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MAY 2018

Lower Elkhorn Basin Levee Setback Project

Environmental Impact Statement/ Environmental Impact Report

Prepared for:

U.S. Army Corps of Engineers
Sacramento District

Department of Water Resources
State of California

NEPA Cooperating Agencies:

NOAA Fisheries

U.S. Fish & Wildlife Service

Draft

Lower Elkhorn Basin
Levee Setback Project
Environmental Impact Statement/
Environmental Impact Report

SCH# 2016092015

Prepared for:

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DRAFT ENVIRONMENTAL IMPACT STATEMENT/
DRAFT ENVIRONMENTAL IMPACT REPORT
LOWER ELKHORN BASIN LEVEE SETBACK PROJECT, YOLO COUNTY, CALIFORNIA
ABSTRACT

Federal Lead Agency: U.S. Army Corps of Engineers (USACE), Sacramento District
State Lead Agency: California Department of Water Resources (DWR)

This Draft Environmental Impact Statement/Draft Environmental Impact Report (DEIS/DEIR) has been prepared by USACE and DWR in accordance with the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), respectively. The DEIS/DEIR evaluates the potential environmental impacts of DWR's Lower Elkhorn Basin Levee Setback Project (LEBLS project or project). DWR is requesting permission from USACE pursuant to Section 14 of the Rivers and Harbors Act of 1899 (33 United States Code [USC] Section 408, referred to as "Section 408") for alteration of Federal project levees; and Section 404 of the Clean Water Act (33 USC Section 1344) for placement of fill in jurisdictional waters of the United States. This EIS/EIR covers the requested permission and permit authorizations from USACE. The National Marine Fisheries Service and the U.S. Fish and Wildlife Service are cooperating agencies under NEPA.

Consistent with DWR's 2012 Central Valley Flood Protection Plan (CVFPP), the project would expand the flood capacities of the Yolo and Sacramento Bypasses, which are both critical flood risk reduction elements for major urban and agricultural areas in the lower Sacramento River watershed. The project would lower flood stages in the Sacramento River and upper Yolo Bypass, reducing flood risks to portions of the Cities of Sacramento, West Sacramento, and Woodland. Located in Yolo County, just west of the Sacramento River at the north end of the Natomas Basin, the project site extends along the Sacramento Bypass and continues north along the east side of the Yolo Bypass terminating just south of Interstate 5. The LEBLS project includes the design, engineering, permitting, real estate acquisition, and construction of between 5-7 miles of new setback levees (depending on alternative), partial or full old levee degrades, seepage berms, cutoff walls, relief wells, erosion protection, and ecosystem enhancement through floodplain expansion and required project mitigation, consistent with the CVFPP.

This DEIS/DEIR includes detailed environmental analyses of five alternatives: No Action Alternative; Alternative 2 (DWR's Preferred Alternative – 7-Mile Setback Partial Degrade), Alternative 3 (7-Mile Expanded Setback Full Degrade), Alternative 4 (5-Mile Expanded Setback Partial Degrade), and Alternative 5 (5-Mile Setback Full Degrade).

Public Review and Comment:
The public comment period for the DEIS/DEIR begins on May 25, 2018, and closes on July 9, 2018. A joint public meeting on the DEIS/DEIR will be conducted by USACE and DWR on Thursday, June 7, 2018 from 4 p.m. to 6 p.m. at West Sacramento City Hall, 1110 West Capitol Avenue, West Sacramento, California 95691.

For further information regarding the DEIS/DEIR, please contact Tanis Toland, USACE Sacramento District, 1325 J Street, Sacramento, CA, 95814, or email Tanis.J.Toland@usace.army.mil; or Erin Brehmer, California Department of Water Resources, 3464 El Camino Avenue, Sacramento, CA 95821, or email Erin.Brehmer@water.ca.gov.

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Executive Summary

ES.1. Introduction

The California Department of Water Resources (DWR) is proposing the Lower Elkhorn Basin Levee Setback project (the proposed action, LEBLS project, or the project) in Yolo County, California, to reduce flood risk on the Sacramento River to the greater Sacramento area. The Lower Elkhorn Basin is bounded by Interstate 5 (I-5) on the north, the Sacramento River on the east, the Sacramento Bypass on the south, and the Tule Canal on the west. The project would set back levees protecting the Lower Elkhorn Basin, including the Sacramento Bypass North Levee and a portion of the Yolo Bypass East Levee, thereby increasing the capacity of the Yolo and Sacramento Bypasses and reducing flood risks on the upper Yolo Bypass and Sacramento River. The project would also implement several ecosystem project elements to increase habitat for special-status species, including fish.

DWR is the lead agency under the California Environmental Quality Act (CEQA). To implement the proposed improvements, DWR is requesting permission from the U.S. Army Corps of Engineers (USACE), Sacramento District pursuant to Section 14 of the Rivers and Harbors Act of 1899 (RHA) (Title 33 of the United States Code [USC], Section 408 [33 USC 408]) (referred to hereafter as Section 408), for the alteration of Federal flood management facilities. DWR is also seeking a Department of the Army Permit under Section 404 of the Clean Water Act (CWA) for discharge of dredged or fill material in jurisdictional waters of the United States. Therefore, because DWR is seeking such permission and authorizations from USACE, USACE is the lead agency under the National Environmental Policy Act (NEPA). The National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) are NEPA Cooperating Agencies.

This document is a project-level joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR). It analyzes impacts associated with implementing DWR’s Preferred Alternative (i.e., the “Proposed Project” under CEQA) and three other action alternatives at an equal level of detail, plus a No Action/No Project Alternative. The project-level NEPA and CEQA documentation is intended to provide USACE and DWR with the environmental information needed to support their decisions whether to approve the project. USACE anticipates that Section 408 permission and Section 404 permit decisions can be made for this project without additional NEPA analysis beyond this EIS/EIR, as long as there are no substantial project changes or deviations from proposed uses or the condition of these uses.

The project site, located in the Lower Elkhorn Basin, is primarily used for agricultural production of row crops (e.g., tomatoes, sunflowers, safflowers); alfalfa; and nut-bearing orchards. The population in the Basin is less than 100 people, and less than 100 building structures including farm buildings, permanent and temporary residences, and commercial buildings. The Basin is subdivided by interior drainage canals forming three subbasins identified as Reclamation Districts (RD): RD 537 (southeast half of Basin), RD 785 (southwest half of Basin), and RD 827 (northern part of Basin). The RDs each operate their own interior drainage canals and pump systems for crop irrigation and interior drainage. The topography of the Lower Elkhorn Basin area is relatively flat and slopes gently from northeast to southwest. The ground surface elevations range from about 10 to 25 feet (North American Datum of

1983 [NAD83]). The Yolo Bypass is oriented generally north to south. The Sacramento Bypass channel is oriented east to west.

ES.2. Statement of Project Purpose and Need, and Objectives

The project purpose is to reduce flood risk to the Cities of Sacramento, West Sacramento, and Woodland by improving the flood management system consistent with the State-approved 2012 Central Valley Flood Protection Plan.

The need for the project is described below.

- A high risk of flooding threatening life and public safety, property, critical infrastructure, and the environment exists throughout the areas protected by the Yolo and Sacramento Bypasses, including, but not limited to portions of the Cities of Sacramento, West Sacramento, and Woodland.
- The Sacramento River Flood Control Project, including the Yolo and Sacramento Bypasses, has inadequate capacity to convey large flood events and needs improvement, as measured in the Yolo Bypass upstream of I-5 and in the Sacramento River at the I Street Bridge.
- The existing Sacramento Bypass North Levee and portions of the Yolo Bypass East Levee are deficient (do not meet current design standards), as evidenced by several slope failures in early 2017.
- The long-term operation, maintenance, repair, replacement and rehabilitation costs for the flood management facilities are expected to continue to increase as these facilities age.
- Climate change may increase hydrologic variability and may put further stress on the flood management system and erode the level of protection provided from previous flood system investments; an increase in system capacity is needed to provide resiliency in the face of uncertain future flow conditions due to climate change.
- Impaired hydrologic and geomorphic processes; eliminated, fragmented, and degraded habitat; and other stressors have reduced the abundance, distribution, and diversity of native aquatic and terrestrial species in the Sacramento Basin.
- Native fish and riparian habitats have been greatly reduced in the Sacramento River Basin.
- Yolo Bypass projects provide unique opportunities to help restore native fish habitat and/or improve fish passage to produce systemwide benefits.

The project objectives are described below.

- Improve public safety by providing localized and substantial flood stage reduction in the Yolo Bypass (as measured at I-5) and Sacramento River (as measured at I Street Bridge), directly upstream and downstream of the Sacramento Weir, consistent with CVFPP goals and objectives.
- Improve flood system resiliency in the face of uncertain future climate and flow conditions by increasing Sacramento Bypass and Upper Yolo Bypass capacities for a 100-year flood event, consistent with CVFPP goals and objectives.

- Provide additional Sacramento Bypass conveyance capacity to enable increased flows over the existing Sacramento Weir and accommodate potential future weir expansions.
- Reduce flood facility operations and maintenance requirements, repairs, and costs.
- Minimize impacts to agricultural production to the extent feasible, consistent with CVFPP objectives.
- Identify potential locations for improving ecosystem functions and contributing to meeting Central Valley Flood System Conservation Strategy (CVFSCS) objectives, consistent with CVFPP goals, while still meeting river stage and bypass conveyance goals.
- Maximize multiple project benefits within funding constraints.
- Minimize impacts to aviation safety to the extent feasible.
- Minimize environmental impacts to the extent feasible.
- Enter into a construction contract by 2020 to meet existing funding requirements.

The project purpose and objectives also require that the project be consistent with CVFPP goals and objectives (DWR 2012a, 2016a).

ES.3. Public Involvement

Public Scoping

On September 8, 2016, USACE issued the Notice of Intent (NOI) to inform agencies and the general public that a joint EIS/EIR was being prepared for the project and invited comments on the scope and content of the document. The NOI was published in the *Federal Register* Vol. 81, No.174, on September 8, 2016. The NOI was also published on the USACE website at: http://www.spk.usace.army.mil/Media/Regulatory-Public-Notices/Article/939929/spk-2016-00457-notice-of-intent-noi-to-prepare-a-joint-environmental-impact-sta/. USACE posted the NOI on September 9, 2016, with an expiration date of October 7, 2016. Agencies and interested parties were given the opportunity to provide USACE with written comments on the proposed scope and content of the EIS/EIR until October 7, 2016 to align with the CEQA Notice of Preparation (NOP) time mandate.

On September 7, 2016, DWR and the State Clearinghouse issued the NOP to inform agencies and the general public that a joint EIS/EIR was being prepared for the project and invited comments on the scope and content of the document. The NOP contained information on the location, date, and time of the scoping meeting. The NOP was also published on the DWR project website at: http://water.ca.gov/floodmgmt/reduce/l-elkhorn.cfm. Additionally, the NOP release and announcement of the joint EIS/EIR scoping meeting was published in the *Sacramento Bee*, the newspaper of greatest general circulation.

As mandated under CEQA, the NOP was circulated for a minimum 30-day public review period, beginning on September 7, 2016, and ending on October 7, 2016. Agencies and interested parties were given the opportunity to provide DWR with written comments on the proposed scope and content of the EIS/EIR until 5 p.m. on October 7, 2016.

