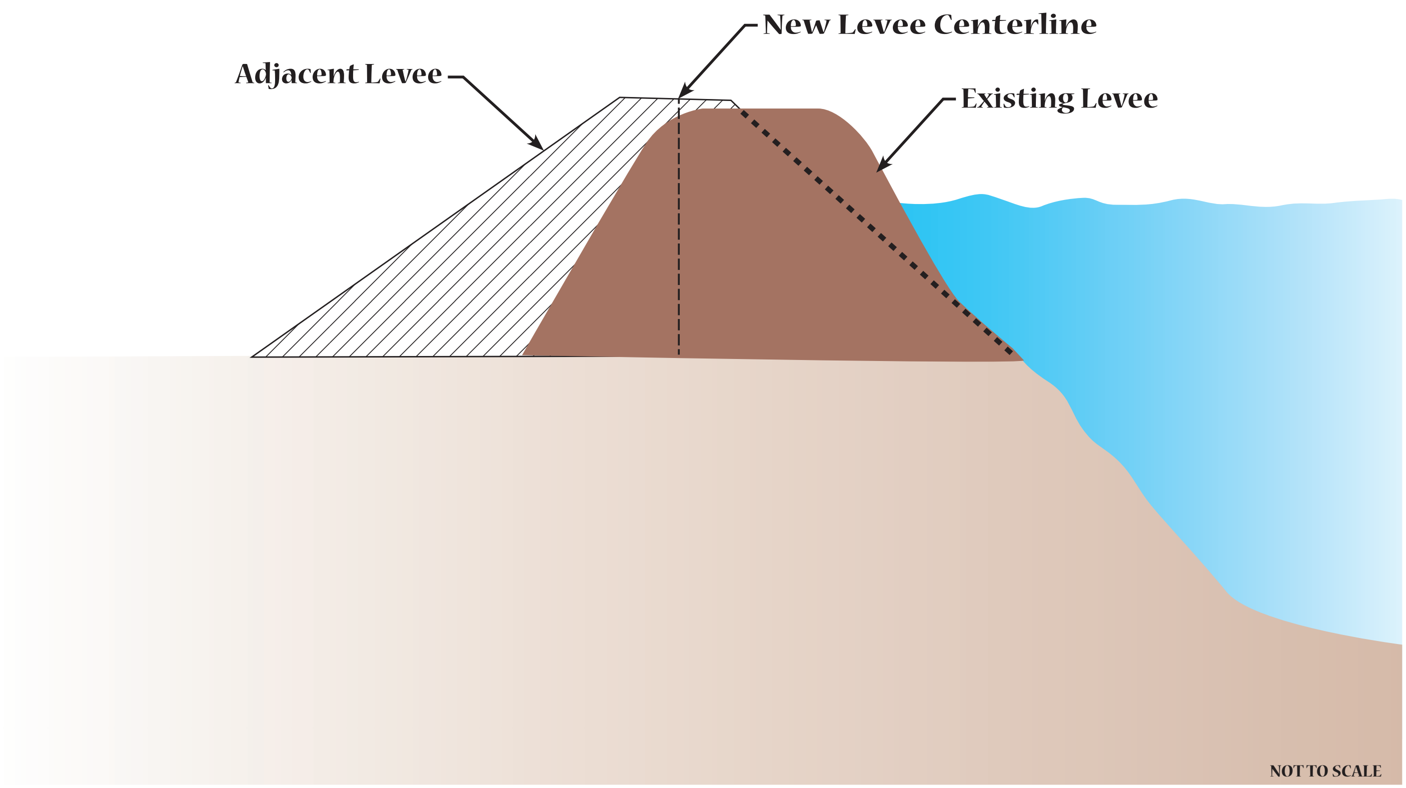


Plate 2-13
Adjacent Levee

Concept

Water-side erosion is prevented by placement of rock.

Details

- Rock is typically 8″-18″ in diameter, placed in a 30″ layer.
- Rock could be covered by soil and/or vegetation.

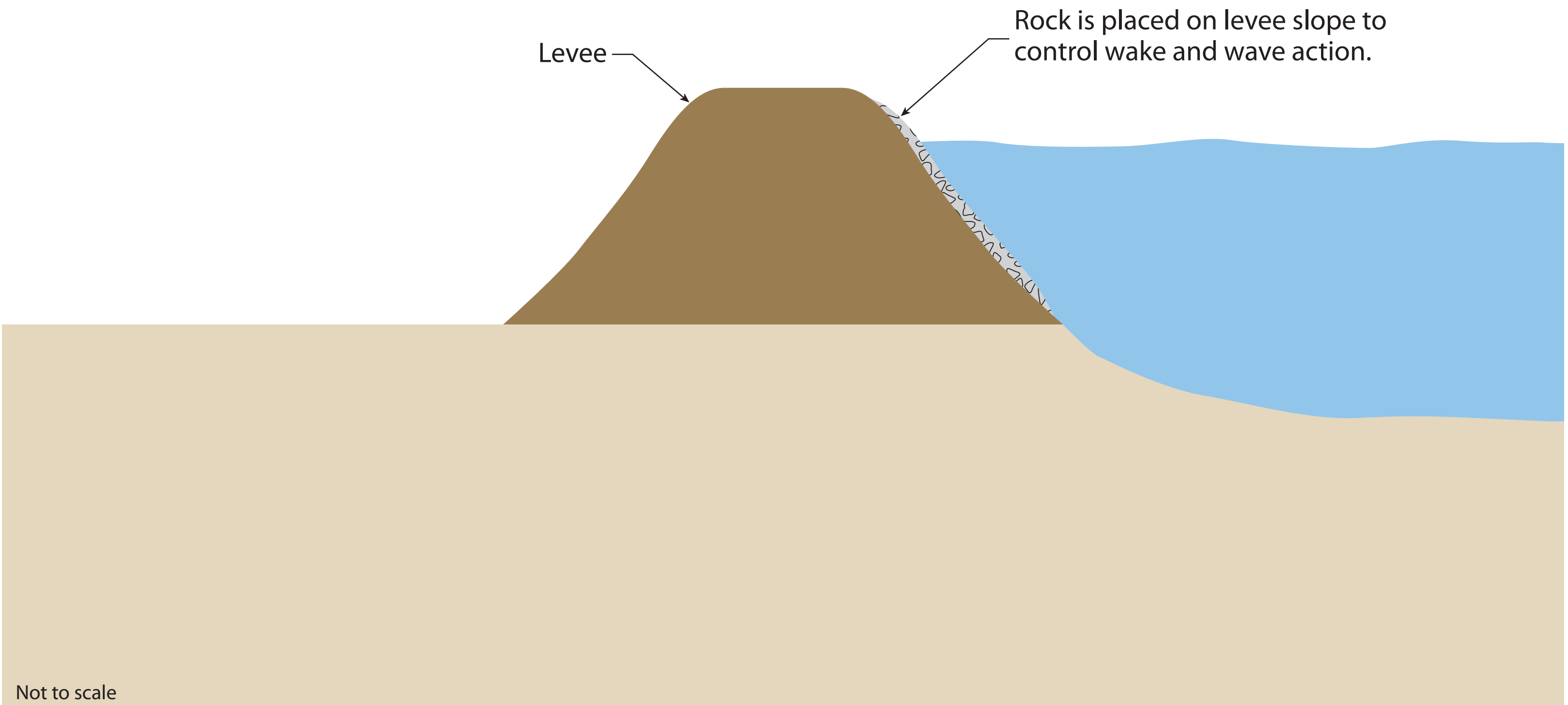


Plate 2-14
Rock Slope Protection

Concept

A new levee is built toward the landside of an existing levee where the existing levee is not readily repairable or where more flooding capacity is desired.

Details

- New levee is built to current standards.
- Old levee will not be maintained for flood protection. It maybe breached for habitat creation.

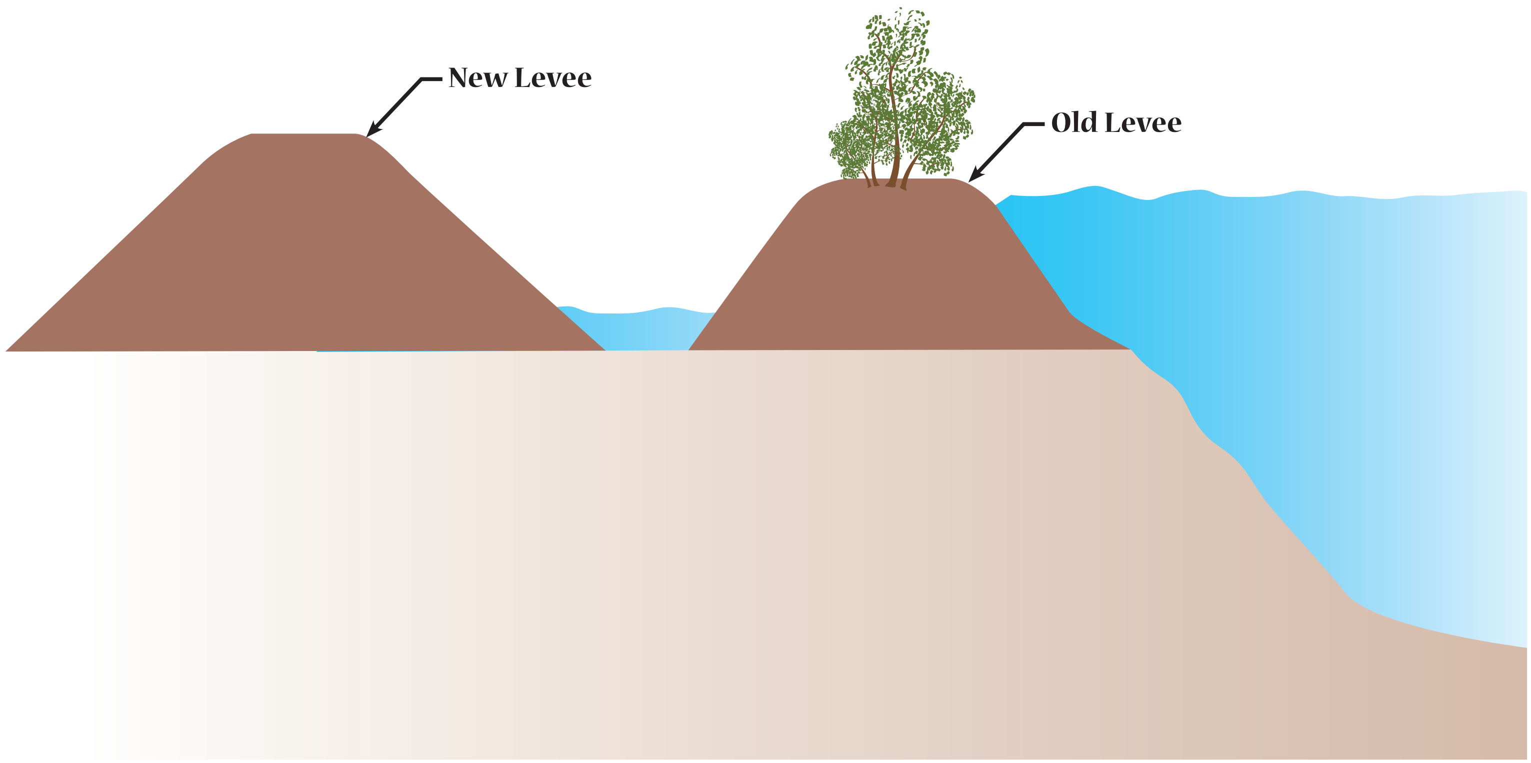
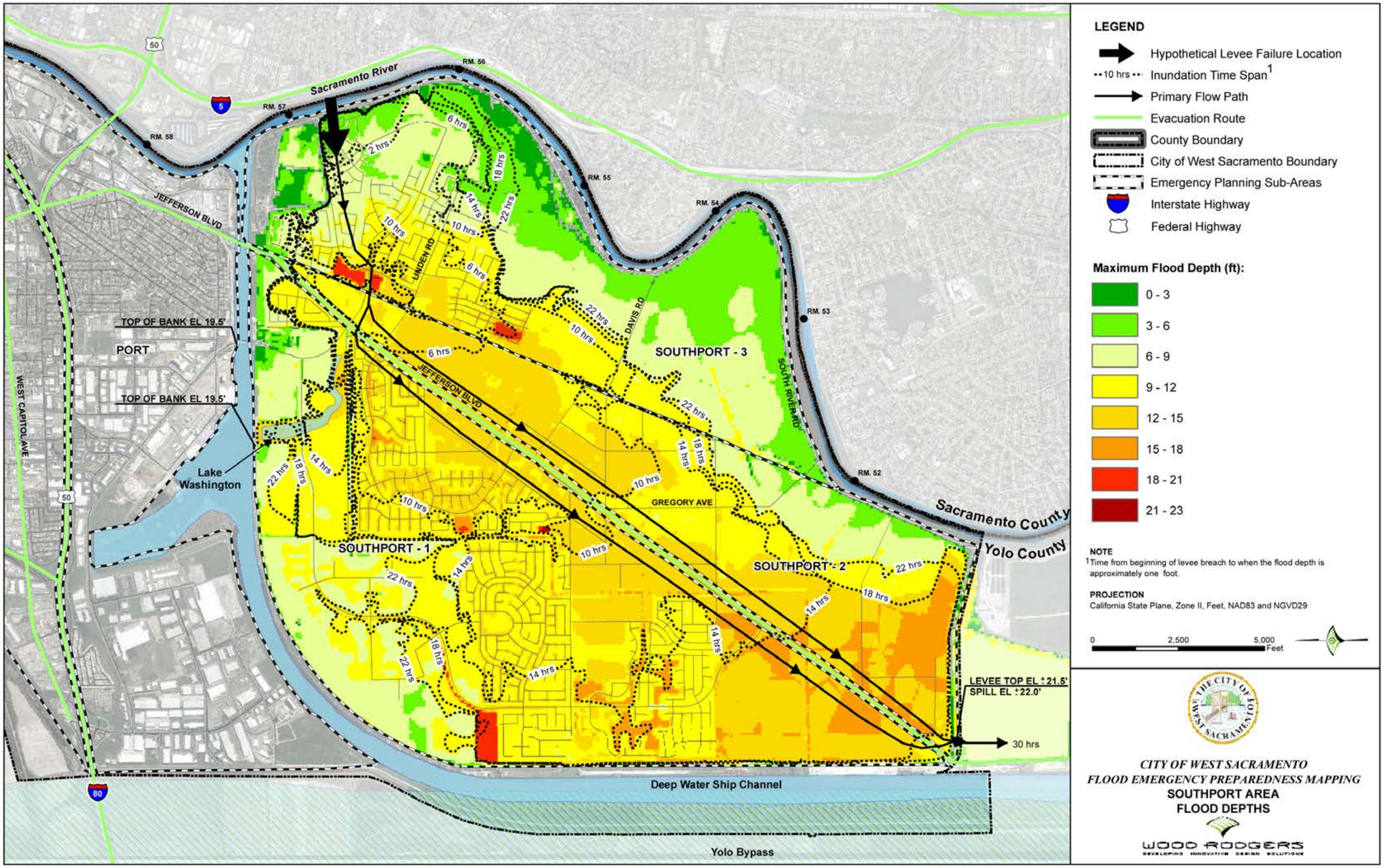
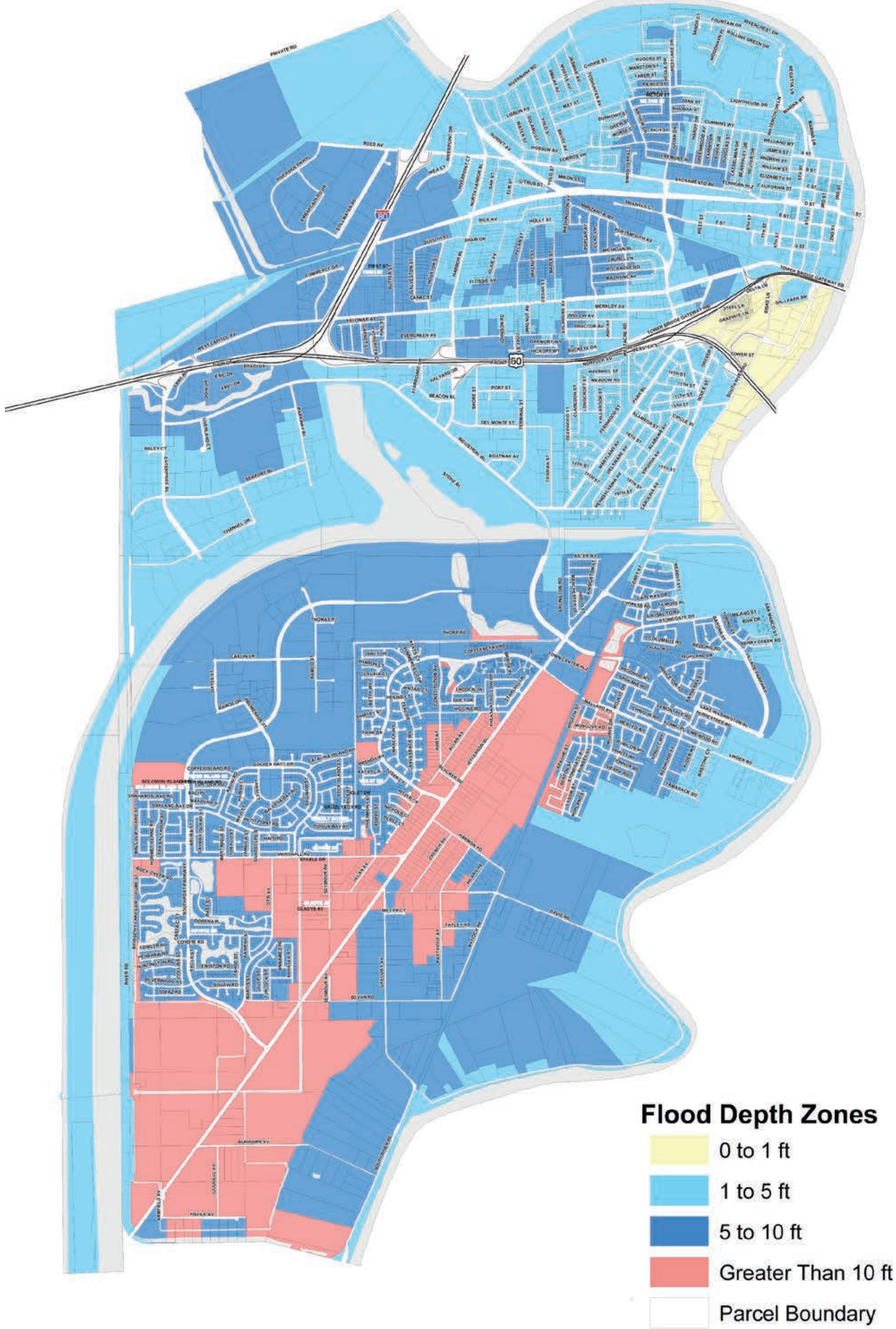


Plate 2-15
Setback Levee



Source: Wood Rodgers, 2006. Flood Emergency Preparedness Mapping. Prepared for the City of West Sacramento. November.

Plate 2-16
100-Year Flood Event
Estimated Time to One-Foot Inundation Depth—Southport Area



Source: PB, 2007. Final Engineer's Report. Prepared for the City of West Sacramento and the West Sacramento Area Flood Control Agency for parcel assessment purposes. July.

Plate 2-17
100-Year Flood Event
Estimated Flood Depths

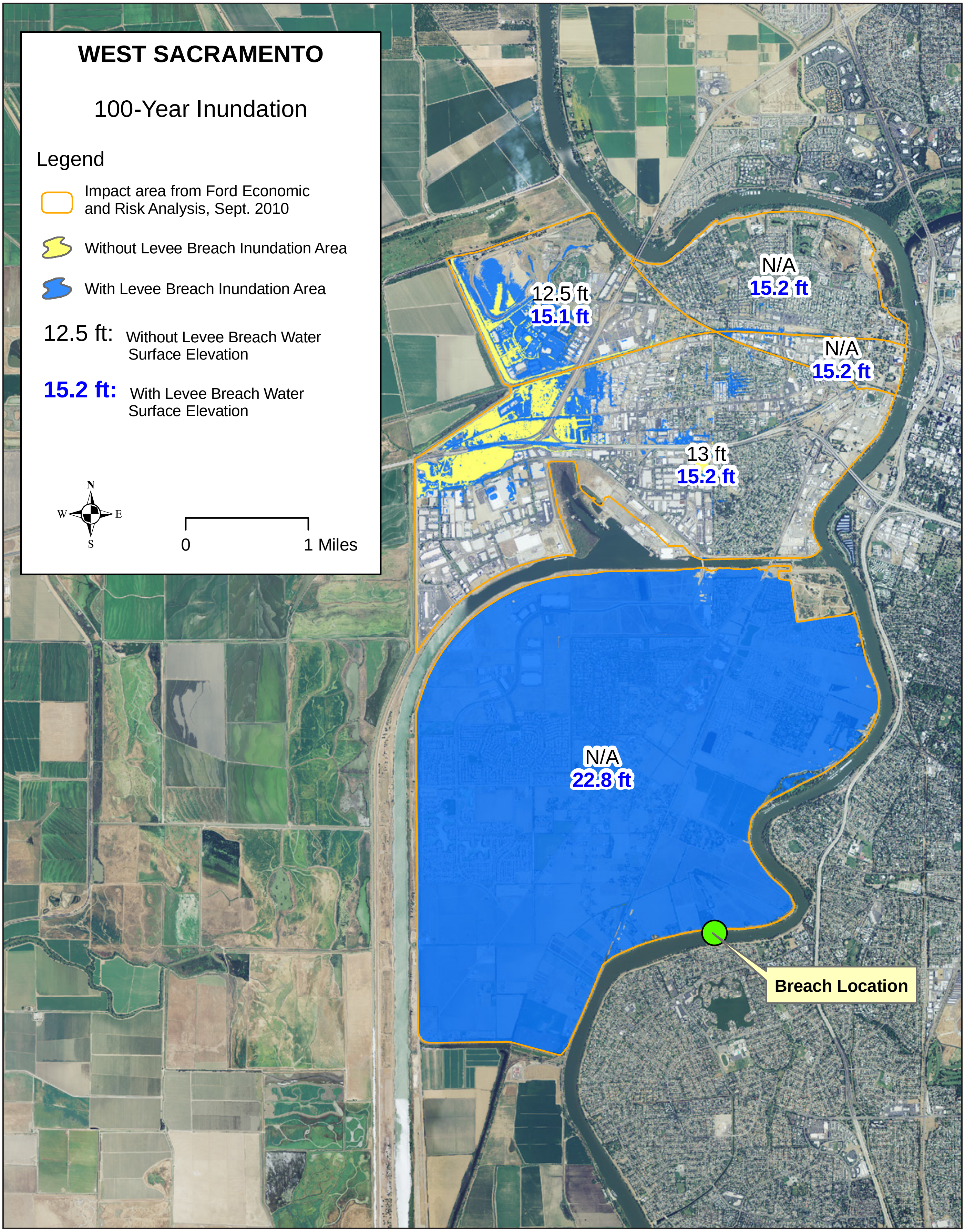


Plate 2-18
100-Year Inundation Map

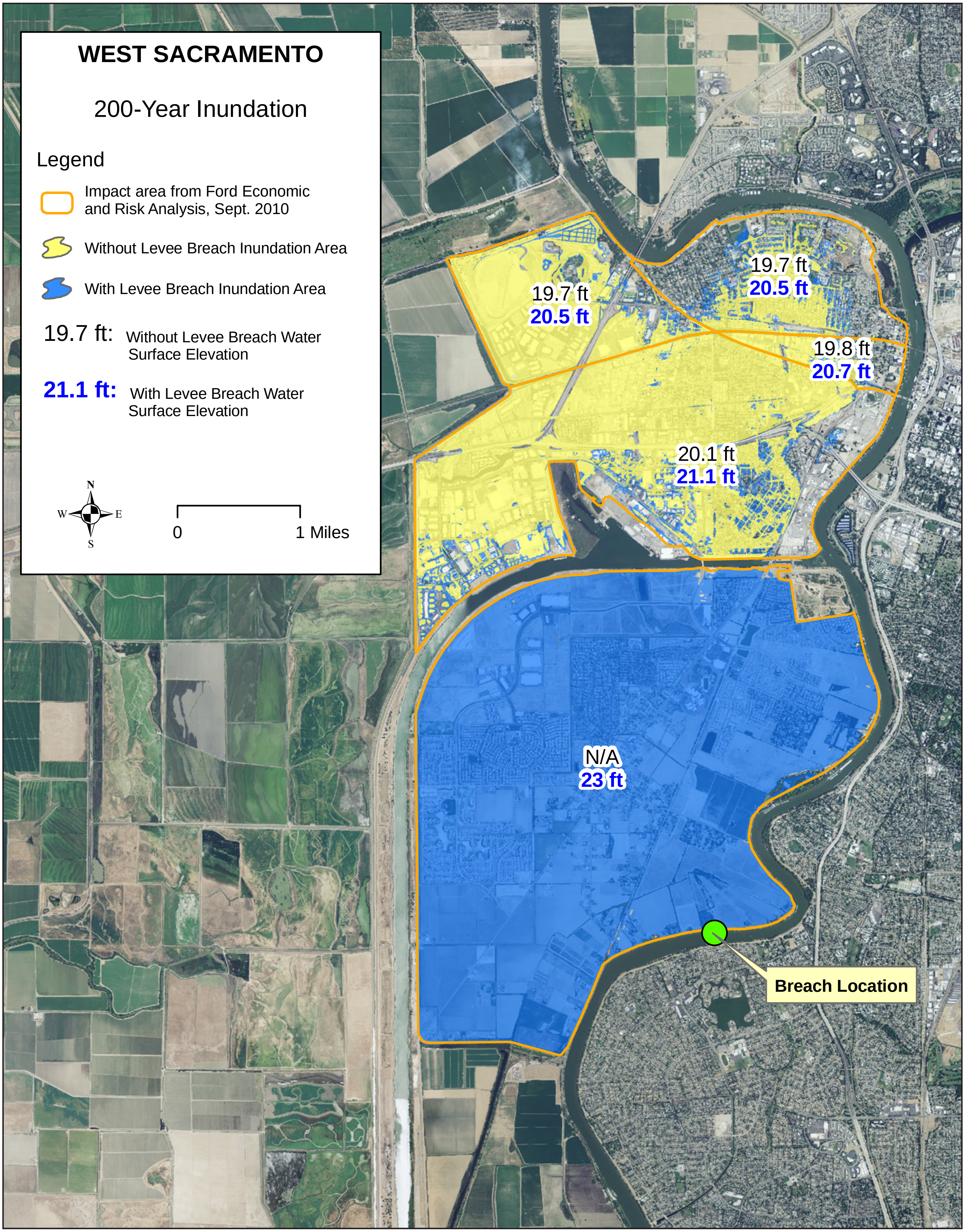
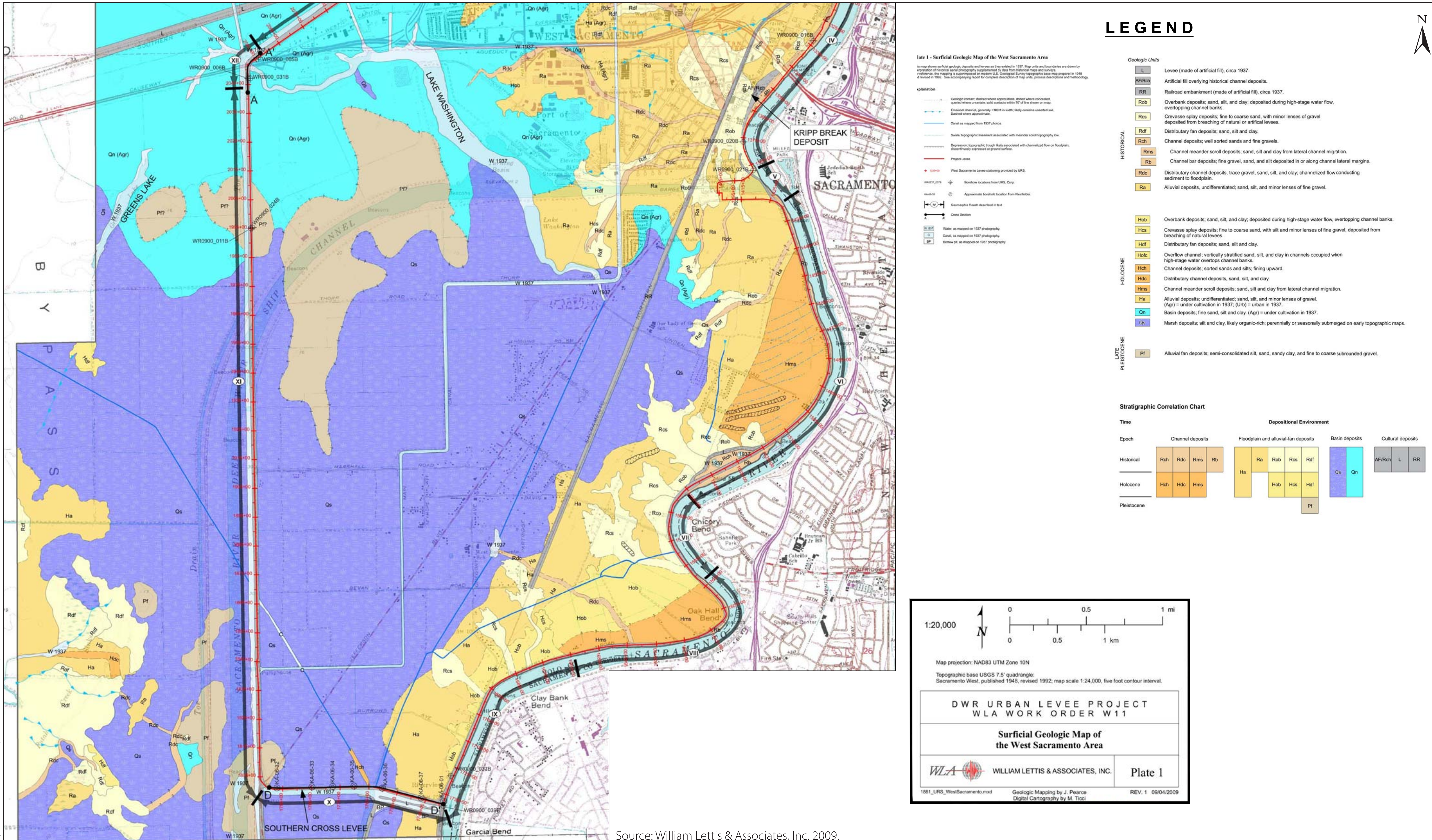


Plate 2-19
200-Year Inundation Map



Source: William Lettis & Associates, Inc. 2009.