USACE and DWR held a joint public scoping meeting on September 15, 2016, in West Sacramento. Six members of the public attended the public scoping meeting. No verbal or written comments were submitted during the public scoping meeting. Written comments on the Lower Elkhorn Levee Setback Project were received by USACE and/or DWR from the following Federal, State, and regional and local agencies, and nongovernmental organizations:

- U.S. Environmental Protection Agency
- California Department of Fish and Wildlife
- Central Valley Regional Water Quality Control Board
- Delta Stewardship Council
- Native American Heritage Commission
- County of Yolo
- Lower Sacramento/Delta North Region
- California Farm Bureau Federation
- Pacific Gas and Electric Company
- Yolo Basin Foundation

Upon request, DWR held and attended a total of more than 30 meetings with interested parties, including NMFS; U.S. Bureau of Reclamation; USFWS; California Department of Fish and Wildlife (CDFW); Yolo County; Sacramento Area Flood Control Agency; RDs 537, 785, and 827; and local landowners. A comprehensive scoping report covering all aspects of public scoping for the project is presented in Appendix A, "Lower Elkhorn Basin Levee Setback Project Public Scoping Report."

Public Review of Draft EIS/EIR

The Draft EIS/Draft EIR (DEIS/DEIR) is being circulated for a 45-day public review period from May 25, 2018 to July 9, 2018, and a joint public meeting on the DEIS/DEIR will be conducted by USACE and DWR on Thursday, June 7, 2018 from 4 p.m. to 6 p.m. at West Sacramento City Hall, 1110 West Capitol Avenue, West Sacramento, California 95691.

The DEIS/DEIR is available for review online at USACE's website, http://www.spk.usace.army.mil/Missions/Regulatory/Permitting/Environmental-Impact-Statements/ and also at DWR's project website, https://www.water.ca.gov/Programs/Flood-Management/Flood-Projects/Lower-Elkhorn-Basin. A CD containing the DEIS/DEIR will be provided upon request. The DEIS/DEIR is also available for review by the public during normal business hours at DWR's office located at 3634 El Camino Avenue, Sacramento, CA. The DEIS/DEIR is being distributed for a 45-day review period that will end on July 9, 2018. Written comments on the DEIS/DEIR must be postmarked no later than 5 p.m. on July 9, 2018.

If comments are provided via email, please include the project title in the subject line, attach comments in MS Word format, and include the commenter's mailing address. Comments should be sent to the following addresses:

Federal (NEPA) Lead Agency Contact:
Tanis Toland
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, CA 95814-2922
Email: Tanis.J.Toland@usace.army.mil

State (CEQA) Lead Agency Contact:
Erin Brehmer
California Department of Water Resources
3464 El Camino Avenue
Sacramento, CA 95821
Email: Erin.Brehmer@water.ca.gov

A joint public meeting on the DEIS/DEIR will be conducted by USACE and DWR on Thursday, June 7, 2018 from 4 p.m. to 6 p.m. at West Sacramento City Hall, 1110 West Capitol Avenue, West Sacramento, California 95691. Comments on the DEIS/DEIR will be accepted during the meeting. Written comments may also be submitted throughout the comment period as described above. Once all comments have been assembled and reviewed, responses will be prepared to address substantive environmental issues that have been raised in the comments. The responses will be included in a Final EIS/EIR (FEIS/FEIR). All comments received by USACE and DWR are public records, subject to disclosure under the Freedom of Information Act or the Public Records Act.

Next Steps in the NEPA and CEQA processes

The FEIS/FEIR will be prepared and circulated in accordance with NEPA and CEQA requirements and will include responses to all comments on the DEIS/DEIR. The FEIS/FEIR will constitute a reprint of the entire DEIS/DEIR, as required by USACE. When the FEIS/FEIR is complete, two processes will occur: (1) USACE will publish the document, and the Notice of Availability (NOA) will be printed in the *Federal Register*, which will mark the start of a 30-day public review period before USACE can issue a Record of Decision (ROD) to implement a preferred alternative, and (2) DWR will publish a Notice of Completion (NOC), which will mark the start of a 10-day public review period before DWR can certify the FEIR, issue Findings of Fact and a Statement of Overriding Considerations, file the Notice of Determination (NOD), and approve DWR’s Preferred Alternative or another alternative, including the No Project Alternative. Once the NOD is filed, a CEQA statute of limitations period will run for an additional 30 days.

ES.4. Areas of Known Controversy

Areas of known controversy and issues to be resolved are summarized below.

- Land ownership, use, and management of affected lands in the Yolo Bypass floodplain at the project site after project construction. DWR continues to engage stakeholders, but the future ownership and management of lands in the Yolo Bypass expanded floodplain has not yet been decided.

- Agricultural-based issues such as maintaining agricultural lands and minimizing farmland loss, impacts on the agricultural economy, conflicts with adjacent land uses, potential loss of property tax revenues, levee setback alignments that minimize farmland loss, cumulative habitat restoration project impacts on agriculture in the Yolo Bypass, potential drainage and access impacts and the timing of proposed inundation, and appropriate mitigation to offset farmland loss and related agricultural impacts. This EIS/EIR includes analysis of agricultural impacts related to these identified issues.

- Potential impacts from changes in flood flow frequency and duration on downstream agriculture and managed wetlands in the Yolo Bypass, as well as financial burdens on local reclamation districts, local communities, and the Counties of Yolo and Solano. The project would not substantially affect the flood-flow frequency, duration, or stage in downstream areas of the Yolo Bypass during 100- and 200-year flood events.

- Potential impacts to threatened and endangered species, critical habitat, and Tribal and cultural resources. These impacts have been evaluated in Chapter 4, “Affected Environment, Environmental Consequences, and Mitigation Measures.”

ES.5. Consultation and Coordination

Tribal Consultation

In September 2016, DWR sent letters to the following Native American Tribes notifying them of the project and inquiring about their interest in providing input:

- Buena Vista Rancheria of Me-Wuk Indians
- Cortina Band of Indians
- Ione Band of Miwok Indians
- Nashville Eldorado Miwok
- Shingle Springs Band of Miwok Indians
- Tsi-Akim Maidu
- United Auburn Indian Community of the Auburn Rancheria (UAIC)
- Yocha Dehe Wintun Nation
- Wilton Rancheria

As of June 6, 2017, USACE has consulted with the following Native American Tribes:

- Cortina Band of Indians
- United Auburn Indian Community of the Auburn Rancheria (UAIC)
- Yocha Dehe Wintun Nation

The Ione Band of Miwok Indians, Shingle Springs Band of Miwok Indians, UAIC, and Wilton Rancheria requested to be involved in the consultation process for this project, and have been included in consultation under Section 106.

USACE is continuing to consult with interested Tribes in accordance with standard procedures implementing Section 106 of the National Historic Preservation Act. DWR is continuing to consult with interested Tribes in accordance with Assembly Bill 52 and DWR’s Tribal Engagement Policy.

Agency and Stakeholder Coordination

In addition to the public scoping activities summarized above, USACE sent letters on October 6, 2016 to NMFS and USFWS inviting them to serve as NEPA Cooperating Agencies. Both Federal agencies accepted the invitation to serve as NEPA Cooperating Agencies.

DWR has conducted a series of outreach meetings since summer 2016 with various agencies and stakeholders to receive input on project components and other aspects of the project. More than 30 meetings have been held. The primary focus of these meetings has been to present project information and obtain input on project components, as well as generally collaborate with agencies and stakeholders to discuss project components and issues. Meetings have included Federal and State agencies and regional and local interests. To date, outreach has been conducted with: USACE, USFWS, NMFS, CDFW, Central Valley Protection Board, Yolo County (including Department of Parks and Recreation and Habitat Conservation Plan/Natural Communities Conservation Plan planning staff), the Lower Sacramento/Delta North Regional Flood Management Planning Group, and planning team members from the California EcoRestore and Yolo Bypass Salmonid Habitat Restoration and Fish Passage Projects. A list of agencies (and stakeholders) notified regarding the project is listed in Chapter 7, "Consultation and Coordination."

ES.6. Alternatives

After formulating and considering many alternatives, four action alternatives were retained for detailed analysis in the EIS/EIR. Alternative 1 (No Action Alternative) does not meet critical project objectives, but is retained for detailed analysis because it is required under NEPA and CEQA requirements. Alternatives 2 (DWR's Preferred Alternative) and 3 meet most or all project objectives and have a high degree of feasibility based on evaluation against the screening criteria presented in Chapter 3, "Alternatives." Alternatives 4 and 5 appear to meet most of the project objectives and have a moderate degree of feasibility based on evaluation against the screening criteria. Alternatives 3 through 5 also reduce at least one environmental impact associated with Alternative 2 (DWR's Preferred Alternative).

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not authorize DWR to construct setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies (levees that do not meet current design standards) along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland.

Alternative 2: 7-Mile Expanded Setback Partial Degrade (DWR's Preferred Alternative)

This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south, which would be set back approximately 1,500 feet east of the existing alignment. It would begin just south of I-5 and continue approximately 5.5 miles south, ending at the new Sacramento Bypass North Levee. The Sacramento Bypass would be expanded by constructing a new setback levee 1,500 feet north of the existing levee, which would be approximately 1.6 miles long. Although most of the existing Yolo Bypass East Levee and Sacramento Bypass North Levee would be degraded following construction of the setback levees, up to 4,500 linear feet of the Yolo Bypass East Levee would be left in place to provide upland habitat for special-status species.

Other components of Alternative 2, common to Alternatives 3, 4, and 5 as well, are listed below.

- Construction of seepage berms, cutoff walls, relief wells, and/or waterside rock armoring on the Yolo Bypass East Levee Setback, the Sacramento Bypass North Levee setback, and the Sacramento Bypass Training Levee, a portion of the Sacramento Bypass South Levee.

- Construction of a gated operations and maintenance (O&M) corridor along the toe of the levee, which would include a road for future levee O&M activities, and use of several haul roads to access the project construction areas.

- Relocation of various above ground utility infrastructure such as power poles and below-ground infrastructure such as the Wickland jet fuel pipeline underneath the Sacramento Bypass; relocation and reconstruction of portions of County Roads 124 and 126; construction of a new drainage canal on the east side of the new Yolo Bypass East Levee setback; and relocating and consolidating existing pump stations on the landside of the levee.

- Excavation of borrow material from the existing levees, within the setback areas, and potentially along the RD 785 and 537 Cross Levees.

- Implementation of a suite of ecosystem benefits including (1) increasing the amount of floodplain habitat to benefit fish species; (2) providing floodplain and emergent wetland habitat adjacent to the existing Tule Canal; (3) encouraging wildlife-friendly agricultural practices on most of the project site; and (4) installing riparian plantings along the east side of the Tule Canal, along the edge of the newly constructed Sacramento Bypass North Levee, and/or within the existing Sacramento Bypass within the footprint of the existing Sacramento Bypass North Levee (after portions of the levee is degraded).

Alternative 3: 7-Mile Expanded Setback Full Degrade

Alternative 3 includes a setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south. It would begin just south of I-5 and would be set back approximately 1,500 feet east of the existing levee in the northern and middle portions of the Basin, continuing south approximately 4.2 miles. From there, the levee setback would expand to 3,000 feet in the southern portion of the Basin, and continue for about 1.3 miles, ending at the new Sacramento Bypass North Levee. The Sacramento Bypass would be expanded by constructing a new setback levee 1,500 feet north of the existing levee and would be approximately 1.3 miles long. Following construction of the new setback levees, the existing Yolo Bypass East Levee and Sacramento Bypass North Levee would be degraded in the project site.