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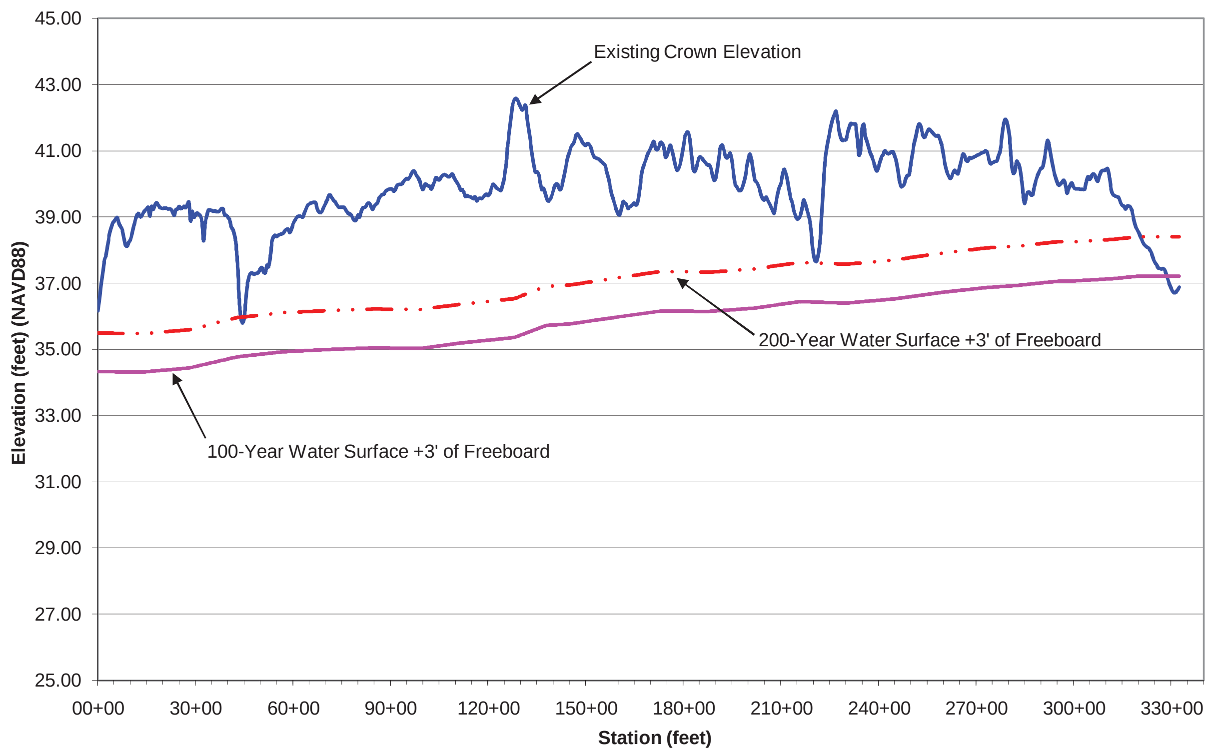
Plate 3.1-1
Project Area Surficial Geologic Map



Source: HDR, Inc., January 2008

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Plate 3.1-2
Freeboard Evaluation of the Southport EIP Project Area Reach Levee

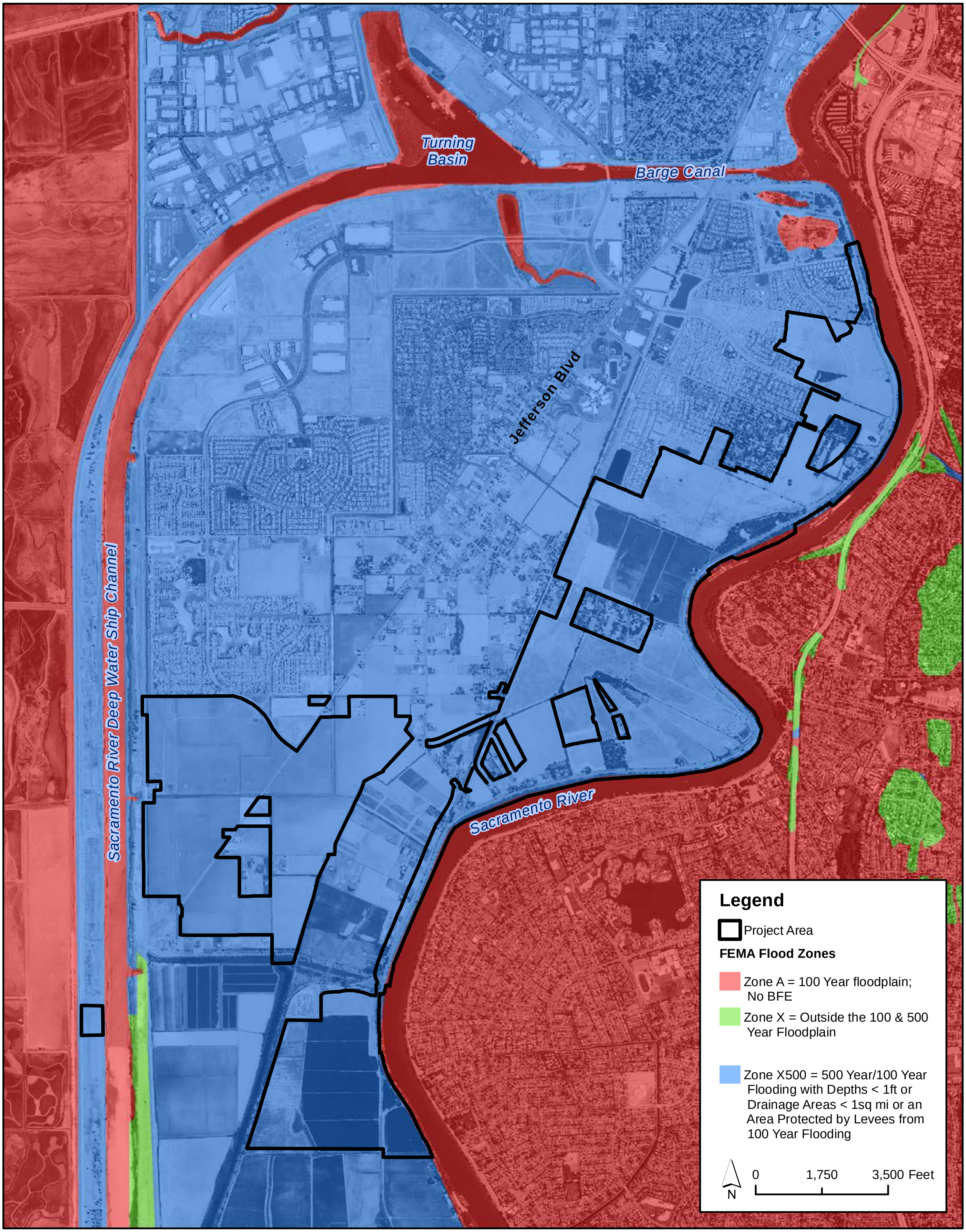

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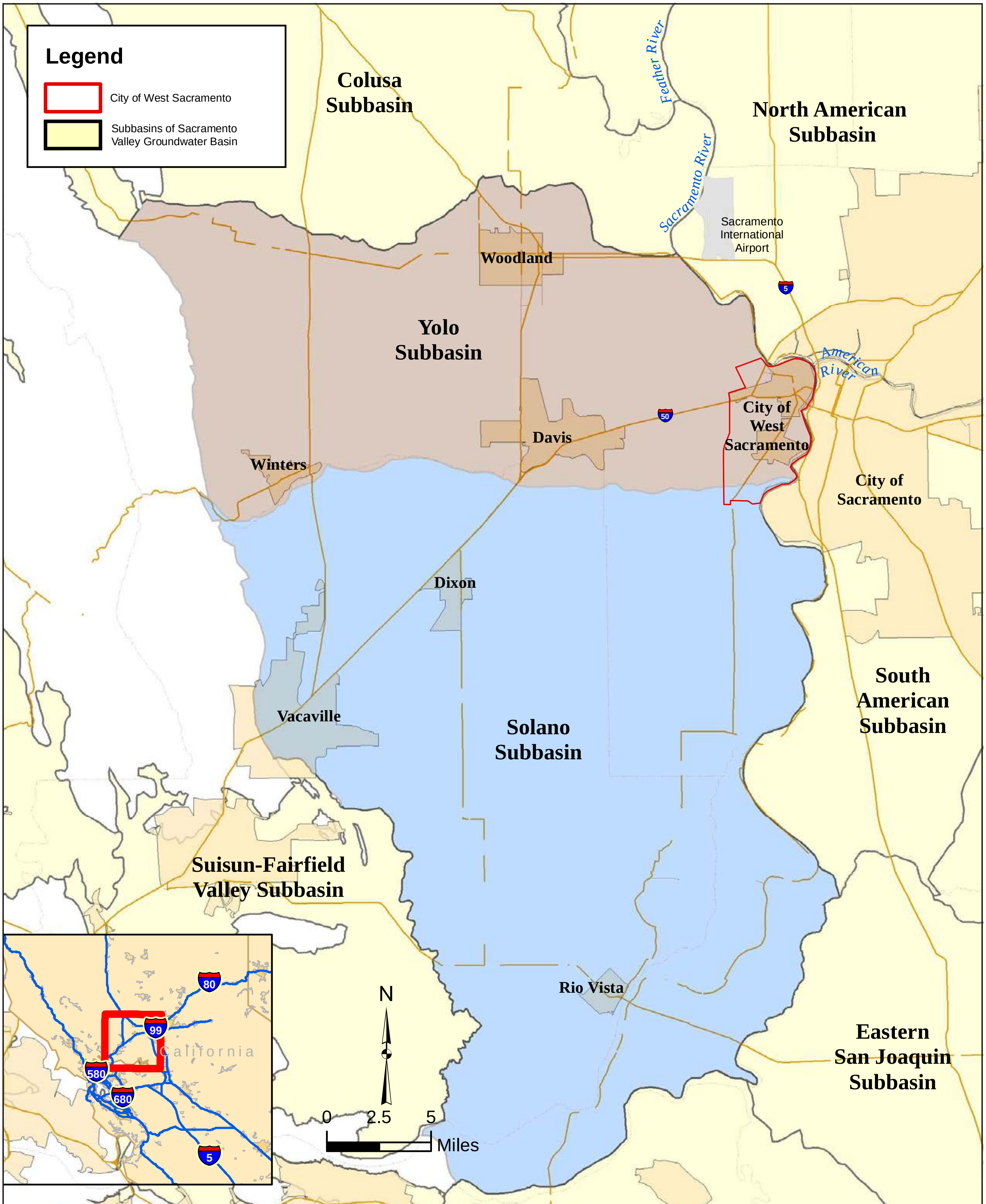
Plate 3.1-3
Federal Emergency Management Agency
Parcel # 0607280010B