Alternative 4: 5-Mile Expanded Setback Partial Degrade

Alternative 4 excludes levee setbacks in the northern part of the Lower Elkhorn Basin. This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south. It would begin approximately 2.5 miles south of I-5 (just south of the existing RD 784 Cross Levee), where it would be set back approximately 1,500 feet, and would continue south approximately 1.7 miles. From there, the levee setback would expand to 3,000 feet in the southern portion of the Basin, spanning 1.3 miles, and ending at the new Sacramento Bypass North Levee. The Sacramento Bypass would be expanded by constructing a new setback levee 1,500 feet north of the existing levee, which would be approximately 1.3 miles long. Although most of the existing Yolo Bypass East Levee and Sacramento Bypass North Levee would be degraded following construction of the setback levees, up to 4,500 linear feet of the Yolo Bypass East Levee would remain to provide upland habitat for special-status species.

Alternative 5: 5-Mile Setback Full Degrade

Similar to Alternative 4, Alternative 5 excludes levee setbacks in the northern part of the Lower Elkhorn Basin, but maintains a full degrade of the affected portion of the Yolo Bypass East Levee. This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south, which would be set back approximately 1,500 feet east of the existing alignment. It would begin approximately 2.5 miles south of I-5 (just south of the existing RD 784 Cross Levee) continuing approximately 3 miles south, ending at the new Sacramento Bypass North Levee. The Sacramento Bypass would be expanded by constructing a new setback levee 1,500 feet north of the existing levee and would be approximately 1.6 miles long. Following construction of the setback levees, the existing Yolo Bypass East Levee and Sacramento Bypass North Levee would be degraded in the project area.

ES.7. Comparison of Impacts between Alternatives

Federal NEPA guidelines require identification of an environmentally preferable alternative; however, under NEPA, that alternative does not need to be identified until the ROD is issued. The State CEQA Guidelines require identification of an environmentally superior alternative from among the action alternatives. If the No Action (No Project) Alternative is environmentally superior, CEQA requires identification of the "environmentally superior alternative" other than the No Project Alternative.

Table ES-1 compares the significance conclusions for selected impacts. Impact mechanisms were included in Table ES-1 if one or more alternatives would result in a significant and unavoidable impact, or if there were substantial differences in the significance conclusions between one or more alternatives. Those environmental impacts not included in Table ES-1 were less than significant or had no impact for any of the alternatives (after mitigation), and were similar across all alternatives. Under all action alternatives, temporary construction and long-term O&M impacts, as well as long-term flood risk reduction, increased riparian/shaded riverine aquatic habitat, and other habitat benefits, would occur compared to the No Action Alternative and existing conditions.

Table ES-2 summarizes key hydraulic changes at selected locations that compare differences between the alternatives. Alternatives 2 and 3 exhibit the greatest flood risk reduction at key points in the Sacramento River Flood Control System. Small relatively equal stage increases occur with all action alternatives in the Yolo Bypass downstream of the Sacramento Bypass, as flood waters are conveyed through the Sacramento and Yolo Bypasses as intended during 100- and 200-year flood events. Alternatives 4 and 5 result in smaller flood reduction benefits, and hence the largest potential risk of a catastrophic flood within the Cities of Sacramento, West Sacramento, and Woodland.

Table ES-3 presents an overview summary comparison of impacts by resource topic. A detailed display of specific effects and mitigation measures is presented below in Table ES-4.

Table ES-1. Comparison of Key Impacts and Benefits between Alternatives

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Aesthetics					
VIS-2: Changes in Scenic Vistas and Existing Visual Character	LTS	SU	SU	SU	SU
Biological Resources – Fish and Aquatic Organisms					
FISH-2: Loss or Degradation of Riparian and Shaded Riverine Aquatic Cover Associated with Levee Construction and Degradation	LTS	**B**	**B**	**B**	**B**
FISH-4: Fish Stranding in Expanded Setback Levee Areas Associated with Enhanced Floodplain Inundation	**B**	LTS	LTS	LTS	LTS
Cultural Resources					
CR-1: Damage to or Destruction of Built Environment Historic Properties	NI	SU	SU	SU	SU
Hazards and Hazardous Materials					
HAZ-4: Creation of Potential Safety Hazards, Including Possible Birdstrike, in the Vicinity of a Public or Private Airport	NI	SU	SU	SU	SU
HAZ-5: Creation of Potential Wildland Fire Hazards	PS	LTS(m)	LTS(m)	LTS(m)	LTS(m)

Table ES-1. Comparison of Key Impacts and Benefits between Alternatives

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Land Use and Planning, and Agricultural and Forestry Resources					
AG-1: Conversion of Substantial Amounts of Important Farmland to Nonagricultural Uses and Conversion of Land under Williamson Act Contracts to an Inconsistent Use	NI	SU	SU	SU	SU
Noise and Vibration					
NOI-1: Potential Exposure of Persons to or Generation of Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance, or in Other Applicable Local, State, or Federal Standards	NI	SU	SU	SU	SU
NOI-3: Potential for Substantial Temporary or Periodic Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing without the Project	NI	SU	SU	SU	SU
Socioeconomics (including Population, Housing, and Employment)					
SOCIO-2: Cause a Substantial Decrease in Total Agricultural Production Values (NEPA Only)	NI	SU	SU	SU	SU
Traffic and Transportation					
TR-1: Increase in Traffic Volumes or Decrease in Capacity along Designated Roadways in the Project Site and Vicinity	NI	SU	SU	SU	SU

Notes:
B = beneficial
LTS = less than significant
LTS(m) = less than significant after mitigation
NI = no impact
PS = potentially significant
SU = significant impact despite mitigation (i.e., significant and unavoidable)
Source: Data compiled by GEI Consultants in 2017

Table ES-2. Key Hydraulic Results Between Action Alternatives at Selected Locations

ID	Index Point	Existing With Project								Future With Project (Cumulative)							
		100 yr				200 yr				100 yr				200 yr			
		Alt 2	Alt 3	Alt 4	Alt 5	Alt 2	Alt 3	Alt 4	Alt 5	Alt 2	Alt 3	Alt 4	Alt 5	Alt 2	Alt 3	Alt 4	Alt 5
24	Yolo Bypass Upstream of I-5	-0.71	-0.81	-0.29	-0.25	-0.66	-0.75	-0.28	-0.24	-0.72	-0.81	-0.31	-0.26	-0.65	-0.75	-0.28	-0.24
47	Sacramento River at the I Street Bridge	-0.81	-0.76	-0.75	-0.70	-0.87	-0.83	-0.82	-0.77	-1.91	-1.97	-1.80	-1.77	-1.98	-2.04	-1.87	-1.85
48	Sacramento River at Freeport	-0.65	-0.61	-0.60	-0.56	-0.70	-0.66	-0.65	-0.61	-1.42	-1.46	-1.37	-1.35	-1.59	-1.64	-1.51	-1.49
28	Yolo Bypass Downstream of Sac Bypass	0.10	0.10	0.09	0.08	0.13	0.13	0.11	0.10	0.19	0.20	0.18	0.18	0.24	0.25	0.21	0.21
29	Yolo Bypass Upstream of I-80	0.09	0.09	0.08	0.08	0.13	0.13	0.10	0.10	0.19	0.19	0.17	0.17	0.24	0.25	0.21	0.21
30	Yolo Bypass Near West Sacramento	0.09	0.09	0.08	0.07	0.12	0.12	0.10	0.09	0.17	0.18	0.16	0.16	0.21	0.22	0.19	0.19
31	Yolo Bypass Downstream of Putah Creek	0.09	0.09	0.08	0.08	0.11	0.11	0.09	0.08	0.17	0.18	0.16	0.16	0.20	0.21	0.18	0.17
32	Yolo Bypass at Lisbon	0.09	0.09	0.08	0.08	0.11	0.11	0.09	0.09	0.17	0.18	0.16	0.16	0.20	0.21	0.18	0.18
34	Yolo Bypass Upstream of RD 2068	0.10	0.10	0.09	0.08	0.11	0.11	0.09	0.09	0.19	0.20	0.17	0.17	0.20	0.21	0.18	0.18
22	Sutter Bypass Upstream of Fremont Weir	-0.14	-0.14	-0.08	-0.07	-0.14	-0.15	-0.08	-0.07	-0.21	-0.22	-0.15	-0.14	-0.21	-0.22	-0.14	-0.14
45	Sac River Downstream of Knights Landing	-0.16	-0.17	-0.08	-0.07	-0.16	-0.17	-0.09	-0.08	-0.21	-0.23	-0.14	-0.13	-0.21	-0.22	-0.13	-0.12
51	Sac River at Rio Vista	0.02	0.02	0.01	0.01	0.02	0.03	0.02	0.02	-0.37	-0.39	-0.32	-0.31	0.03	0.04	0.03	0.03

Notes:
All stage changes presented in feet
Comparisons are to Existing Conditions (same as Alternative 1, No Action Alternative) for 100-year and 200-year flood events
Green = stage decrease 0.20 feet or greater
Yellow = stage increase 0.20 feet or greater

Table ES-3. Comparative Summary of Impacts by Resource Topic

	Alternative 1: No Action Alternative	Alternative 2: DWR's Preferred Alternative	Alternative 3: 7-Mile Expanded Setback Full Degrade	Alternative 4: 5-Mile Expanded Setback Partial Degrade	Alternative 5: 5-Mile Setback Full Degrade
Aesthetics					
Impacts Before Mitigation	LTS	S	S	S	S
Impacts After Mitigation		SU	SU	SU	SU
Air Quality					
Impacts Before Mitigation	NI	S	S	S	S
Impacts After Mitigation		LTS	LTS	LTS	LTS
Biological Resources – Fish and Aquatic Organisms					
Impacts Before Mitigation	LTS	PS	PS	PS	PS
Impacts After Mitigation		LTS	LTS	LTS	LTS
Biological Resources – Vegetation and Wildlife					
Impacts Before Mitigation	LTS	PS	PS	PS	PS
Impacts After Mitigation		LTS	LTS	LTS	LTS
Biological Resources – Wetlands and Other Waters					
Impacts Before Mitigation	NI	PS	PS	PS	PS
Impacts After Mitigation		LTS	LTS	LTS	LTS
Climate Change					
Impacts Before Mitigation	NI	LTS	LTS	LTS	LTS
Impacts After Mitigation		LTS	LTS	LTS	LTS
Cultural Resources					
Impacts Before Mitigation	NI	S	S	S	S
Impacts After Mitigation		SU	SU	SU	SU
Energy					
No Impacts or Mitigation Measures					
Environmental Justice					
Impacts Before Mitigation	NI	NI	NI	NI	NI
Impacts After Mitigation		NI	NI	NI	NI
Geology, Soils, and Paleontological Resources					
Impacts Before Mitigation	NI	PS	PS	PS	PS
Impacts After Mitigation		LTS	LTS	LTS	LTS
Groundwater Resources					
Impacts Before Mitigation	NI	LTS	LTS	LTS	LTS
Impacts After Mitigation		LTS	LTS	LTS	LTS

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Table ES-3. Comparative Summary of Impacts by Resource Topic

	Alternative 1: No Action Alternative	Alternative 2: DWR's Preferred Alternative	Alternative 3: 7-Mile Expanded Setback Full Degrade	Alternative 4: 5-Mile Expanded Setback Partial Degrade	Alternative 5: 5-Mile Setback Full Degrade
Hazards and Hazardous Materials					
Impacts Before Mitigation	NI	PS	PS	PS	PS
Impacts After Mitigation		SU	SU	SU	SU
Hydrology, Hydraulics, and Flood Risk Management					
Impacts Before Mitigation	LTS	LTS	LTS	LTS	LTS
Impacts After Mitigation		LTS	LTS	LTS	LTS
Land Use and Planning, and Agricultural and Forestry Resources					
Impacts Before Mitigation	NI	S	S	S	S
Impacts After Mitigation		SU	SU	SU	SU
Mineral Resources					
Impacts Before Mitigation	NI	LTS	LTS	LTS	LTS
Impacts After Mitigation		LTS	LTS	LTS	LTS
Noise and Vibration					
Impacts Before Mitigation	NI	S	S	S	S
Impacts After Mitigation		SU	SU	SU	SU
Recreation					
Impacts Before Mitigation	NI	S	S	S	S
Impacts After Mitigation		LTS	LTS	LTS	LTS
Socioeconomics (including Population, Housing, and Employment)					
Impacts Before Mitigation	NI	S	S	S	S
Impacts After Mitigation		SU	SU	SU	SU
Traffic and Transportation					
Impacts Before Mitigation	NI	S	S	S	S
Impacts After Mitigation		SU	SU	SU	SU
Utilities and Service Systems					
Impacts Before Mitigation	NI	PS	PS	PS	PS
Impacts After Mitigation		LTS	LTS	LTS	LTS
Water Quality					
Impacts Before Mitigation	NI	PS	PS	PS	PS
Impacts After Mitigation		LTS	LTS	LTS	LTS

Note: This table provides an overview of impacts, and identifies the highest level of impact for each resource topic. Please refer to Table ES-5 for a detailed comparison of individual impacts.

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Several key differences among the four action alternatives (Alternatives 2–5) are summarized below.

- Among the action alternatives, Alternative 3 would entail the greatest amount of construction, would disturb the largest amount of land, and would result in the largest amount of agricultural land being placed into the Yolo Bypass. Therefore, in general, Alternative 3 would have the greatest level of environmental impacts among the action alternatives.
- Because Alternatives 4 and 5 would entail construction of a shorter setback levee along the East Yolo Bypass (as compared to Alternatives 2 and 3), Alternatives 4 and 5 would require less construction and would disturb a smaller area of land. Therefore, the level of impacts under Alternatives 4 and 5 would be less as compared to Alternatives 2 and 3 for all topic areas evaluated in this EIS/EIR, with a key exception that Alternatives 4 and 5 would have the greatest remaining flood risk to the Sacramento area among the action alternatives (and resulting substantial environmental impacts if a flood occurred), and less habitat benefits.
- Among the action alternatives, Alternative 5 would entail the least amount of construction and would disturb the least amount of land. Therefore, Alternative 5 would have the lowest level of environmental impacts among the action alternatives, with a key exception of having the greatest remaining flood risk to the Sacramento area among the action alternatives (and resulting substantial environmental impacts if a flood occurred), and smaller habitat benefits than Alternatives 2 and 3.
- Alternatives 4 and 5 would not meet all project objectives. Most importantly, they would not provide as high of a level of flood risk reduction as Alternatives 2 and 3 as measured at three key locations (Yolo Bypass upstream of I-5, Sacramento River at I Street Bridge, and Sacramento River at Freeport), and therefore would result in less flood risk reduction for the greater Sacramento area, as well as substantial environmental impacts if a flood occurred.

Under the No Action Alternative, no flood risk reduction improvements would be constructed. There would be a lost opportunity to substantially reduce flood stages in the Sacramento River and thereby substantially reduce the risk of flooding to the Cities of Sacramento, West Sacramento, and Woodland, as well as the substantial environmental impacts that could result from a flood event. Although an improvement in flood risk reduction, Alternatives 4 and 5, with the shortest setbacks of the Yolo Bypass East Levee, would not meet key project objectives and would result in less flood risk reduction. Consequently, Alternatives 4 and 5 have higher risks of flooding than Alternatives 2 and 3, which could cause substantial environmental impacts if a flood event occurred, as presented in “Consequences of No Action,” in Section 3.5.2, “No Action/No Project Alternative Description.” While providing a high level of flood risk reduction, Alternative 3 would also entail the greatest amount of construction, would disturb the largest amount of land, and would result in the largest amount of agricultural land being placed into the Yolo Bypass. Alternative 2 (DWR’s Preferred Alternative) would have lesser environmental impacts than Alternative 3; provide a high level of flood risk reduction very similar to Alternative 3; and would best meet the project purpose, need, and objectives. Therefore, Alternative 2 is the environmentally superior alternative.

The environmentally preferable/superior alternative may not be the preferred alternative for implementation. USACE and DWR will identify the preferred alternative following additional public participation, including input from stakeholders and interested agencies, and consideration of comments received during the public review period for this EIS/EIR.

ES.8. Summary of Impacts and Mitigation Measures

A summary of all direct and indirect impacts and mitigation measures that would result from implementation of each alternative are shown in Table ES-4, with significance conclusions before and after implementation of mitigation.

All action alternatives would make a cumulatively considerable incremental contribution to the following significant cumulative impacts:

- changes in scenic vistas and existing visual character (long-term permanent alteration in the Lower Elkhorn Basin),
- loss of agricultural lands (primarily long-term permanent loss from new levee footprints),
- changes in agricultural economics and values (NEPA only).

There are no feasible mitigation measures to further reduce the cumulatively considerable incremental contribution to these significant cumulative impacts beyond Mitigation Measure VIS-2 for visual impacts and Mitigation Measures AG-1a, AG-1b, and AG-1c for loss of agricultural lands and changes in agricultural economics and values. Consequently, these impacts remain as significant and unavoidable impacts.

ES.9. Summary of Significant and Unavoidable Impacts

Project implementation would result in significant and unavoidable adverse impacts *after implementation of mitigation* as shown in Table ES-5.

Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
4.2 Aesthetics				
VIS-1: Damage to Scenic Resources within State- or County-designated Scenic Highways	Alternative 1: No Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
VIS-2: Changes in Scenic Vistas and Existing Visual Character	Alternative 1: No Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	S	VIS-2a: Screen Construction Sites, Staging Areas, and Borrow Sites within 300 Feet of Residences VIS-2b: Incorporate Visual Screening for Permanent Pipeline Control Structure	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
VIS-3: Introduction of New Sources of Light and Glare	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	VIS-3a: Coordinate Nighttime Lighting with Sacramento International Airport Operations and Restrict Night Lighting within and Near Airport Runway Approaches and Near CHP Academy Airport VIS-3b: Provide Shielding from Nighttime Construction Activities or Offer to Temporarily Relocate Affected Residents	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
4.3 Air Quality				
AIR-1: Conflict with an Air Quality Plan, Contribute to Yolo-Solano Air Quality Management District Standards Exceedance, Generate a Considerable Increase of a Nonattainment Pollutant, and Contribute	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	AIR-1a: Implement the Yolo-Solano Air Quality Management District's Best Management Practices for Construction Emission Control, or Measures that Perform as Well as Yolo-Solano Air Quality Management District Best Management Practices AIR-1b: Implement the Sacramento Metropolitan Air Quality Management District's Enhanced Fugitive PM Dust Control Practices AIR-1c: Use the Sacramento Metropolitan Air Quality Management District's Enhanced Exhaust Control	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
Substantially to Air Quality Violation			Practices for Construction Equipment, and Pay Associated Fees AIR-1d: Use the Yolo-Solano Air Quality Management District's Off-site Mitigation Fee to Reduce NO_X and ROG Emissions, and Pay Associated Fees AIR-1e: Use Dispersion Modeling to Demonstrate PM_{10} Emissions Would Not Exceed the National Ambient Air Quality Standards or State Ambient Air Quality Standards	
AIR-2: Potentially Expose Sensitive Receptors to Substantial Pollutant Concentrations (Dust)	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	AIR-1a: Implement the Yolo-Solano Air Quality Management District's Best Management Practices for Construction Emission Control, or Measures that Perform as Well as Yolo-Solano Air Quality Management District Best Management Practices AIR-1b: Implement the Sacramento Metropolitan Air Quality Management District's Enhanced Fugitive PM Dust Control Practices AIR-1e: Use Dispersion Modeling to Demonstrate PM_{10} Emissions Would Not Exceed the National Ambient Air Quality Standards or State Ambient Air Quality Standards	LTS
AIR-3: Exceed General Conformity *de Minimis* Thresholds (Federal Action Requires Conformity Determination)	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	S	AIR-1a: Implement the Yolo-Solano Air Quality Management District's Best Management Practices for Construction Emission Control, or Measures that Perform as Well as Yolo-Solano Air Quality Management District Best Management Practices AIR-1b: Implement the Sacramento Metropolitan Air Quality Management District's Enhanced Fugitive PM Dust Control Practices AIR-1c: Use the Sacramento Metropolitan Air Quality Management District's Enhanced Exhaust Control	LTS

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
			Practices for Construction Equipment, and Pay Associated Fees AIR-1d: Use the Yolo-Solano Air Quality Management District's Off-site Mitigation Fee to Reduce NO_X and ROG Emissions, and Pay Associated Fees AIR-1e: Use Dispersion Modeling to Demonstrate PM_{10} Emissions Would Not exceed the National Ambient Air Quality Standards or State Ambient Air Quality Standards	
4-4. Biological Resources – Fish and Aquatic Organisms				
FISH-1: Temporary Disturbance of Fish, Habitat Degradation, and Adverse Effects on Fish Health during Construction Activities	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	GEO-2: Acquire Appropriate Regulatory Permits, and Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices, and Comply with Yolo County Improvement Standards for Grading and Erosion Control when Relocating County Road 124 and any Associated Drainage Facilities HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities WQ-1: Limit Ground-disturbance to Construction Areas and Avoid and Limit Disturbance to Stream Banks and Habitats when Feasible WQ-2: Install, Monitor, and Maintain Erosion Control Measures to Minimize Soil or Sediment from Entering Waterways or Wetlands	LTS
FISH-2: Loss or Degradation of Riparian and Shaded Riverine Aquatic Cover Associated with Levee Construction and Degradation	Alternative 1: No Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	B	None	B
	Alternative 1: No Action Alternative	NI	None	NI

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
FISH-3: Degradation and Contamination of Aquatic Habitat and Adverse Effects on Fish Health and Survival Associated with Exposure of Disturbed Soils and Contaminated Materials	Alternative 2: DWR's Preferred Alternative	PS	GEO-2: Acquire Appropriate Regulatory Permits, and Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices, and Comply with Yolo County Improvement Standards for Grading and Erosion Control when Relocating County Road 124 and any Associated Drainage Facilities HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities HAZ-2c: Implement Remediation of Old Bryte Landfill	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
FISH-4: Fish Stranding in Expanded Setback Levee Areas Associated with Enhanced Floodplain Inundation	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
FISH-5: Increases in Aquatic Habitat Associated with Expanded Floodplain Area	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	B	None	B
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
4.5. Biological Resources – Vegetation and Wildlife				
BIO-1: Potential Loss of Special-status Plants and Potential Loss and Degradation of Special-status Plant Habitat	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	BIO-1a: Conduct Focused Surveys for Special-status Plants, and Avoid Impacts, where Feasible BIO-1b: If Avoiding Construction-related Effects on Special-status Plants is Infeasible, Minimize and, where Appropriate, Compensate for Effects on Special-status Plant Species and Loss of Habitat BIO-1c: Prepare and Implement an Invasive Plant Management Plan	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
BIO-2: Potential Effects on Valley Elderberry Longhorn Beetle and Its Habitat	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	BIO-2a: Conduct Focused Surveys for Elderberry Shrubs, and Avoid Impacts, where Feasible BIO-2b: If Avoiding Construction-related Effects on Elderberry Shrubs is Infeasible, Minimize and, where Appropriate, Compensate for Effects on Valley Elderberry Longhorn Beetle and Loss of Habitat	LTS
BIO-3: Potential Disturbance or Loss of Giant Garter Snakes and Their Habitat	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	BIO-3a: Implement Measures to Avoid Impacts to Giant Garter Snake and Its Habitats, where Feasible BIO-3b: If Avoiding Effects on Giant Garter Snake is Infeasible, Minimize and, where Appropriate, Compensate for Effects on This Species and Loss of Habitat	LTS
BIO-4: Potential Disturbance or Loss of Northwestern Pond Turtles and their Habitat	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	BIO-4: Avoid and Minimize Impacts to Northwestern Pond Turtle and Its Habitats, where Feasible	LTS
BIO-5: Potential Loss of Burrowing Owl Individuals from Destruction of Occupied Burrows and Nest Disturbance	Alternative 1: No-Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	BIO-5a: Conduct a Habitat Assessment and Focused Surveys for Burrowing Owls, and Avoid Impacts, where Feasible BIO-5b: If Surveys Detect Burrowing Owl in the Project Area, Implement Measures to Avoid and Minimize Effects to Burrowing Owl and Establish Protective Buffers Around Occupied Burrows and Monitor	LTS
BIO-6: Potential Disturbance of Nesting Special-status Birds and Common Raptor Species, Potential Loss of Active Nests and	Alternative 1: No-Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade	PS	BIO-6a: Compensate for Loss of Swainson's Hawk Foraging Habitat.	LTS