Source: Luhdorff & Scalamini Consulting Engineers

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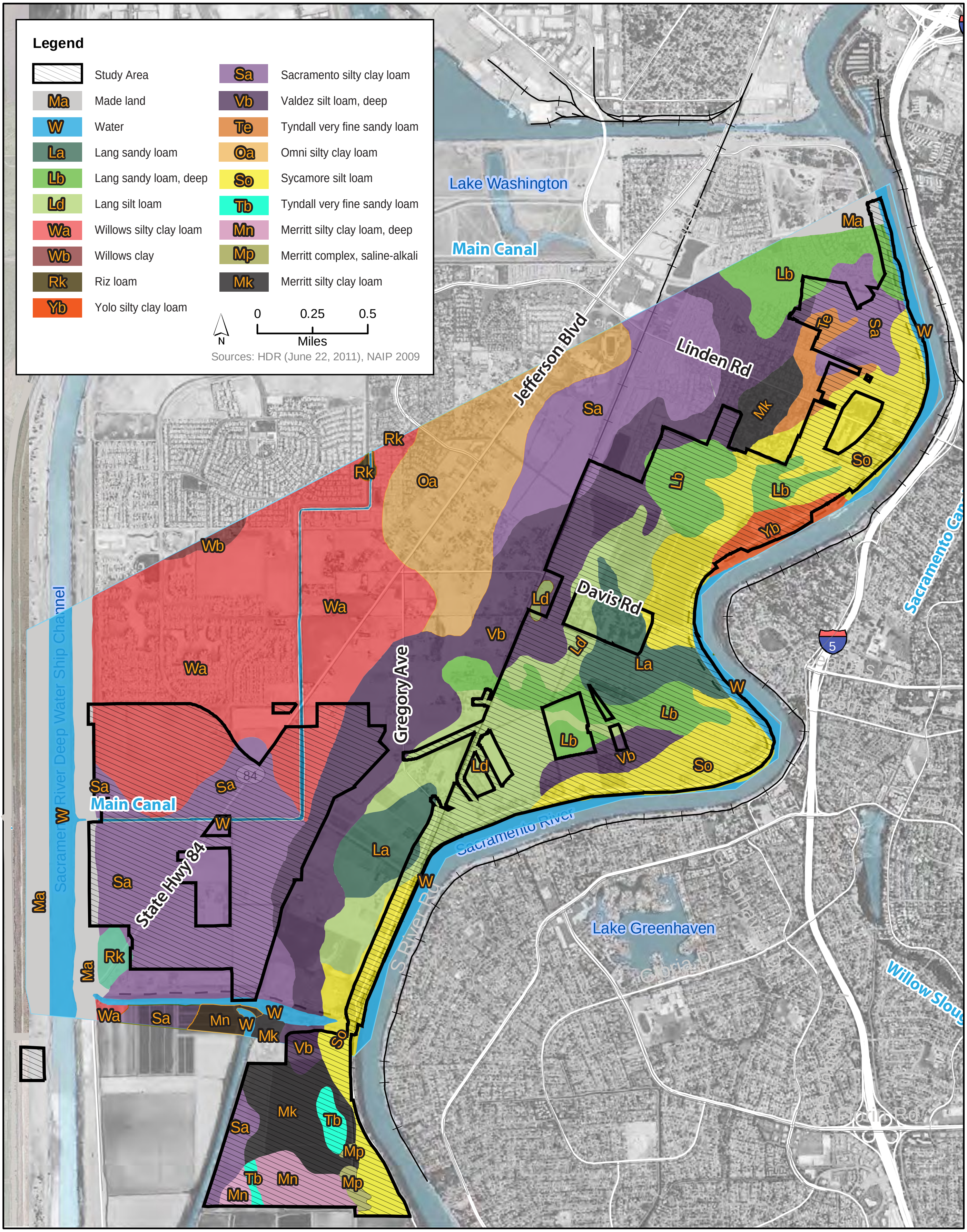
Plate 3.2-1
Yolo and Solano Subbasins of Sacramento Valley Groundwater Basin



Graphics ... 00071.11 (7/16/14) AB

Plate 3.3-1 (revised)
Soil Types within the Study Area

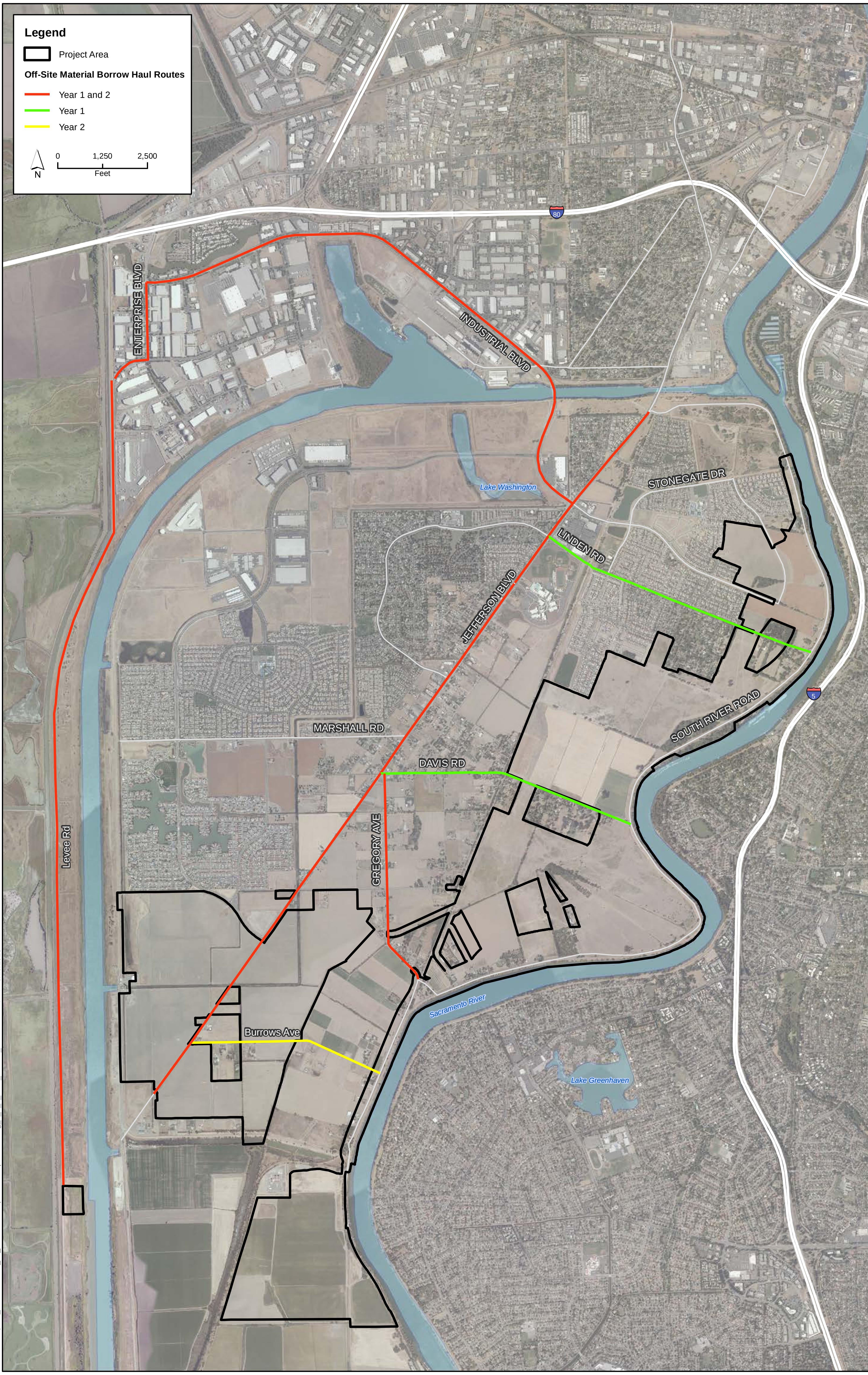


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Plate 3.4-1
Off-Site Material Borrow Haul Routes

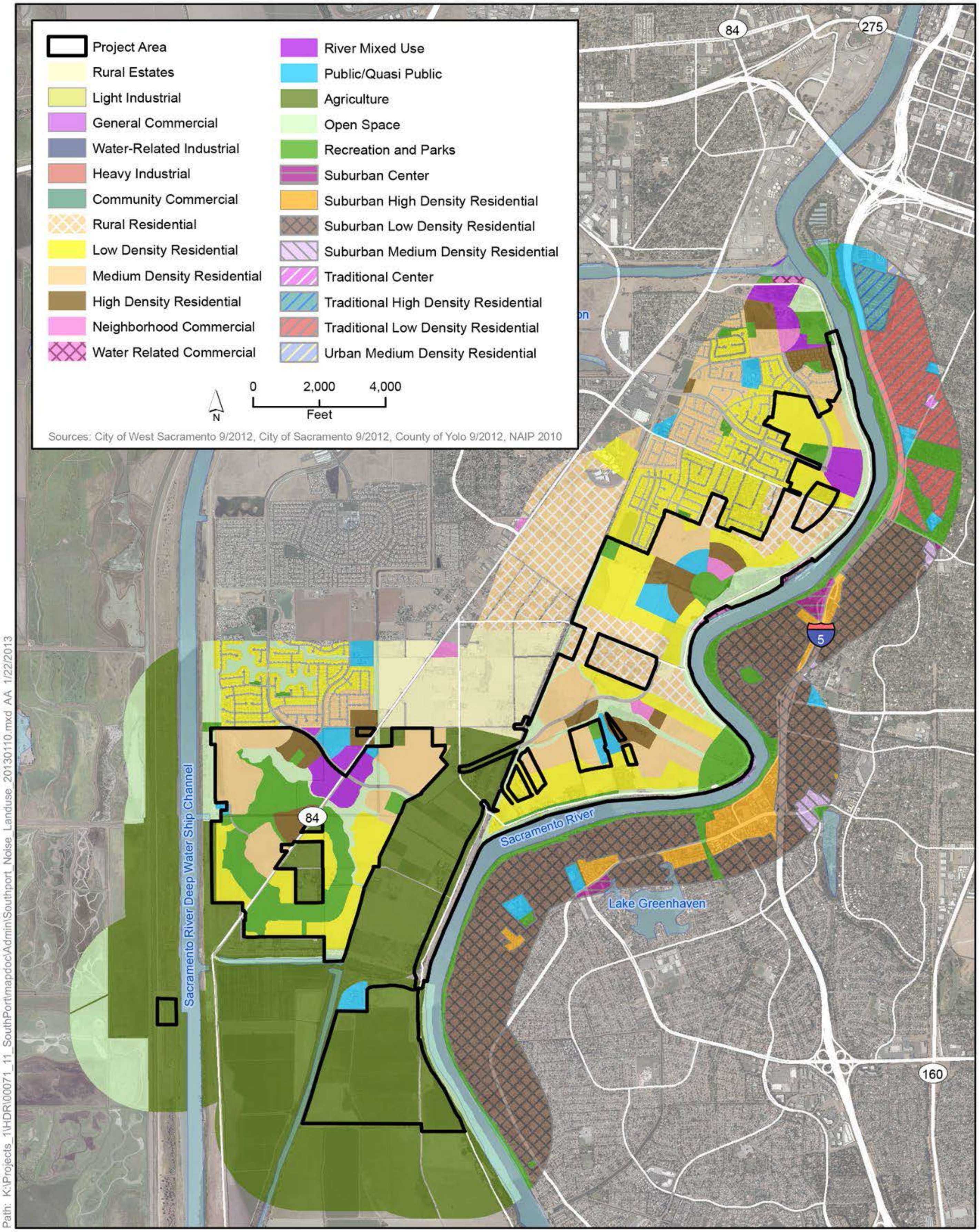

Plate 3.7-1
Land Uses Within One Half Mile of the Project Area

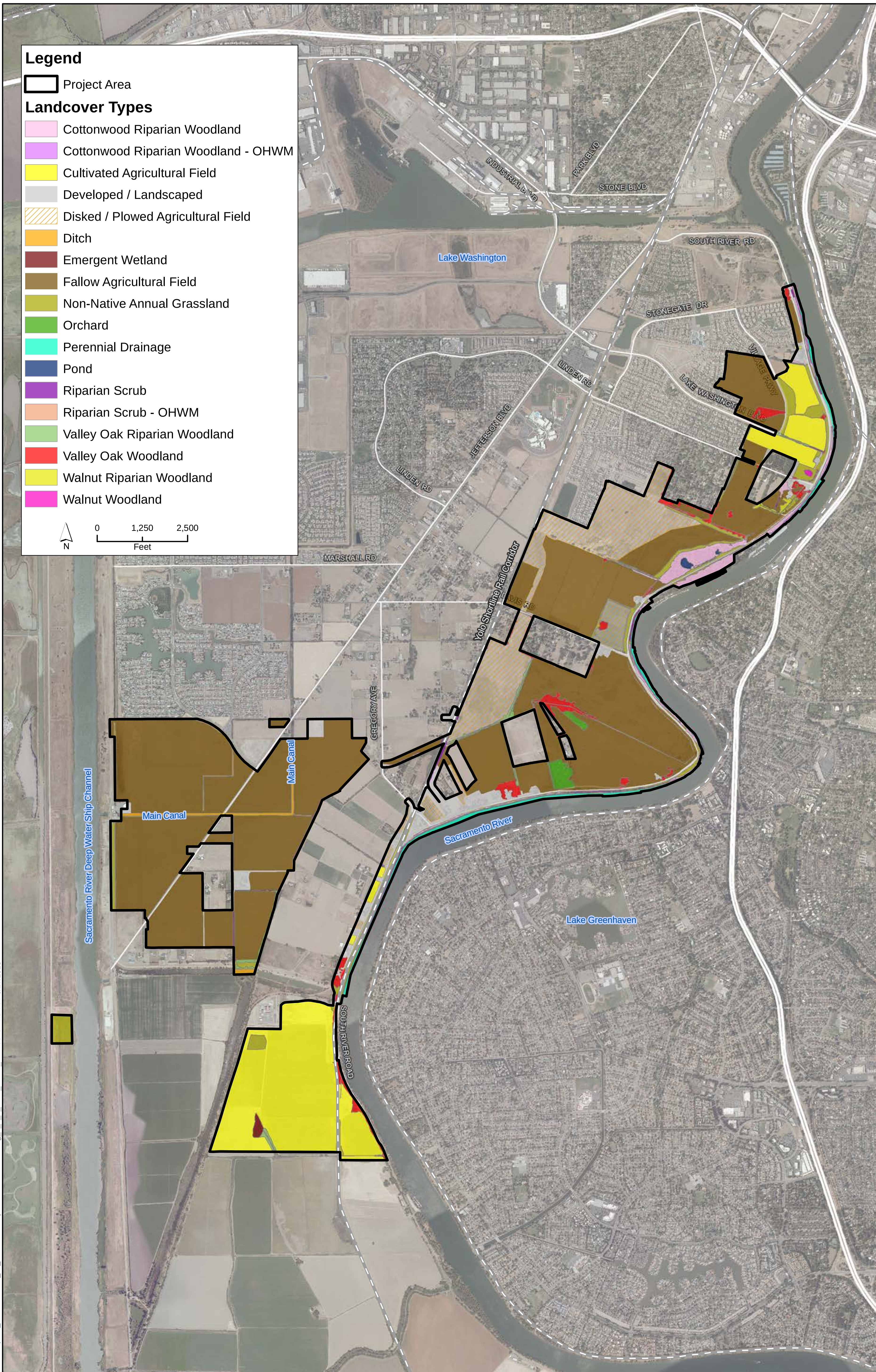

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Plate 3.8-1
Land Cover Types in the Southport Project Area