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
Nest Trees, and Potential Loss of Nesting and Foraging Habitat	Alternative 5: 5-Mile Setback Full Degrade		BIO-6b: Conduct Focused Surveys for Nesting Special-status Birds and Common Raptor Species, and Avoid Impacts, where Feasible BIO-6c: If Avoiding Construction-related Effects on Nesting Special-status Birds and Common Raptors is Infeasible, Implement Minimization Measures	
BIO-7: Potential Disturbance or Loss of Roosting Special-Status Bats	Alternative 1: No Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	PS	BIO-7: Avoid and Minimize Disturbance and Loss of Roosting Special-status Bats	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
BIO-8: Potential Disturbance and Loss of Sensitive Habitats, including Riparian Habitat	Alternative 1: No-Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	PS	BIO-8a: Designate, Protect, Avoid, and Monitor Riparian Habitat, and Obtain and Comply with Required State Permits/Authorizations and Conditions BIO-8b: Obtain and Comply with Required State Permits/Authorizations, Implement Permit Conditions, and Develop and implement a Mitigation Plan	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
BIO-9: Potential Interference with Terrestrial Wildlife Movement, Migration Corridors, and Nursery Sites	Alternative 1: No-Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
4.6 Biological Resources – Wetlands and Other Waters				
WATERS-1: Potential Disturbance and/or Loss of Jurisdictional Waters	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	WATERS-1: Implement Measures to Avoid, Minimize, and Compensate for Loss of Jurisdictional Waters WQ-1: Limit Ground-disturbance to Construction Areas and Avoid and Limit Disturbance to Stream Banks and Habitats	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
			WQ-2: Install, Monitor, and Maintain Erosion Control Measures to Minimize Soil or Sediment from Entering Waterways or Wetlands WQ-3: Inspect Sediment and Turbidity Control Barriers Daily during Construction for Proper Function and Replace Immediately if Not Functioning Effectively WQ-4: Remove Sediment from Sediment Controls and Dispose of Properly WQ-5: Treat Silted Water from Construction Activities WQ-6: Treat All Disturbed Soils with Appropriate Erosion Control GEO-2: Acquire Appropriate Regulatory Permits, and Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan and Bentonite Slurry Spill Contingency Plan to Reduce the Potential for Environmental Contamination during Construction Activities	
4.7 Climate Change				
Impact GHG-1: Generate Construction-related GHG Emissions that could Potentially Make a Cumulatively Considerable Contribution to a Significant Cumulative Impact on Climate Change	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	LTS	GHG-1: Implement DWR Best Management Practices	LTS

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
4.8 Cultural Resources				
CR-1: Damage to or Destruction of Built Environment Historic Properties	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	CR-1: Prepare and Implement Interpretive and Educational Material Relating to Sacramento River Flood Control Project	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
CR-2: Damage to or Destruction of Known Prehistoric-period Archaeological Sites	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	NI	None	NI
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
CR-3: Potential Damage to or Destruction of Traditional Cultural Properties/Tribal Cultural Resources	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	CR-3a: Conduct Cultural Resource Awareness Sensitivity Training CR-3b: Conduct Monitoring at Locations Identified by Native American as Sensitive CR-3c: Implement Procedures to Evaluate Tribal Cultural Resources/Traditional Cultural Properties and Implement Avoidance and Minimization Measures to Avoid Significant Adverse Effects	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
CR-4: Damage to or Destruction of Known Historic-period Archaeological Sites	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	NI	None	NI
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
CR-5: Potential Damage to or Destruction of Previously	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS		LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
Undiscovered Archaeological Sites	Alternative 4: 5-Mile Expanded Setback Partial Degrade		CR-5: Implement Procedures for Inadvertent Discovery of Cultural Material and Implement an Inadvertent Discovery Plan	
	Alternative 5: 5-Mile Setback Full Degrade			
CR-6: Potential Damage to or Destruction of Human Remains during Construction	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	CR-6: Implement Procedures for Inadvertent Discovery of Human Remains	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
4.9 Energy				
No Impacts or Mitigation Measures				
4.10 Environmental Justice				
EJ-1: Potential for Disproportionately High and Adverse Effects on Minority and Low-income Populations in Census Tract 101.02	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	NI	None	NI
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
4.11 Geology, Soils, and Paleontological Resources				
GEO-1: Damage to Flood Facilities from Seismic and Geologic Hazards	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
GEO-2: Potential Temporary, Short-term Construction-related Erosion	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	GEO-2: Acquire Appropriate Regulatory Permits, Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
	Alternative 5: 5-Mile Setback Full Degrade		Practices, and Comply with Yolo County Improvement Standards for Grading and Erosion Control	
GEO-3: Potential Damage to or Destruction of Unique Paleontological Resources	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	GEO-3: Conduct Construction Personnel Education, Stop Work if Paleontological Resources are Discovered, Assess the Significance of the Find, and Prepare and Implement a Recovery Plan, as Required	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
4.12 Groundwater Resources				
GW-1: Possible Long-term Effects on Groundwater Levels Resulting from Installation of Slurry Cutoff Walls	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
4.13 Hazards and Hazardous Materials				
HAZ-1: Potential Accidental Spills of Hazardous Materials Used during Construction Activities	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
HAZ-2: Possible Exposure of People and the Environment to Existing Hazardous Materials, Including Cortese-listed Sites	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	HAZ-2a: Prepare a Worker Health and Safety Plan, and Implement Appropriate Measures to Minimize Potential Exposure to Hazardous Materials HAZ-2b: Properly Remove and Dispose of Asbestos-containing Materials and Materials Coated with Lead-Based Paint HAZ-2c: Implement Remediation of Old Bryte Landfill (CEQA Only)	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
			UTL-1: Verify Utility Locations, Coordinate with Affected Utility Providers, Prepare and Implement a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage	
HAZ-3: Possible Contamination of Soil and/or Groundwater from Accidental Destruction of Active, Plugged, or Abandoned Natural Gas Wells	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	HAZ-3a: Abandon or Avoid Active Natural Gas Wells, Provide New Infrastructure to Withstand Flood Flows, and Maintain Well Access HAZ-3b: Avoid Abandoned Natural Gas Wells or Consult with the California Division of Oil, Gas, and Geothermal Resources to Determine Additional Well Plugging Requirements and Implement Recommended Measures	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade	PS	HAZ-3b: Avoid Abandoned Natural Gas Wells or Consult with the California Division of Oil, Gas, and Geothermal Resources to Determine Additional Well Plugging Requirements and Implement Recommended Measures	LTS
	Alternative 5: 5-Mile Setback Full Degrade			
HAZ-4: Creation of Potential Safety Hazards, Including Possible Birdstrike, in the Vicinity of a Public or Private Airport	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	HAZ-4: Consider FAA Guidelines and Coordinate with Sacramento International Airport and CHP Academy Staff Regarding Hazardous Wildlife Attractants	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
HAZ-5: Creation of Potential Wildland Fire Hazards	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	HAZ-5: Prepare and Implement a Fire Prevention Plan	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
HAZ-6: Creation of a Potential Public Health Hazard from Substantially Increased	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS		LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
Exposure to Mosquito-borne Diseases by Substantially Increasing the Amount of Mosquito Habitat	Alternative 4: 5-Mile Expanded Setback Partial Degrade		HAZ-6: Integrate Best Management Practices for Mosquito Control and Implement Workplace Precautions Against Vector-borne Diseases	
	Alternative 5: 5-Mile Setback Full Degrade			
4.14 Hydrology, Hydraulics, and Flood Risk Management				
HH-1: 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	Alternative 1: No Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	B	HH-**1:** Coordinate with Local Maintaining Agencies to Ensure Proper Maintenance of Yolo Bypass Levees from Sacramento Bypass to Cache Slough	B
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
HH-2: Loss of Agricultural Water Supplies	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	NI	None	NI
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
HH-3: Substantially Alter the Existing Drainage Pattern of the Site or Area, including through the Alteration of the Course of a Stream or River, in a Manner Which Would Result in Substantial Erosion, Siltation, or Flooding On- or Off-site	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
4.15 Land Use and Planning, and Agricultural and Forestry Resources				
LU-1: Project-related Alterations of Land Uses or Patterns of Land Use that Could Cause a Substantial Adverse Physical Environmental Effect	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
AG-1: Conversion of Substantial Amounts of Important Farmland to Nonagricultural Uses and Conversion of Land under Williamson Act Contracts to an Inconsistent Use	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	AG-1a: Preserve Agricultural Productivity of Important Farmland to the Extent Feasible AG-1b: Minimize Impacts on Williamson Act-Contracted Lands, Comply with California Government Code Sections 51290–51293, and Coordinate with Landowners and Agricultural Operators AG-1c: Establish Conservation Easements Where Potentially Significant Agricultural Land Use Impacts Remain after Implementation of Mitigation Measures	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
4.16. Mineral Resources				
MIN-1: Loss of Availability of Regionally or Locally Important Natural Gas Resources	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
MIN-2: Loss of Availability of Regionally or Locally Important Aggregate Resources	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
4.17 Noise and Vibration				
NOI-1: Potential Exposure of Persons to or Generation of Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance, or in Other Applicable Local, State, or Federal Standards	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	S	NOI-1: Implement Feasible Measures to Reduce Construction Noise Effects	SU
NOI-2: Potential Exposure of Persons to or Generation of Excessive Groundborne Vibration or Groundborne Noise Levels	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	NOI-2: Perform a Vibration Evaluation if Construction Occurs within 200 feet of a Residential Structure, and Implement Feasible Measures	LTS
NOI-3: Potential for Substantial Temporary or Periodic Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing without the Project	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	NOI-1: Implement Feasible Measures to Reduce Construction Noise Effects	SU
NOI-4: Possible Exposure of Construction Workers to Aircraft Noise during Construction Activities	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	LTS	None	LTS

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
4.18 Recreation				
REC-1: Temporary and Short-term Changes in Recreational Opportunities during Project Construction Activities	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	REC-1: Prepare and Implement a Bicycle Detour Plan for On-street Bicycle Routes, Provide Construction Period Information on Closures	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
REC-2: Implement Activities that Would Cause a Substantial Long-term Disruption of any Institutionally Recognized Recreational Activities	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	REC-2: Provide Access to Sacramento Bypass Wildlife Area and Install Restrictive Signage	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
4.19 Socioeconomics (including Population, Housing, and Employment)				
SOCIO-1: Increases in Population and Housing Demand, and Employment Changes (NEPA and CEQA)	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
SOCIO-2: Cause a Substantial Decrease in Total Agricultural Production Values (NEPA Only)	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	None	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
SOCIO-3: Cause a Loss of Agricultural Employment or Reduced Opportunity	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
for Income Increases (NEPA Only)	Alternative 5: 5-Mile Setback Full Degrade			
4.20 Traffic and Transportation				
TR-1: Increase in Traffic Volumes or Decrease in Capacity along Designated Roadways in the Project Site and Vicinity	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	TR-1: Prepare and Implement a Traffic Control and Road Maintenance Plan	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
TR-2: Potential for Increased Emergency Response Times or Inadequate Emergency Access	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	TR-2: Provide Pre-notification of Road Closures and Detours to Emergency Service Providers, and Maintain Emergency Access	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
TR-3: Decreased Performance or Safety of Alternative Modes of Transportation	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	REC-1: Prepare and Implement a Bicycle Detour Plan for On-street Bicycle Routes, Provide Construction Period Information on Bicycle Facility Closures	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
TR-4: Possible Increased Hazards Due to a Design Feature or Incompatible Uses	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	TR-1: Prepare and Implement a Traffic Control and Road Maintenance Plan	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
4.21 Utilities and Service Systems				
UTL-1: Temporary Short-term Disruption of Utility Services	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	UTL-1: Verify Utility Locations, Coordinate with Affected Utility Providers, Prepare and Implement a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage	LTS
UTL-2: Increase in Solid Waste Generation	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	LTS	None	LTS
4.22 Water Quality				
WQ-1: Possible Temporary and Short-term Impacts on Water Quality from Stormwater Runoff, Erosion, and Spills Associated with Construction	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	WQ-1: Limit Ground-disturbance to Construction Areas and Avoid and Limit Disturbance to Stream Banks and Habitats WQ-2: Install, Monitor, and Maintain Erosion Control Measures to Minimize Soil or Sediment from Entering Waterways or Wetlands WQ-3: Inspect Sediment and Turbidity Control Barriers Daily during Construction for Proper Function and Replace Immediately if Not Functioning Effectively WQ-4: Remove Sediment from Sediment Controls and Dispose of Properly WQ-5: Treat Water with Silt or Mud from Construction Activities to Prevent it from Entering Live Waterways WQ-6: Treat All Disturbed Soils with Appropriate Erosion Control GEO-2: Acquire Appropriate Regulatory Permits, Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management	LTS

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Table ES-4. Summary of Impacts and Mitigation Measures

Impact Title	Alternative	Significance Before Mitigation	Mitigation Measure Title	Significance After Mitigation
			Practices, and Comply with Yolo County Improvement Standards for Grading and Erosion Control HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan and Bentonite Slurry Spill Contingency Plan to Reduce the Potential for Environmental Contamination during Construction Activities	
WQ-2: Possible Temporary Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table during Construction	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	WQ-7: Obtain Appropriate Discharge and Dewatering Permit and Implement Provisions for Dewatering	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
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Table ES-5. Summary of Significant and Unavoidable Impacts

Section Name/Topic Area (Alternative)	Impact Number	Impact Title
Direct and Indirect Impacts		
Aesthetics (All Action Alternatives)	VIS-2	Changes in Scenic Vistas and Existing Visual Character
Cultural Resources (All Action Alternatives)	CR-1	Damage to or Destruction of Built Environment Historic Properties
Hazards and Hazardous Materials (All Action Alternatives)	HAZ-4	Creation of Potential Safety Hazards, Including Possible Birdstrike, in the Vicinity of a Public or Private Airport
Hydrology, Hydraulics, and Flood Risk Management (No Action Alternative only)	HH-1	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

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Table ES-5. Summary of Significant and Unavoidable Impacts

Section Name/Topic Area (Alternative)	Impact Number	Impact Title
Land Use and Planning, and Agricultural and Forestry Resources (All Action Alternatives)	AG-1	Conversion of Substantial Amounts of Important Farmland to Nonagricultural Uses and Conversion of Land under Williamson Act Contracts to an Inconsistent Use
Noise (All Action Alternatives)	NOI-1	Potential Exposure of Persons to or Generation of Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance, or in Other Applicable Local, State, or Federal Standards
	NOI-2	Potential Exposure of Persons to or Generation of Excessive Groundborne Vibration or Groundborne Noise Levels
	NOI-3	Potential for Substantial Temporary or Periodic Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing without the Project
Socioeconomics (All Action Alternatives)	SOCIO-2	Cause a Substantial Decrease in Total Agricultural Production Values (NEPA Only)
Traffic and Transportation (All Action Alternatives)	TR-1	Increase in Traffic Volumes or Decrease in Capacity along Designated Roadways in the Project Site and Vicinity
Cumulative Impacts		
Aesthetics (All Action Alternatives)	N/A	Changes in Scenic Vistas and Existing Visual Character
Land Use and Planning, and Agricultural and Forestry Resources (All Action Alternatives)	N/A	Conversion of Substantial Amounts of Important Farmland to Nonagricultural Uses and Conversion of Land under Williamson Act Contracts to an Inconsistent Use
Socioeconomics (All Action Alternatives)	N/A	Changes in Agricultural Economics and Values (NEPA only).

Notes: Action Alternatives = Alternatives 2 (DWR's Preferred Alternative), 3, 4, and 5; N/A = Not Applicable
Source: Data compiled by GEI Consultants, Inc. in 2017

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Abbreviations and Acronyms

AB	Assembly Bill
AB 52	Assembly Bill 52
ACHP	Advisory Council on Historic Preservation
ACMs	asbestos-containing materials
ADT	Average Daily Traffic
AEP	annual exceedance probability
ALUCP	Airport Land Use Compatibility Plan
AOA	air operations area
APE	Area of Potential Effects
AQMD	Air Quality Management District
ARB	Air Resources Board
ARCF	American River Common Features Project
ASTs	aboveground fuel storage tanks
B	beneficial
B.P.	Before Present
Basin Plan	Sacramento and San Joaquin River Basins
BDCP	Bay Delta Conservation Plan
BiOps	Biological Opinions
BMPs	Best Management Practices
BO	Biological Opinion
BOs	Biological Opinions
BWFS	Basin-Wide Feasibility Studies
Bypass	Yolo Bypass
CAA	Clean Air Act
$CaCO_3$	calcium carbonate
C-AEP	conditional annual exceedance probability
cal B.P.	calibrated Before Present
CAL FIRE	California Department of Forestry and Fire Protection
CalEEMod	California Emissions Estimator Model
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CAMU	Corrective Action Management Unit
CBC	California Building Code

CCAA	California Clean Air Act
CCAD	Consolidated Capital Assessment District
CCR	California Code of Regulations
CDBW	California Department of Boating and Waterways
CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CDP	Census Designated Place
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CHP	California Highway Patrol
CIWMB	California Integrated Waste Management Board
CLD	California Levee Database
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNP	conditional non-exceedance probability
CNPS	California Native Plant Society
CO	carbon monoxide
CRHR	California Register of Historical Resources
CSLC	California State Lands Commission
CT	Census Tract
CVFMP	Central Valley Flood Management Planning
CVFSCS	Central Valley Flood System Conservation Strategy
CVHS	Central Valley Hydrologic Study
CVIFMS	Central Valley Integrated Flood Management Study
CVP	Central Valley Project
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
CWAP	California Water Action Plan
CWC	California Water Code
cy	cubic yards
dB	decibels
dBA	A-weighted decibels
DEIS/DEIR	Draft Environmental Impact Statement/Draft

	Environmental Impact Report
Delta	Sacramento-San Joaquin Delta
diesel PM	diesel exhaust PM
DMM	deep soil mixing method
DOC	Calfiornia Department of Conservation
DOF	California Department of Finance
DOGGR	California Division of Oil, Gas, and Geothermal Resources
DPS	distinct population segment
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
DWSC	Deep Water Ship Channel
DWSE	design water surface elevation
EC	Electrical Conductivity
EDD	California Employment Development Department
EFH	Essential Fish Habitat
EIPs	early implementation projects
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EM	Engineering Manual
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ER	Engineer Regulation
ERP	Ecosystem Restoration Program
ESA	Endangered Species Act
ETL	Engineering Technical Letter
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHA	Federal Highway Administration
FEIS/FEIR	Final Environmental Impact Statement/Draft Environmental Impact Report
FIRMs	Flood Insurance Rate Maps
FMMP	Farmland Mapping and Monitoring Program
Folsom JFP	Folsom Dam Safety/Flood Damage Reduction Joint Federal Project
FPIIB	Flood Protection Integrity and Inspection Branch
FPPA	Farmland Protection Policy Act
FR	*Federal Register*
FRLRP	Feather River Levee Repair Project
FRPA	Fish Restoration Program Agreement

GEI	GEI Consultants, Inc.
GGS	giant garter snake
GHG	greenhouse gas
GIS	Geographic Information Systems
gpm	gallons per minute
GRR	General Reevaluation Report
GSAs	Groundwater Sustainability Agencies
GSPs	Groundwater Sustainability Plans
H	horizontal
HAPs	Hazardous Air Pollutants
HCP	Habitat Conservation Plan
HCP/NCCP	Habitat Conservation Plan/Natural Community Conservation Plan
HDD	horizontal directional drilling
I-5	Interstate 5
I-80	Interstate 80
IRWMP	Integrated Regional Water Management Plan
IST	I Street
ITP	Incidental Take Permit
IWM	instream woody material
JPA	Joint Powers Authority
KLOG	Knights Landing Outfall Gates
KOPs	key observations points
kWh	kilowatt hours
LAFCo	Local Agency Formation Commission
LCP	Local Conservation Plan
L_{dn}	day-night average level
LEBLS	Lower Elkhorn Basin Levee Setback
L_{eq}	equivalent sound level
$L_{eq(24)}$	equivalent noise level (the sound energy averaged over a 24-hour period)
$L_{eq[h]}$	1-hour, A-weighted equivalent sound level
LM	linear mile
LMA	Levee Maintaining Agency
L_{max}	maximum sound level
L_n	percentile-exceeded sound level
LOS	Level of Service
LPP	Locally Preferred Plan
LSAA	Lake and Streambed Alteration Agreement
LTS	less than significant

LWD	Left Wing Dam
MBTA	Migratory Bird Treaty Act
mcl	maximum contaminant level
mcy	million cubic yards
MIAD	Mormon Island Auxiliary Dam
MLD	Most Likely Descendant
MMcf	million cubic feet
MOA	Memorandum of Agreement
NAAQS	National Ambient Air Quality Standards
NAD83	North American Datum of 1983
NAHC	Native American Heritage Commission
NCCP	Natural Communities Conservation Plan
NCSC	natural communities of special concern
NEMDC	Natomas East Main Drainage Canal
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NI	no impact
NLIP	Natomas Levee Improvement Program
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOC	Notice of Completion
NOD	Notice of Determination
NOI	Notice of Intent
NOP	Notice of Preparation
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NWP	Nationwide Permit
O&M	operations and maintenance
OEHHA	Office of Environmental Health Hazard Assessment
OHP	Office of Historic Preservation
OPR	Office of Planning and Research
OPT	one pass trench
OSHA	Occupational Safety & Health Administration
PA	Programmatic Agreement