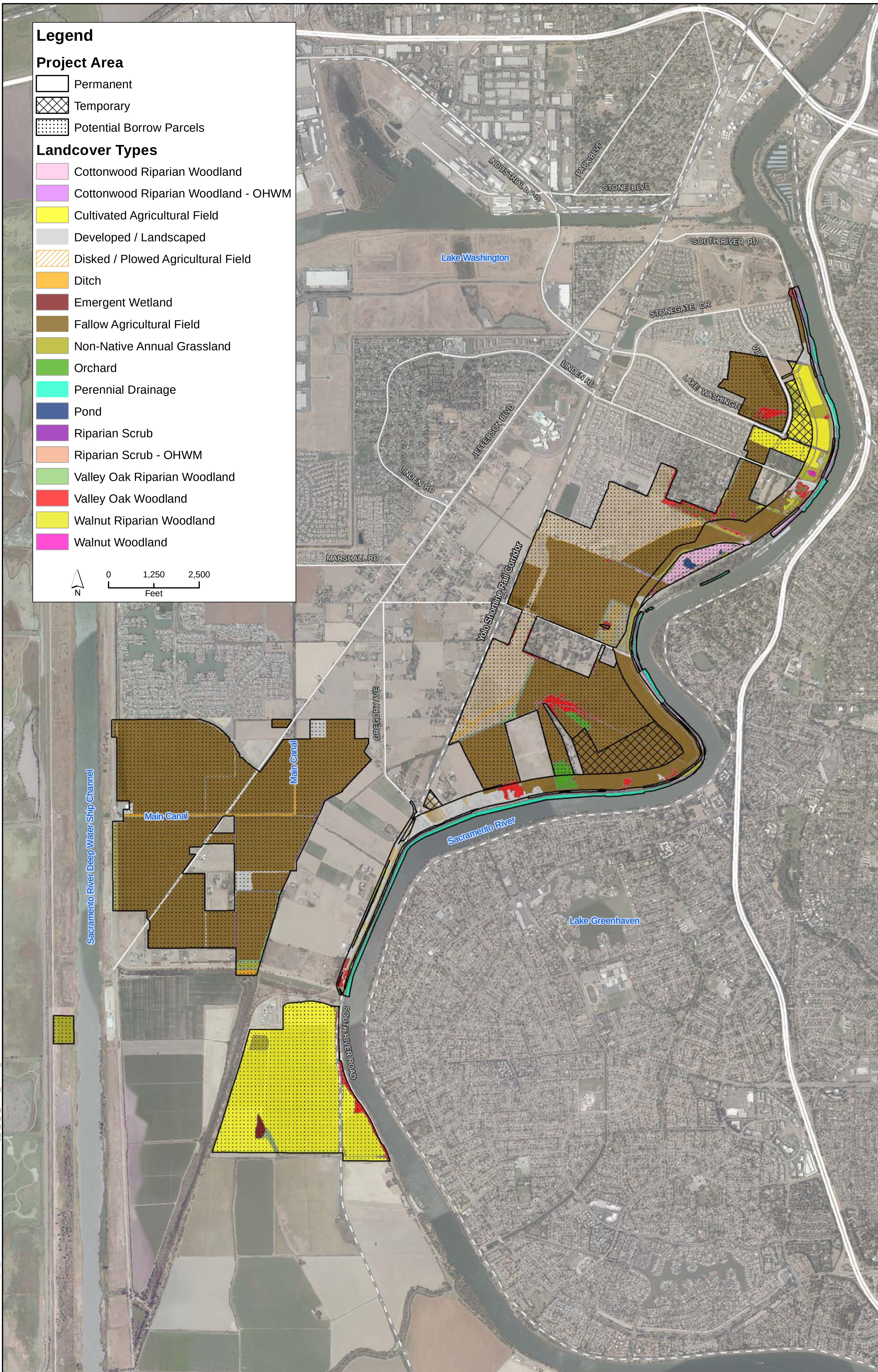

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Plate 3.8-2
Alternative 1 Impacts on Vegetation and Waters of the United States

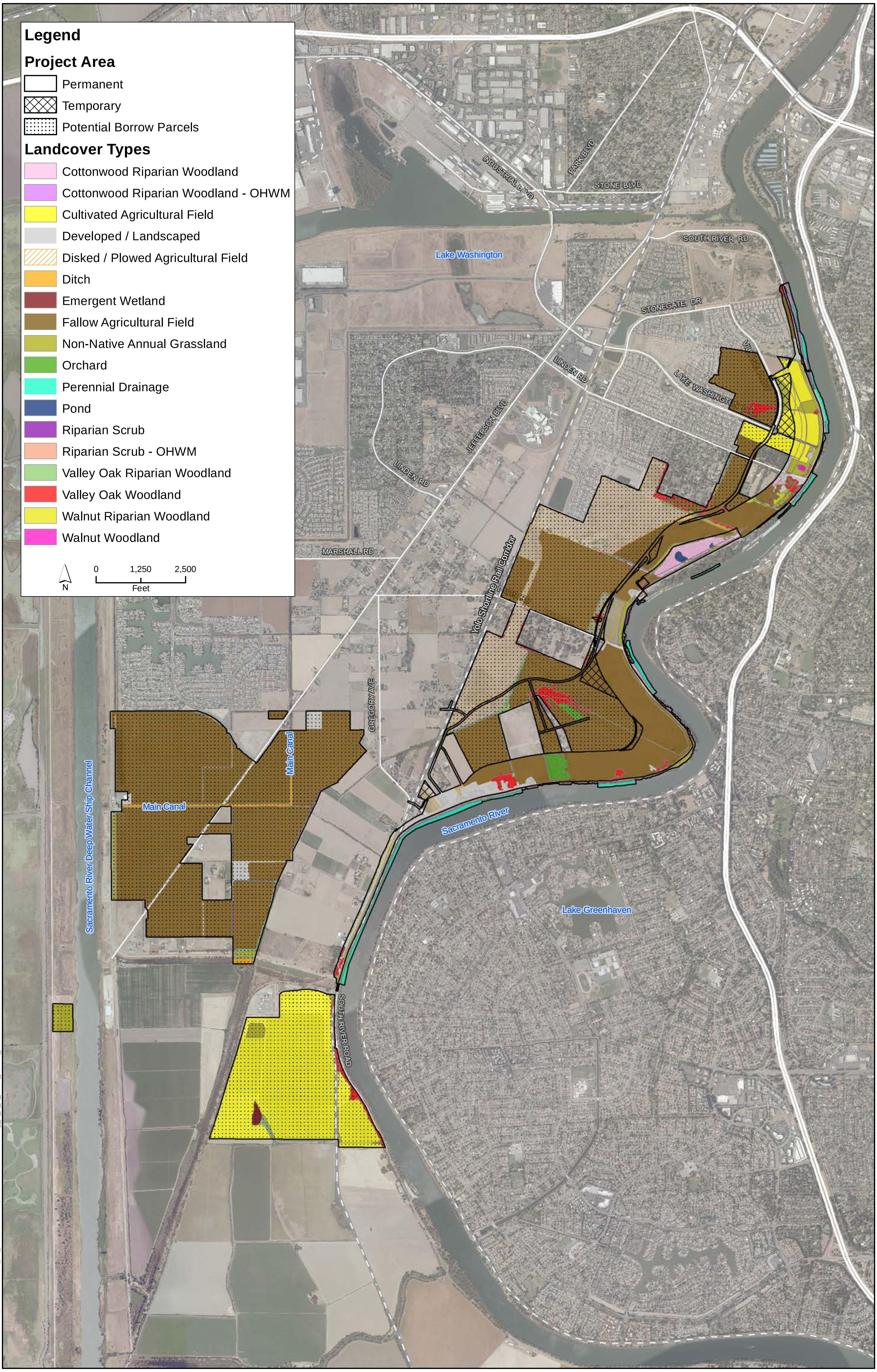

Plate 3.8-3
Alternative 2 Impacts on Vegetation and Waters of the United States

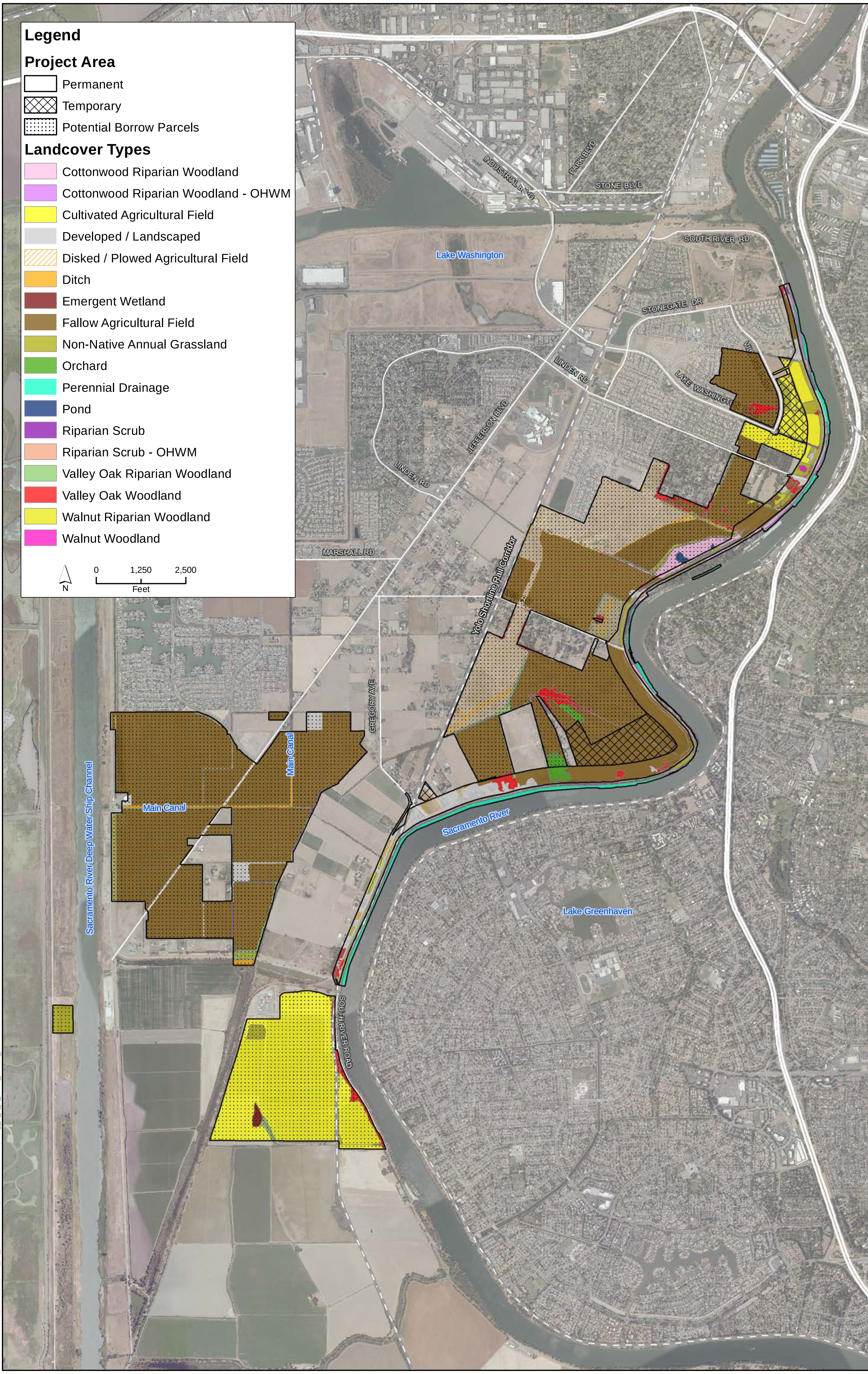

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Plate 3.8-4
Alternative 3 Impacts on Vegetation and Waters of the United States