PCBs	polychlorinated biphenyls
PCC	Portland cement concrete
PCE	passenger car equivalent
PEIR	Program Environmental Impact Report
PG&E	Pacific Gas and Electric Company
PL	Public Law
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 micrometers or less
ppb	parts per billion
ppm	part per million
ppt	parts per thousand
PPV	peak particle velocity
PRC	California Public Resources Code
PS	potentially significant
PSU	potentially significant and unavoidable
RBDD	Red Bluff Diversion Dam
RCNM	Roadway Construction Noise Model
RCRA	Resource Conservation and Recovery Act
RD	Reclamation District
Reclamation	U.S. Bureau of Reclamation
RFMP	Regional Flood Management Plan
RHA	Rivers and Harbors Act
RI/FS	Remedial Investigation/Feasibility Study
RM	River Mile
ROD	Record of Decision
ROG	reactive organic gases
RPAs	Reasonable and Prudent Actions
RWD	Right Wing Dam
RWQCBs	Regional Water Quality Control Boards
S	significant
SAAQS	State Ambient Air Quality Standards
SACOG	Sacramento Area Council of Governments
SAFCA	Sacramento Area Flood Control Agency
SB	soil-bentonite
SBPFS	Sutter Basin Pilot Feasibility Study
SCAS	Sacramento County Airport System
SCB	soil-cement-bentonite
SERP	Small Erosion Repair Program

SFNA	Sacramento Federal Nonattainment Areas
SHPO	State Historic Preservation Officer
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMARA	Surface Mining and Reclamation Act of 1975
SO_2	sulfur dioxide
SPCCP	spill prevention control and countermeasures plan
SR 16	State Route 16/Jackson Highway
SRA	shaded riverine aquatic
SRBPP	Sacramento River Bank Protection Project
SRFCP	Sacramento River Flood Control Project
SRPS	South River Pump Station
SSIA	Systemwide Investment Approach
STLC	Soluble Threshold Limit Concentration
SU	significant and unavoidable
SVAB	Sacramento Valley Air Basin
SVP	Society of Vertebrate Paleontology
SWIF	System Wide Improvement Framework
SWP	State Water Project
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SYMVCD	Sacramento-Yolo Mosquito and Vector Control District
TACs	Toxic Air Contaminants
TCPs	Traditional Cultural Properties
TCRs	Tribal Cultural Resources
TDS	total dissolved solids
TMDLs	total maximum daily loads
TOL	top of levee
tpd	tons per day
TRD	trench remixing deep
TRLIA	Three Rivers Levee Improvement Authority
TSS	total suspended sediment
TTLC	Total Threshold Limit Concentration
UAIC	United Auburn Indian Community of the Auburn Rancheria
UCMP	University of California, Berkeley Museum of Paleontology
ULDC	Urban Levee Design Criteria
Uniform Act	Uniform Relocation Assistance and Real Property

	Acquisition Policies Act
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
V	vertical
VOC	volatile organic compounds
VON	Verona
WCM	Water Control Manual
WDRs	waste discharge requirements
WNV	West Nile virus
WPIC	Western Pacific Interceptor Canal
WRCC	Western Regional Climate Center
WSAFCA	West Sacramento Area Flood Control Agency
WSLIP	West Sacramento Levee Improvements Program
YCFCWCD	Yolo County Flood Control and Water Conservation District
YSAQMD	Yolo-Solano Air Quality Management District
$\mu g/m^3$	micrograms per cubic meter
μin/sec	1 micro inch per second

Glossary

"100-year" flood	A flood that has a 1 percent annual probability of occurring. The Federal Emergency Management Agency accreditation means that a levee provides protection against the base flood (100-year) event, based on certification provided by a civil engineer.
"200-year" flood	A flood that has a 0.5 percent annual probability of occurring. Both State policy and recently enacted State legislation (Senate Bill [SB] 5) call for 200-year (0.5 percent annual chance) flood protection to be the minimum level of protection for urban and urbanizing areas in the Central Valley. SB 5 requires that the "200-year" protection be consistent with criteria used or developed by the California Department of Water Resources. SB 5 sets a target date of 2025 for all urban and urbanizing areas protected by Federal/State project levees to achieve 200-year flood protection, and calls for building limitations after 2015 if adequate progress toward achieving this standard is not met.
"500-year" flood	A flood that has a 0.2 percent annual probability of occurring.
additional levee height	The height of the levee measured from the surface of the water to the top of the levee.
agricultural stewardship	A public and private commitment to manage and preserve the resources and the conditions necessary for a robust and sustainable agricultural industry in California.
boil	Areas where water pressure from near-record levels can move under a levee and begin to percolate up through the soils on the landside of a levee.
borrow	Soil or sediment taken from a site for use in constructing a structure, such as a levee.
bypass	A flood bypass is a large area of land typically confined by levees that is designed to convey excess flood waters from a river or stream to reduce the risk of flooding from the river near a key point of interest, such as a city.
cement-bentonite (CB) mix	A mixture of cement and bentonite used in cutoff wall to prevent levee underseepage.
conservation easement	An easement granted by a landowner to a public or private entity (as a land trust) in which the landowner agrees to restrictions on use of the land (as from development) and the holder agrees to enforce the restrictions.
crown	The top of a levee.
cutoff wall	An engineered barrier constructed underground to reduce the flow of water through permeable soils (sands and gravels) typically within a levee. A trench is typically excavated within the levee or levee foundation area using a modified backhoe to reach down to less permeable foundation conditions (silts and clays) under the levee footprint. The trench is backfilled by blending the excavated soil with minerals that increase the length of time for water to travel through the subsurface.
deep soil mixing method (DMM)	DMM is an advanced ground improvement method in which cement (or other agents) is mixed with in-situ soil to form in-place soil-cement columns that increase the strength and reduce the compressibility of soft ground in a levee.
encroachment	Anything that is built or grows within the Federal project levee right-of-way (generally within 15-20 feet of the levee toe) and is not part of the levee system (i.e., trees, piers, steps, poles, retaining walls, fences, and other structures). Encroachments may obstruct visibility or prevent access for inspection of a levee from crown to toe, on both the waterside and the landside of a levee. In response to lessons learned from analyzing 21st-century river levee failures, the U.S. Army Corps of Engineers (Federal) and the Central Valley Flood Protection Board (State) strictly enforce conditions for permitting levee encroachments.
flood hazard area	An area that does not meet the minimum level of flood protection required by Federal or State

law, whichever is more stringent.

freeboard Distance between the top of a levee and the top of high-water level.

General Reevaluation Report (GRR) A report prepared by the U.S. Army Corps of Engineers to evaluate proposed modifications to a Federally authorized levee project. The report is a series of technical studies that support decision making by describing the process used to reevaluate the levee system, the evaluation criteria, and the results of the evaluation.

geosynthetic filter fabric Synthetic products used to stabilize terrain on embankments.

horizontal directional drilling (HDD) HDD is a steerable trenchless method of installing underground pipe in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal impact on the surrounding area. Directional boring is used when trenching or excavating is not practical.

haul route Any road, temporary or permanent, used to move equipment and/or materials to and from a construction project. A haul route typically includes city and county roads, and State or Interstate highways.

hydraulics The study and computation of the characteristics of water flowing in a stream or river (e.g., depth [or stage or water surface elevation], velocity, slope).

landside Describes an area (location) on the landside of the levee.

lead agency Under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), a lead agency is that agency that will either carry out the project, or has jurisdiction over another entity. In the case of the Lower Elkhorn Basin Levee Setback project, the California Department of Water Resources (as CEQA lead agency) would carry out the project, but seeks 408 permission from the U.S. Army Corps of Engineers (as NEPA lead agency) to alter a Federal project levee.

levee A large dike or artificial embankment typically constructed of earthen materials, often having an access road along the top or along the landside of the levee, which is designed as part of a system to protect against loss of life and property damage from floods.

levee height The height of the levee measured from the surface of the adjacent ground to the top of the levee.

LiDAR A remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.

one-pass trench (OPT) techniques This trench technique allows the installation of cutoff walls within levees.

mitigation One or all of the following: (1) avoiding an impact altogether by not taking a certain action or parts of an action; (2) minimizing an impact by limiting the degree or magnitude of an action and its implementation; (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating an impact over time by preservation and maintenance operations during the life of an action; and/or (5) compensating for an impact by replacing or providing substitute resources or environments.

project site The project site is defined as the area that would be directly and physically affected by the project. This area extends from the waterside toe of the existing levee to the landside edge of the improvements associated with the setback levee.

Proposition 1E The Disaster Preparedness and Flood Protection Bond Act of 2006 (Proposition 1E) authorizes $4.09 billion in general obligation bonds to rebuild and repair California’s most vulnerable flood control structures to protect homes and prevent loss of life from flood-related disasters, including levee failures, flash floods, and mudslides. Proposition 1E also protects California’s drinking water supply system by rebuilding Delta levees vulnerable to earthquakes and storms.

Reclamation District A district formed under California State Water Code 50000 et. seq. as a way to pay for the costs of reclaiming land for future use. Reclamation districts are formed in areas that have been inundated with water, such as floodplains, salt marshes, or tidelands, and are typically responsible for levee maintenance as a “Levee Maintaining Agency” (LMA).

redundancy	The duplication of critical components of a system with the intention of increasing reliability of the system, usually in the form of backup and/or fail-safe components.
relief wells	Levees are subject to seepage through their foundations and abutments. Relief wells are placed on the landside of a levee to relieve the confine water pressures to safe values, thus preventing the removal of levee materials via internal erosion and subsequent weakening of the levee.
remnant levee	The levee that remains (e.g., left in place) when a new levee or setback levee is constructed.
resiliency	In this context, the capacity of the Sacramento River Flood Control Project to adapt to and recover from changed conditions from a flood event(s). Also, the ability to avoid, minimize, withstand, and recover from the effects of adversity, whether natural or manmade, under all circumstances of use.
robustness	The ability of a system to continue to operate correctly across a wide range of operational conditions (the wider the range of conditions, the more robust the system), with minimal damage, alteration or loss of functionality, and to fail gracefully outside of that range.
Sacramento River Flood Control Project	The Federal and State flood control project designed to occasionally spill potential flood flows through a system of weirs and flood relief structures into adjacent basins, such as the Yolo and Sutter Bypasses. The bypasses convey the flood flows downstream where the water is conveyed back into the natural river.
seepage	The slow movement of water through, for example, small cracks, pores, or interstices of a levee.
seepage berm	A seepage berm is a berm set against the landside of a levee to reduce the potential for levee failure due to underseepage or through-seepage.
setback levee	Levees that are “set back” from the original levee some distance to increase the carrying capacity of the river or bypass during flood flows, as well as increase floodplain habitats. The remnant levee can be fully degraded, and typically used to construct a portion of the setback levee, or partially degraded to provide habitat complexity for aquatic and riparian species.
soil-bentonite (SB) mix	A homogeneous mixture of specified soil material, bentonite, cement, and water, most commonly used to construct cutoff walls within levees.
staging area	A location where people, vehicles, and equipment or materials are assembled and stored before use at a construction site.
State Plan of Flood Control (SPFC)	The Federal and State plan consisting of flood control works, lands, programs, plans, policies, conditions, and mode of maintenance and operations of the Sacramento River Flood Control Project.
trench remixing deep (TRD) technique	TRD employs a continuously revolving chain that both excavate and mixes in situ soils with added slurry while constructing a cutoff wall in a levee.
through-seepage	Waters forced through the above-ground sides of levees that weaken levees over time.
toe	Where a levee slope meets the ground.
Urban Levee Design Criteria (ULDC)	ULDC provides engineering criteria and guidance to design, evaluate, operate, and maintain levees and floodwalls that provide an urban level of flood protection (i.e., 200-year level of flood protection) in California, as well as for determining design water surface elevations along leveed and unleveed streams.
underseepage	Occurs when the pressure of high-water levels forces water under the levee and out of the ground on the landside, eroding soil under the levee and causing a hole, which weakens a levee over time.
waterside	Describes an area (location) on the waterside of the levee.
weir	A low dam in a river to raise the water level or divert its flow at specific river flows.