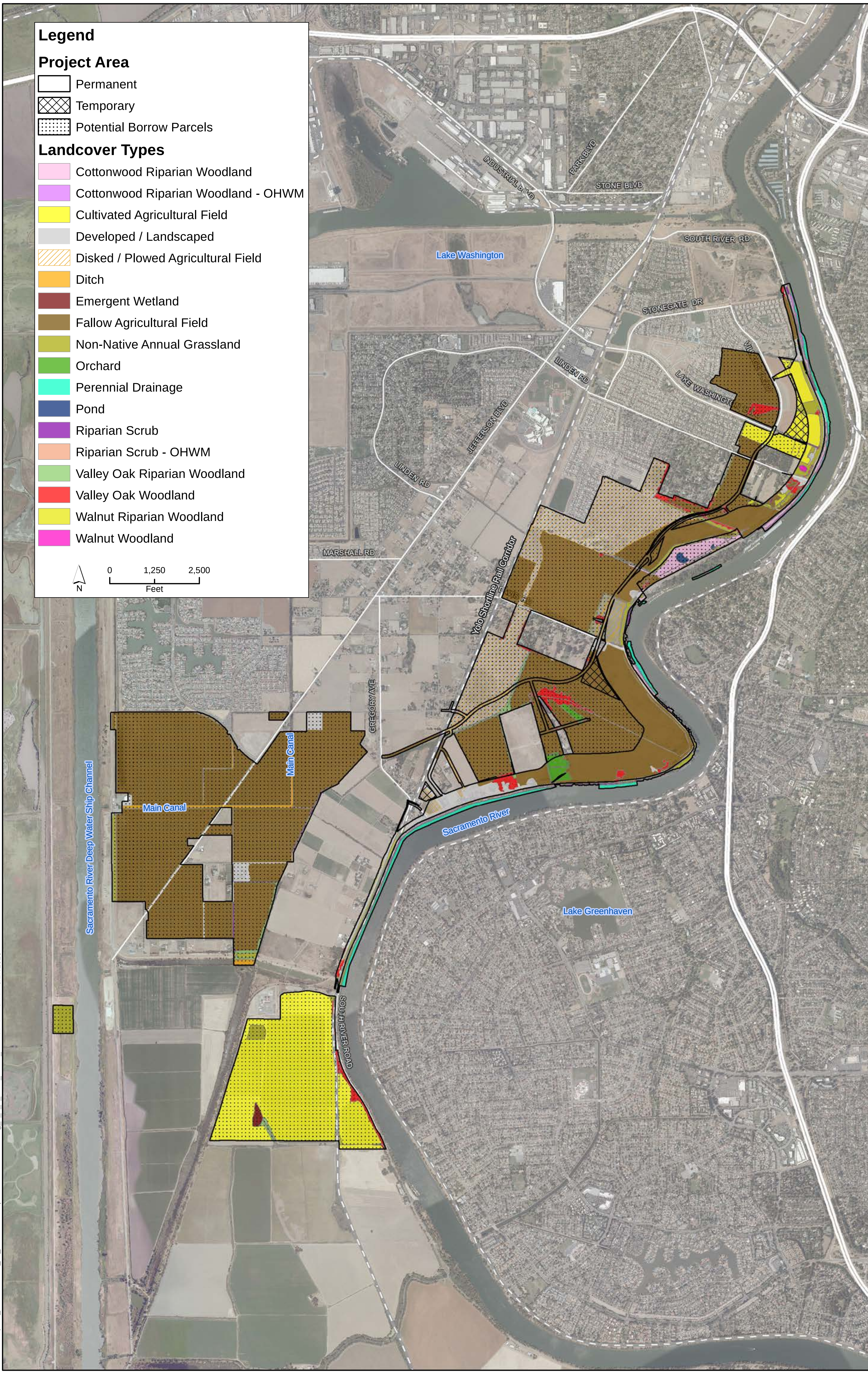

Plate 3.8-5
Alternative 4 Impacts on Vegetation and Waters of the United States

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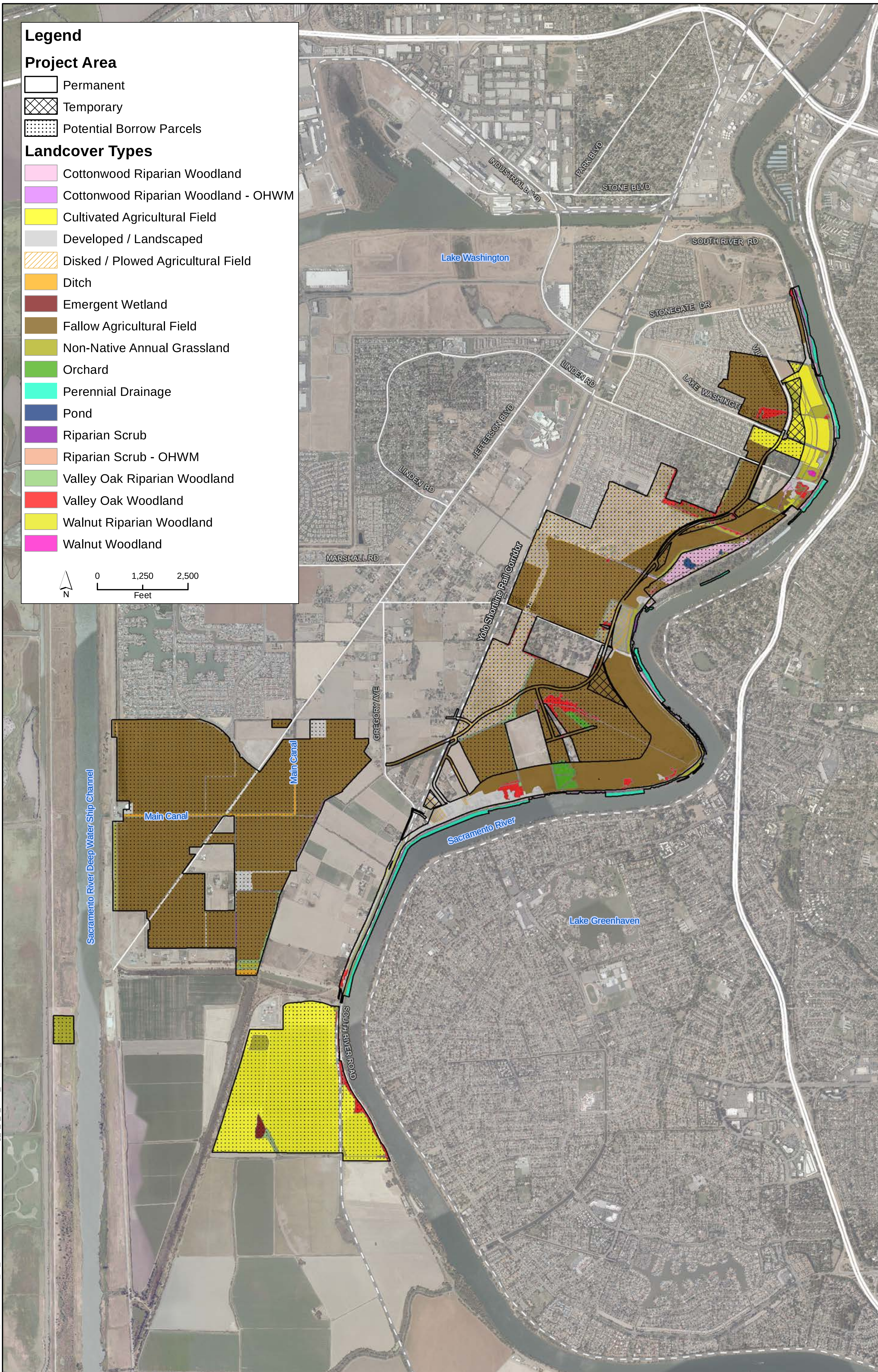

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Plate 3.8-6
Alternative 5 Impacts on Vegetation and Waters of the United States

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Plate 3.9-1
Shaded Riverine Aquatic Habitat

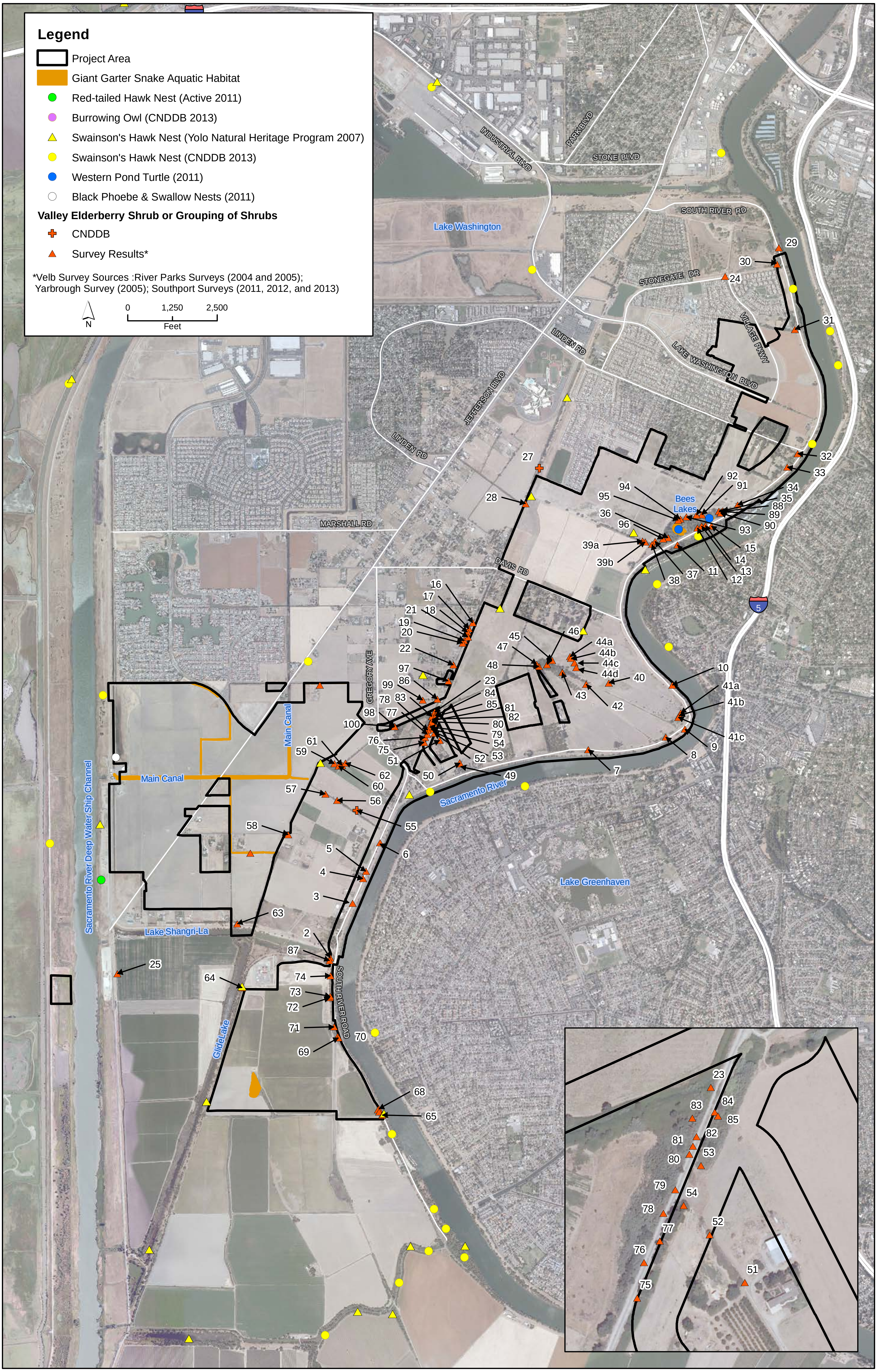

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Plate 3.10-1 (revised)
Wildlife Locations in the Study Area

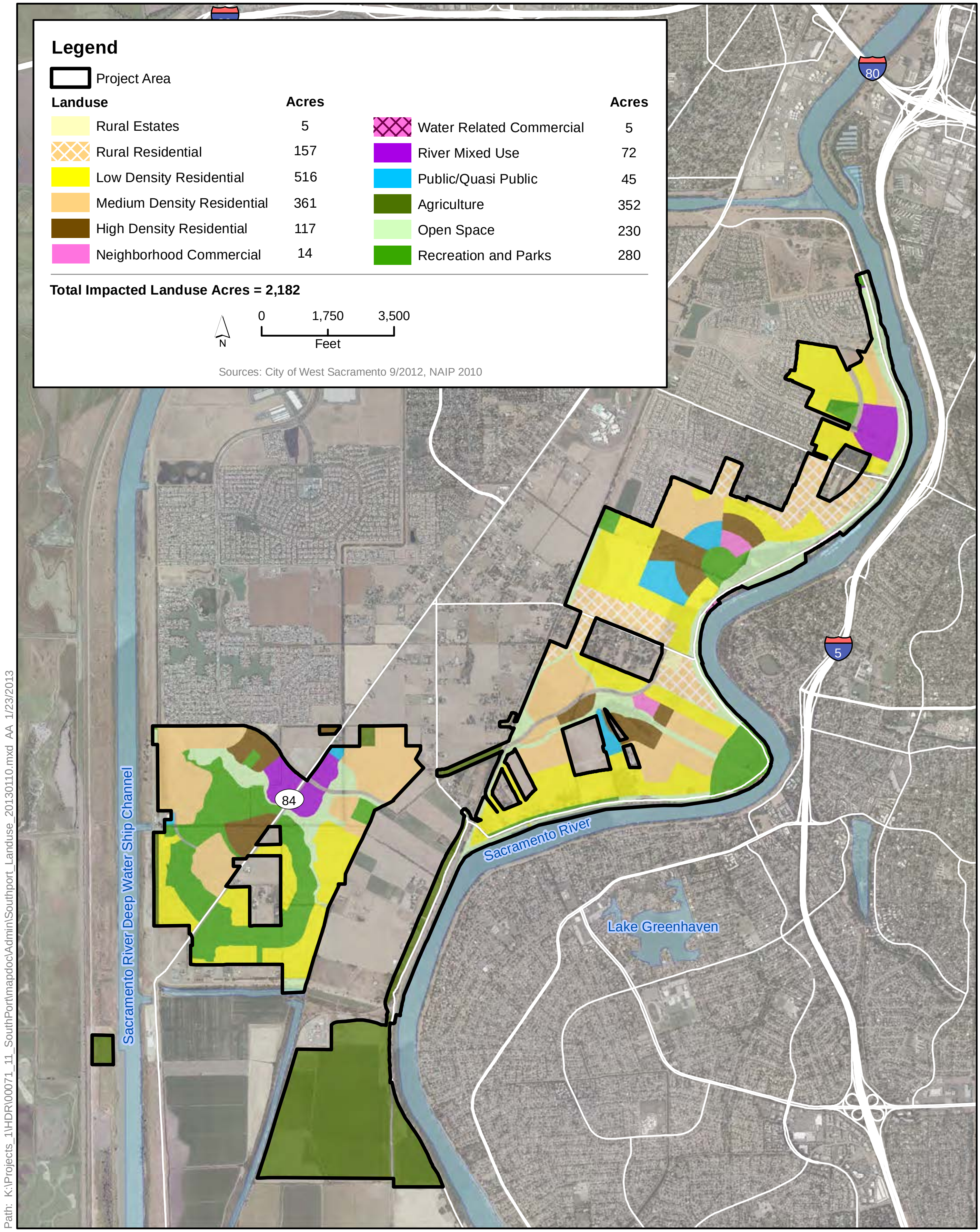

Plate 3.11-1
Southport Land Use

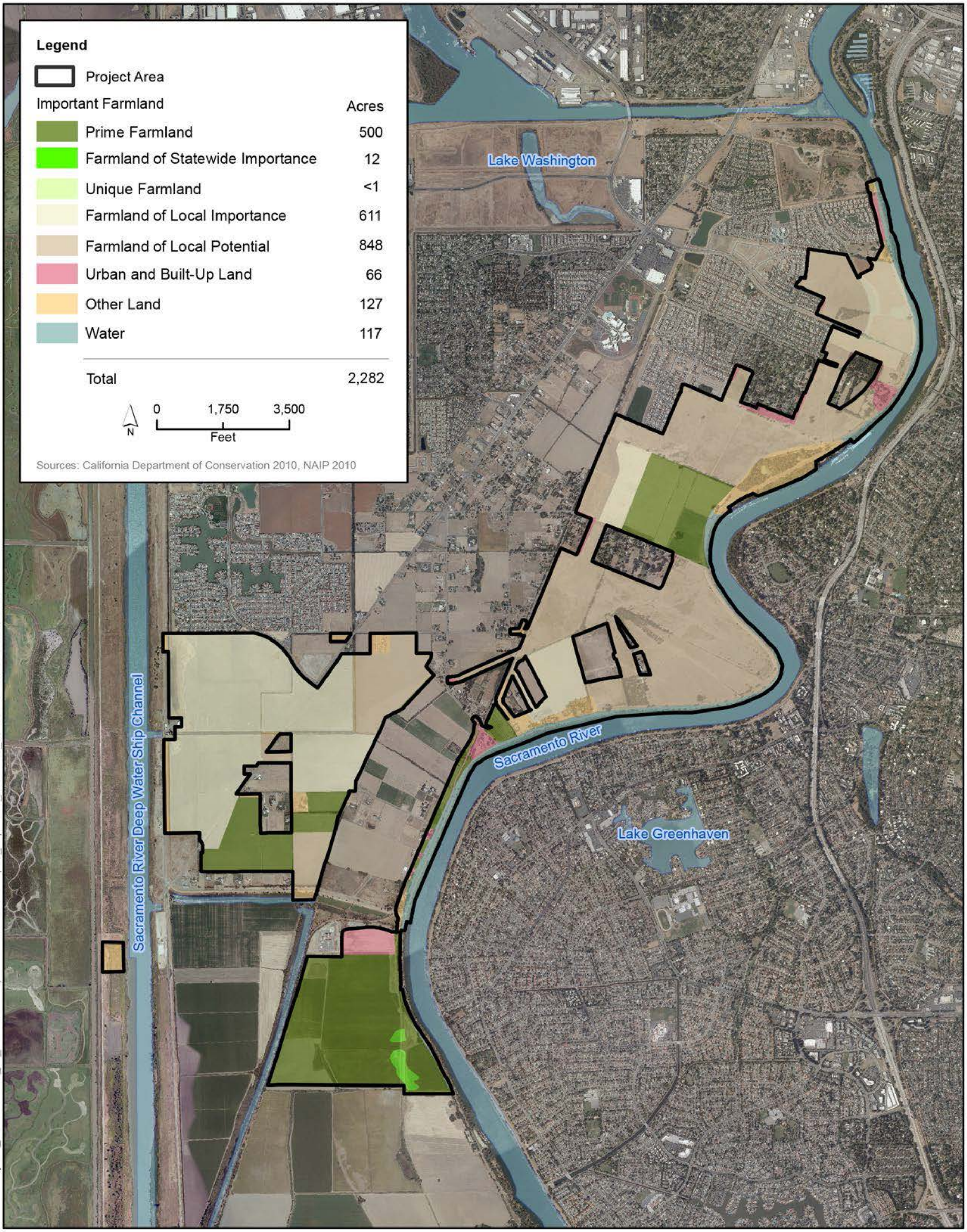

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Plate 3.11-2
Southport Project Important Farmland

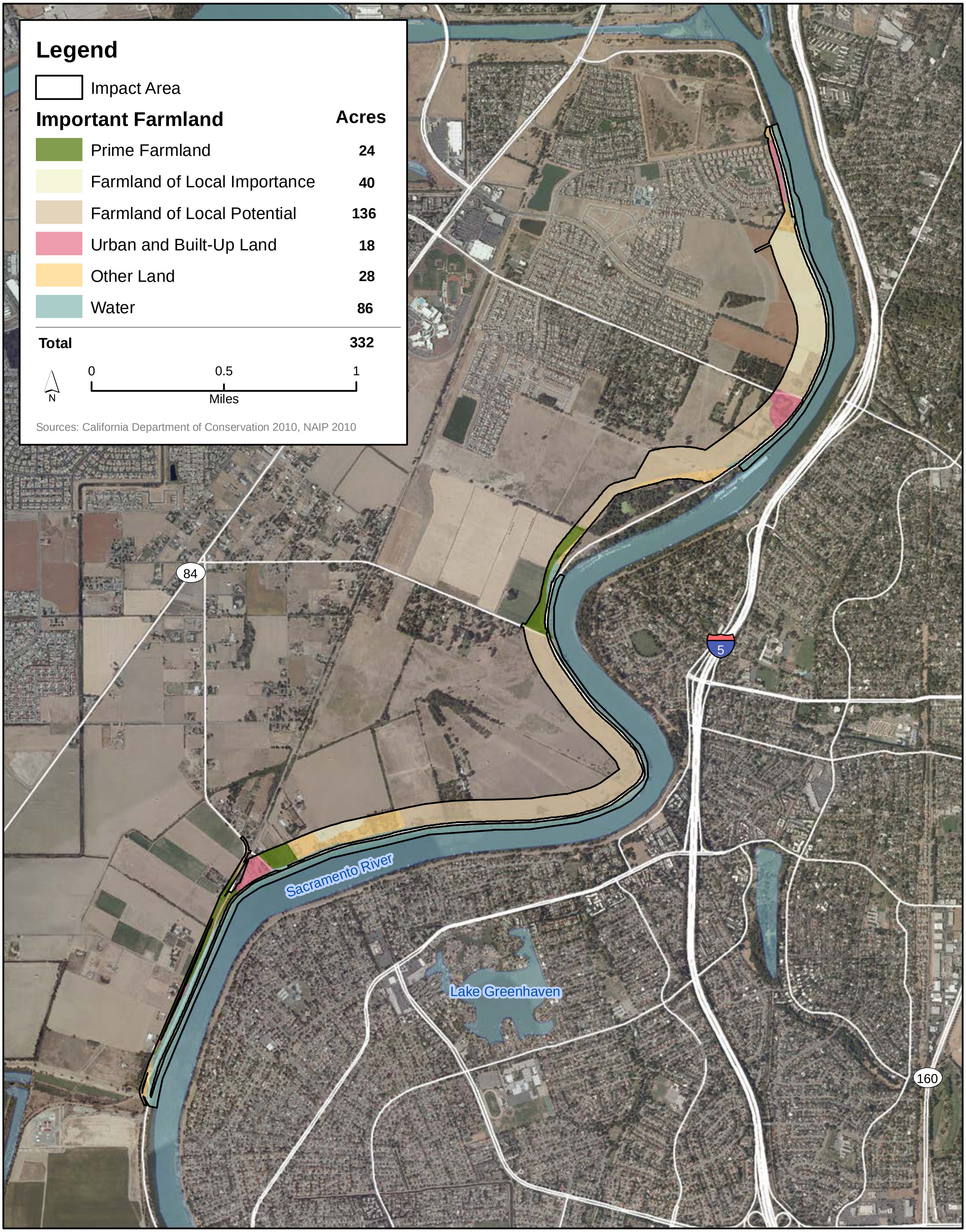

Plate 3.11-3
Southport Project Important Farmland - Alternative 1

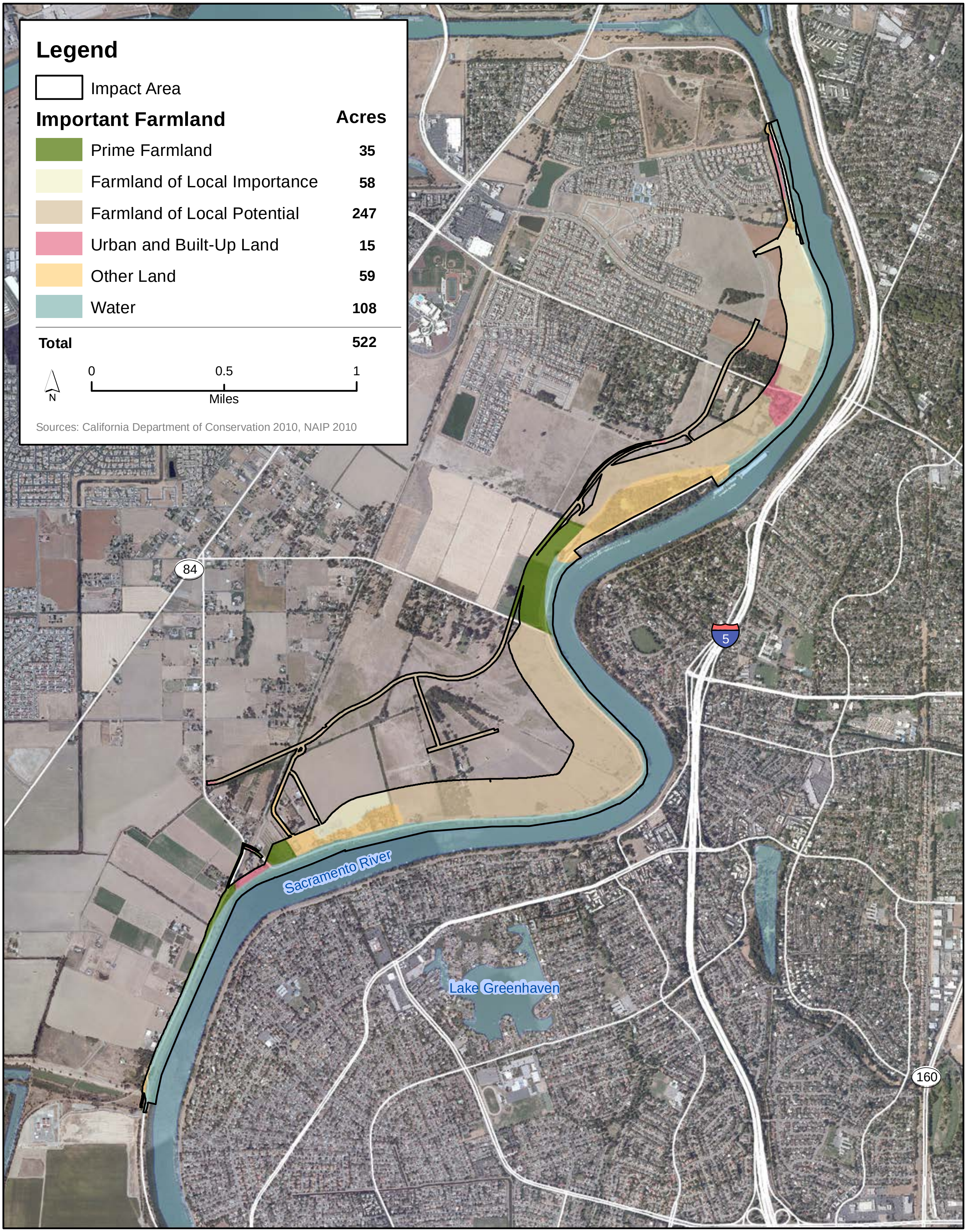

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Plate 3.11-4 (revised)
Southport Project Important Farmland - Alternative 2

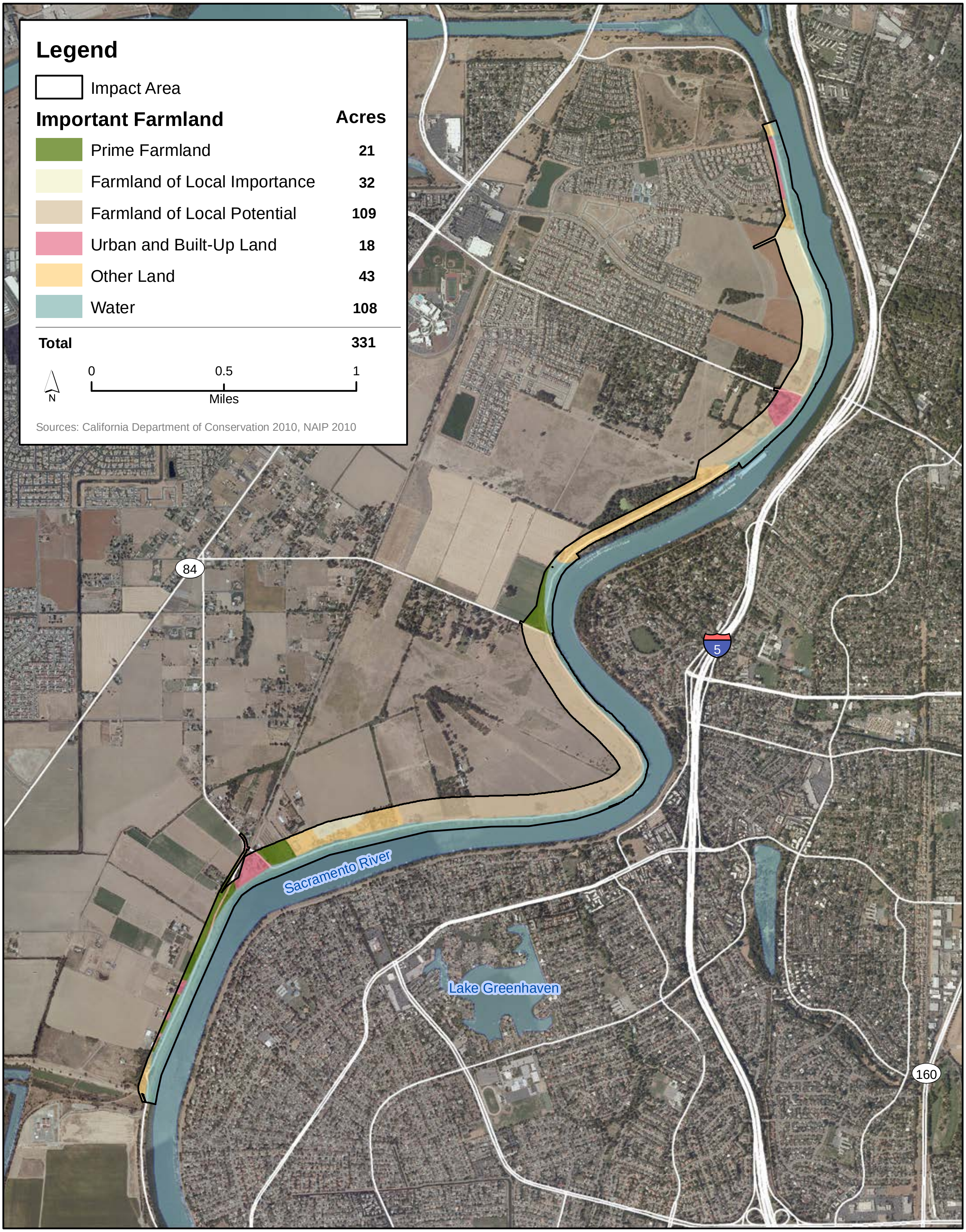

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Plate 3.11-5
Southport Project Important Farmland - Alternative 3

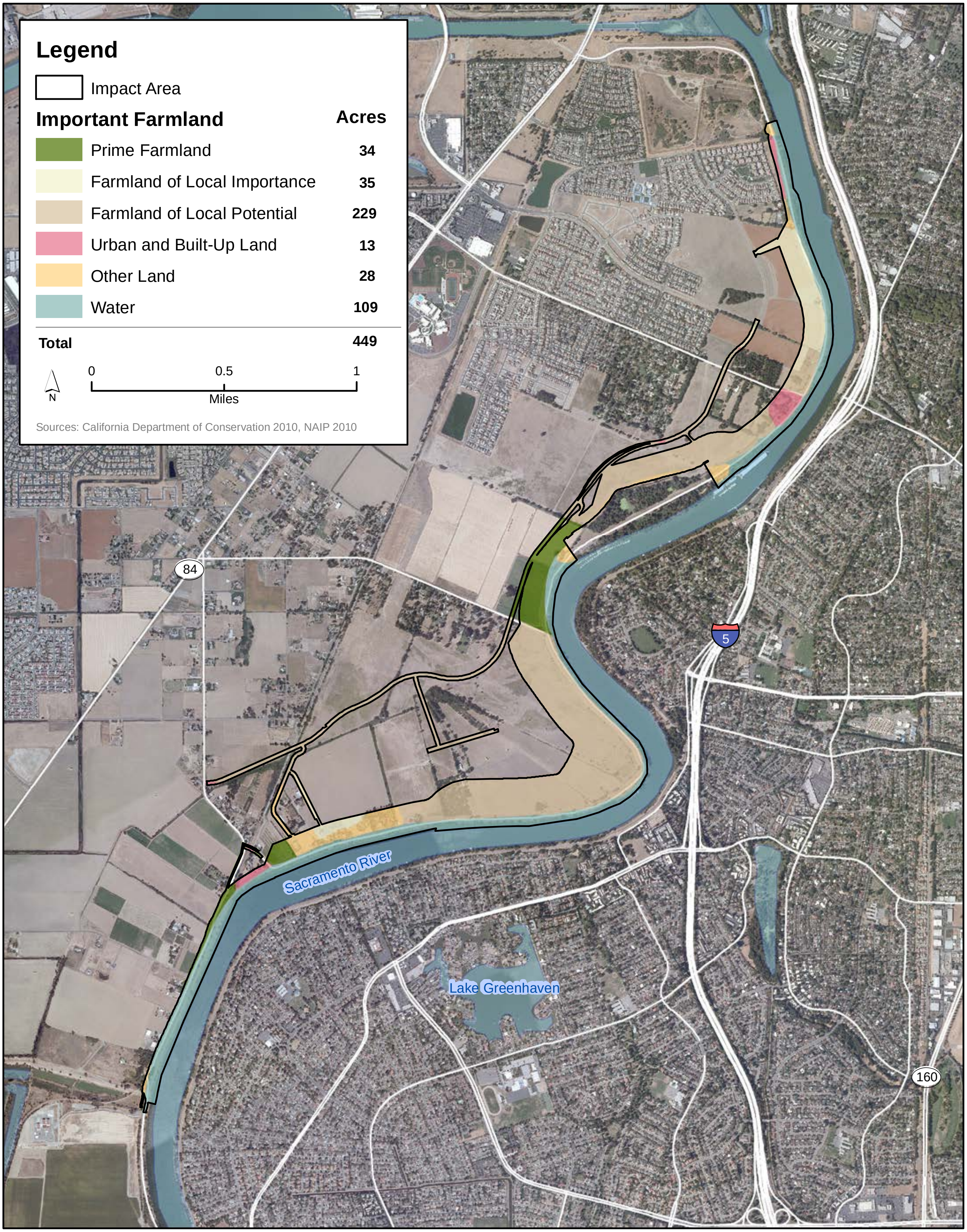

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Plate 3.11-6 (revised)
Southport Project Important Farmland - Alternative 4

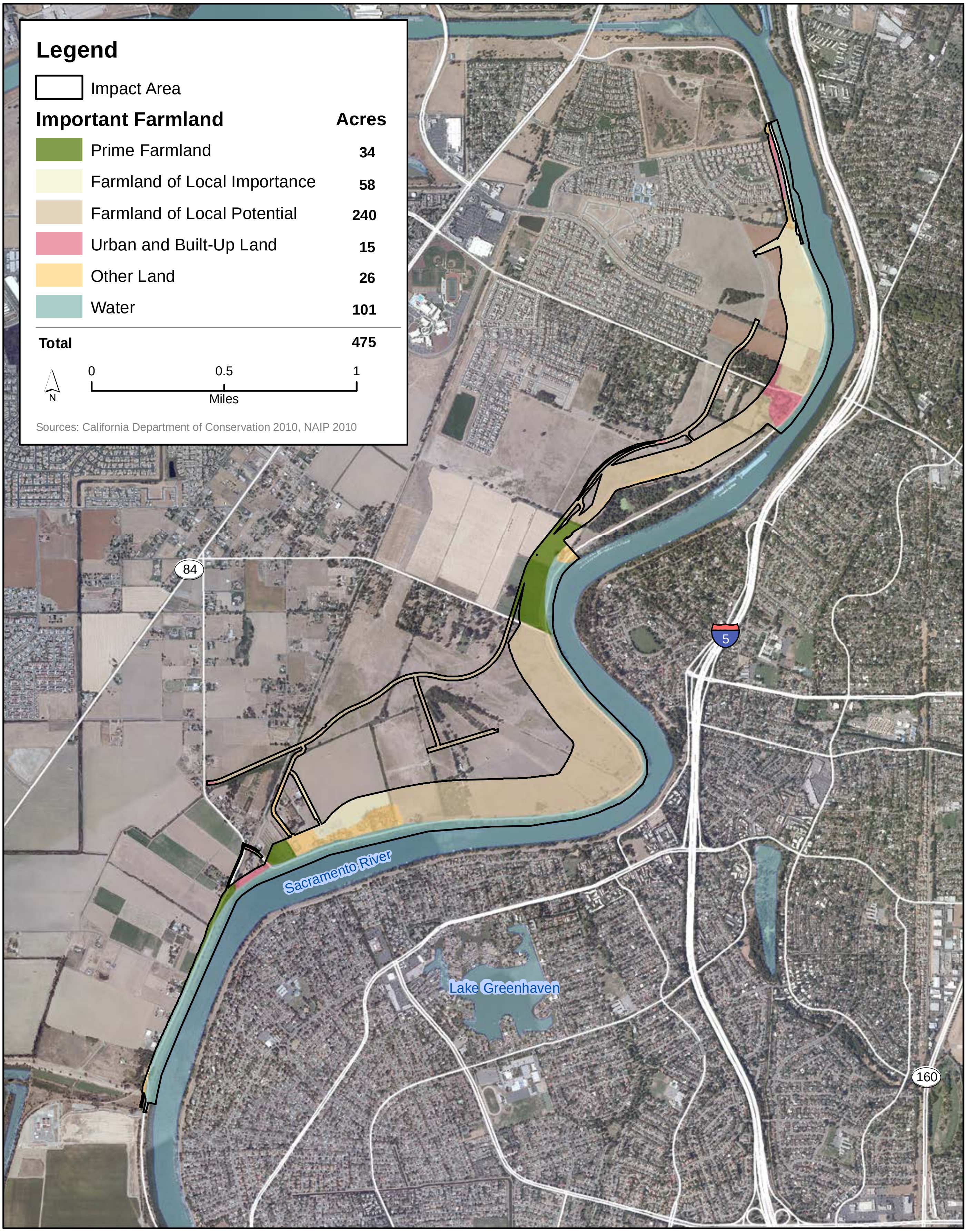

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Plate 3.11-7 (revised)
Southport Project Important Farmland - Alternative 5

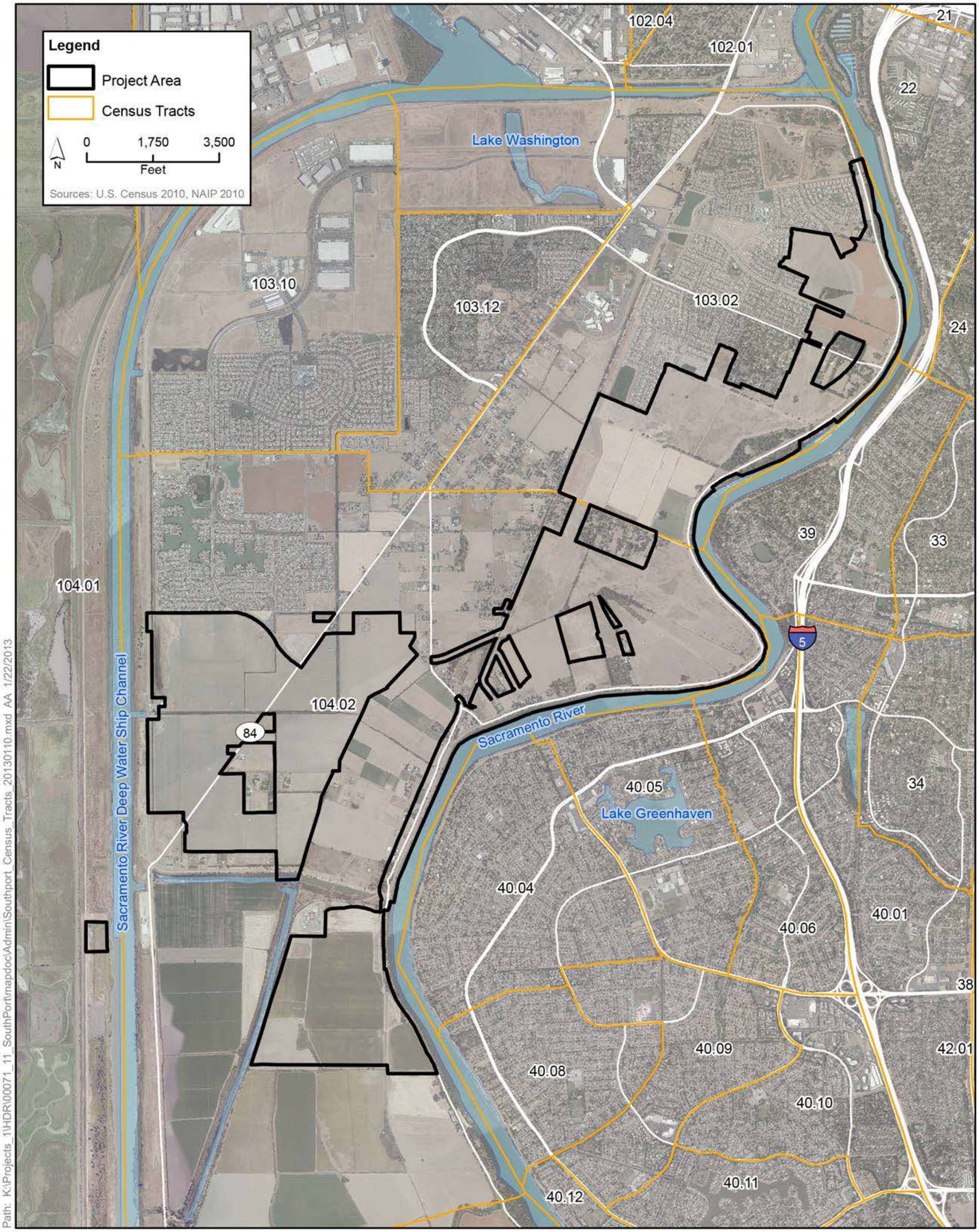

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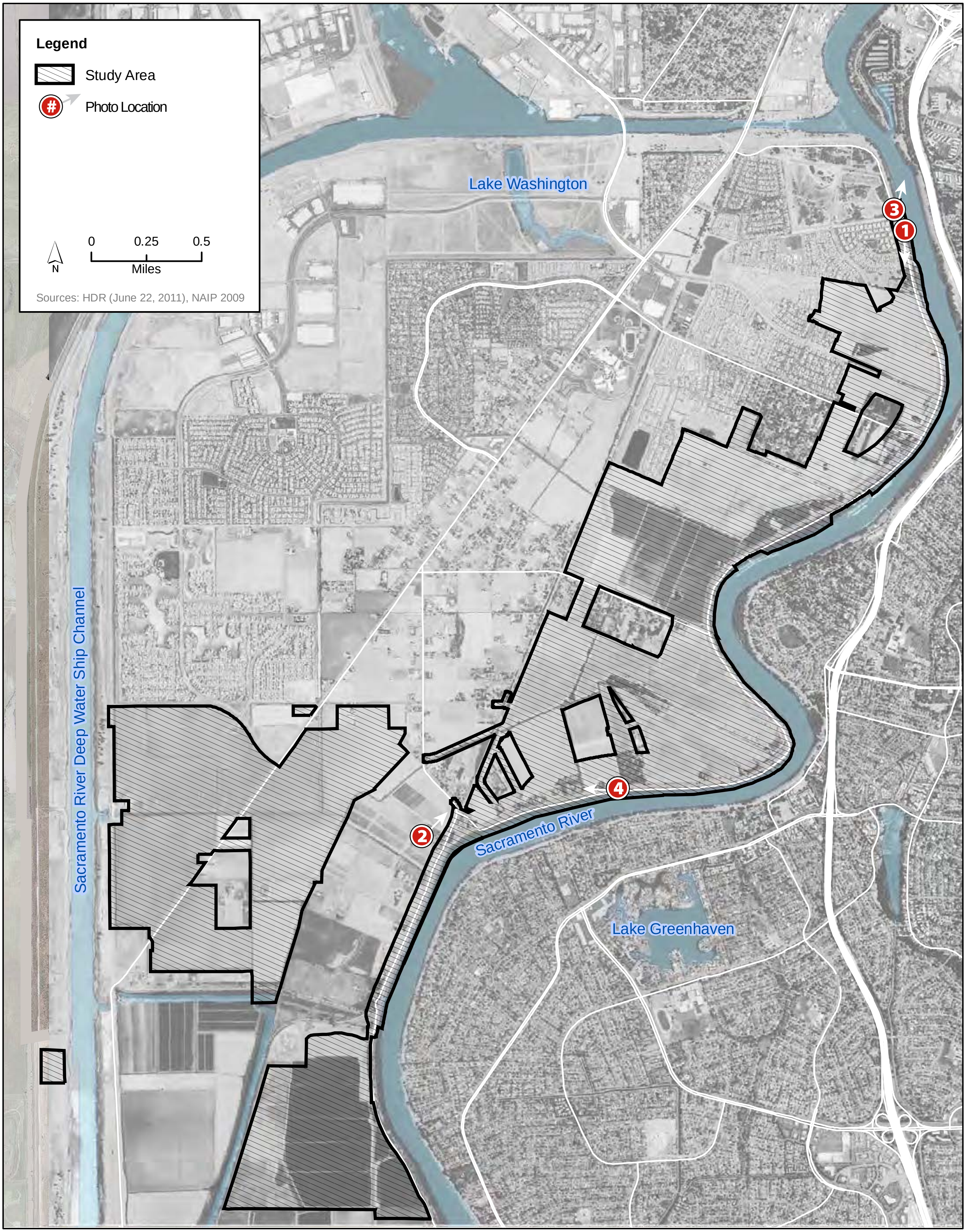
Plate 3.12-1
Census Tracts



Graphics ... 00071.11 (9/20/12) AB

Plate 3.13-1
Representative Photo Locations

Photo 1: Looking south from S. River Road toward suburban development.

Photo 2: Looking northeast from S. River Road toward a rural residence and agricultural lands.

Graphics …00071.11 (9/20/12) AB

Plate 3.13-2
Representative Photos


Photo 3: Looking northeast from S. River Road toward downtown Sacramento.


Photo 4: Looking southwest from S. River Road toward the Vaca Mountains.

Graphics …00071.11 (9/20/12) AB

Plate 3.13-2 (con'd.)
Representative Photos

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Plate 3.15-1
Utility Relocation