Chapter 1. Introduction

The California Department of Water Resources (DWR) is proposing the Lower Elkhorn Basin Levee Setback Project (the proposed action), LEBLS project, or project) in Yolo County, California, to reduce flood risk on the Sacramento River to the greater Sacramento area. To implement the proposed improvements, DWR is requesting permission from the U.S. Army Corps of Engineers (USACE), Sacramento District pursuant to Section 14 of the Rivers and Harbors Act of 1899 (RHA) (Title 33 of the United States Code [USC], Section 408 [33 USC 408]) (referred to hereafter as Section 408), for the alteration of Federal flood management facilities. DWR is also seeking a permit under Section 404 of the Clean Water Act (CWA) for discharge of dredged or fill material in jurisdictional waters of the United States. DWR is the “requester” under Section 408 and the “applicant” under Section 404. The Requester’s/Applicant’s Preferred Alternative (hereafter referred to as DWR’s Preferred Alternative or Alternative 2 in this document) would require both of these approvals for implementation.

The project includes flood management system improvements that would be implemented as part of an ongoing Federal-State-Local effort to improve the State Plan of Flood Control in the Lower Sacramento River Basin that was initiated in the aftermath of recurring flood events (post-1986, post-1997, and post-Katrina periods). These flood events and resulting flood-risk reduction efforts occurring over the past 25 years provide the context in which DWR’s Preferred Alternative and alternatives under consideration have been formulated. The alternatives that are being analyzed in this EIS/EIR are a specific response to the flood-risk management policy developments that have occurred in the post-Katrina period, as directed in DWR’s 2012 Central Valley Flood Protection Plan (CVFPP).

1.1 Purpose and Intended Uses of the Environmental Impact Statement/Environmental Impact Report

This document is a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) and is intended to satisfy the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) for disclosing environmental effects on the physical, human, and natural environments, and identifying mitigation measures related to the project alternatives, including DWR’s Preferred Alternative, prior to making a decision on project approval. Specifically, this document analyzes the LEBLS project to support a NEPA Record of Decision (ROD) and CEQA Notice of Determination (NOD).

This EIS/EIR has been prepared by both USACE, as Federal lead agency under NEPA, and DWR, as State lead agency under CEQA. The EIS/EIR is a joint document intended to comply with both NEPA and CEQA. See Code of Federal Regulations (CFR), Title 40, Sections 1502.25, 1506.2, and 1506.4 (authority for combining Federal and State environmental documents); 33 CFR Part 230 (USACE NEPA regulations); and 33 CFR Part 325, Appendix B (“NEPA Implementation Procedures for the [USACE] Regulatory Program”). See also California Code of Regulations (CCR), Title 14, Division 6, Chapter 3 (State CEQA Guidelines), Section 15222 (“Preparation of Joint Documents”). For purposes of this EIS/EIR, NEPA’s required “Preferred Alternative” and CEQA’s required “Proposed Project” are both identified in this EIS/EIR as DWR's Preferred Alternative. The terms "LEBLS project" or "project" are used to refer to the full range of action alternatives (NEPA's "proposed action").

1.1.1 National Environmental Policy Act

NEPA provides an interdisciplinary framework for Federal agencies to develop information that will help them to take environmental factors into account in their decision making (42 USC 4321, 40 CFR 1500.1). According to NEPA, an EIS is required whenever a proposed major Federal action (e.g., a proposal for legislation or an activity financed, assisted, conducted, approved, or authorized by a Federal agency) would result in adverse effects on the quality of the human and natural environment.

An EIS is an informational document used by Federal agencies in making decisions. An EIS is intended to provide full and open disclosure of environmental consequences prior to agency action, an interdisciplinary approach to project evaluation, objective consideration of all reasonable alternatives, application of measures to avoid or reduce adverse impacts, and an avenue for public and agency participation in decision-making (40 CFR 1502.1). NEPA defines mitigation as avoiding, minimizing, rectifying, reducing, or compensating for significant adverse effects of the proposed action (40 CFR 1508.20), in this case, DWR's Preferred Alternative.

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

1.1.2 California Environmental Quality Act

According to the State CEQA Guidelines (14 CCR Section 15064[f][1]), preparation of an EIR is required whenever a project may result in a potentially significant or significant environmental impact on the physical environment. An EIR is an informational document used to inform public agency decision makers and the general public of the potentially significant and significant environmental impacts of a project, identify possible feasible ways to minimize or reduce to less-than-significant levels the potentially significant and significant impacts, and describe a reasonable range of alternatives to the project that could feasibly attain most of the basic objectives of the project while substantially lessening, mitigating, or avoiding any of the potentially significant and significant environmental impacts. Public agencies are required to consider the information presented in the EIR and administrative record when determining whether to approve a project.

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

1.1.3 Type of Environmental Impact Statement/Environmental Impact Report

The information contained in this EIS/EIR includes enough specificity for a site-specific, project-level environmental review under both NEPA and CEQA, and will allow the consideration of discretionary approvals for this project. DWR's intention in evaluating the project at a project-level of detail is that no further CEQA documents will be required following certification of the EIR and adoption of one of the alternatives under consideration, barring the occurrence of any of the circumstances described in California PRC Section 21166. USACE similarly intends this EIS/EIR to provide sufficient NEPA analysis for implementation of any one of the alternatives under consideration. USACE anticipates that Section 408 permission and Section 404 permit decisions can be made for this project without additional NEPA analysis beyond this EIS, as long as there are no substantial project changes or deviations from proposed uses or the condition of these uses. Pursuant to NEPA, CEQA, and the State CEQA Guidelines, the discussion of potential impacts on the environment in this EIS/EIR is focused on those impacts that USACE and DWR have determined may be potentially significant.

1.2 Agency Roles and Responsibilities

USACE will use this EIS in exercising its regulatory authority under Section 14 of the RHA (Section 408) and Section 404 of the CWA. The EIS also may be used as an informational document by Federal NEPA cooperating agencies that could have permitting or approval authority for project components.

DWR and CEQA responsible and trustee agencies will use this EIR to ensure that they have met CEQA requirements before deciding whether to approve or permit project components over which they have jurisdiction. The EIR also may be used by other State, regional, and local agencies, which may have an interest in resources that could be affected by the project, or that have jurisdiction over project components.

1.2.1 Lead Agencies

USACE is the Federal lead agency for the project under NEPA and DWR is the State lead agency for the project under CEQA. USACE is responsible for making Section 408 permission and Section 404 permit decisions and ensuring that NEPA requirements have been met. DWR has the principal responsibility for approving and implementing the project and for ensuring that CEQA requirements have been met. The EIS/EIR may also be used by other Federal, State, regional, and local agencies, which may have an interest in resources that could be affected by the project, or that have jurisdiction over components of the project.

The project represents a Federal action because it would require one or more of the following Federal permits, authorizations, and permissions:

- Department of the Army permission under RHA Section 408 to alter a Federal levee and for modifications, additions, and deletions to State Plan of Flood Control Facilities (which are part of the joint Federal-State flood protection system); and

- Department of the Army permit under CWA Section 404 for discharges of dredge or fill material into waters of the United States and/or navigable water.

1.2.2 Cooperating, Responsible, and Trustee Agencies

Under NEPA, a cooperating agency is any Federal agency other than the Federal lead agency that has jurisdiction by law or special expertise with respect to any environmental impact involved in an action requiring an EIS. Under NEPA, cooperating agencies are encouraged to actively participate in the NEPA process of the Federal lead agency, review the NEPA documents of the Federal lead agency, and use the documents when necessary if making decisions on the project. The National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) are NEPA cooperating agencies for this EIS.

Under CEQA, a responsible agency is an agency other than the State lead agency that has legal responsibility for carrying out or approving a project or components of a project (California PRC Section 21069). A trustee agency is a State agency that has jurisdiction by law over natural resources that are held in trust for the people of the State of California. Responsible and trustee agencies are encouraged to actively participate in the CEQA process of the CEQA lead agency, provide comments during scoping and on the EIR, and use the documents when necessary if making decisions on the project. Responsible and trustee agencies for this EIR are provided below.

Several agencies other than USACE and DWR have an interest in implementation of the project or administer related projects and programs, as identified below.

NEPA Cooperating Agencies

The following Federal agencies are cooperating agencies under NEPA:

- National Marine Fisheries Service
- U.S. Fish and Wildlife Service

CEQA State Responsible and Trustee Agencies

The following State agencies are potential responsible or trustee agencies under CEQA:

- California Agricultural Commissioner
- California Air Resources Board
- California Department of Conservation
- California Department of Fish and Wildlife (trustee agency)
- California Department of Toxic Substances Control
- California Department of Transportation
- California Native American Heritage Commission
- California Office of Historic Preservation
- California State Lands Commission (trustee agency)
- California State Parks (trustee agency)
- Central Valley Flood Protection Board
- Central Valley Regional Water Quality Control Board
- Delta Protection Commission
- Delta Stewardship Council
- State Water Resources Control Board

DWR has also extended the same courtesy afforded to trustee agencies to Native American Tribes that identified an interest in the project.

CEQA Regional and Local Responsible Agencies

The following regional and local agencies are potential responsible agencies under CEQA:

- Reclamation District 537
- Reclamation District 785
- Reclamation District 827
- Sacramento Area Flood Control Agency
- West Sacramento Flood Control Agency
- County of Sacramento
- County of Yolo
- Sacramento County Airport System
- Sacramento Metropolitan Air Quality Management District
- Sacramento Northern Railway
- Yolo-Solano Air Quality Management District

1.3 Regulatory Requirements, Permissions, Permits, Authorizations, and Approvals

The project is dependent upon Federal action because the proposed levee improvements and the project's mitigation strategy would require Federal permits for one or more of the following activities: (i) permission to alter a Federal levee under Section 14 of the RHA (Section 408), (ii) discharges of fill material into waters of the United States (Section 404 of the CWA), (iii) activities affecting plant or animal species protected by the Federal Endangered Species Act (ESA) (16 USC 1531 et seq.), and (iv) activities affecting cultural resources that are listed or are eligible for listing in the National Register of Historic Places (NRHP) for compliance with Section 106 of the NHPA of 1966, as amended (16 USC 470). Table 1-1 identifies Federal actions, permissions, permits, authorizations, and approvals from Federal agencies for which this EIS/EIR may be used during these agencies' decision-making process.

State, regional, and local agencies will rely primarily upon CEQA during their decision-making processes. Table 1-2 identifies potential State, regional, and local actions, permits, and approvals for which this EIR may be used during these agencies' decision-making process.

1.4 Regional Setting and Project Site

1.4.1 Regional Setting

The Central Valley of California is a broad, gently sloping valley that drains into the largest estuary on the West Coast, the Sacramento-San Joaquin Delta (Delta). The valley is bounded on the west by the Coast Range, on the north by the Cascade Range, and on the east by the Sierra Nevada Range. Historically, lower-lying lands along the valley's two major rivers, the Sacramento and the San Joaquin, were floodplains that were regularly inundated for long periods during large, seasonal flood events. For the purposes of this document, only the Sacramento Valley portion of the Central Valley is discussed further.

Table 1-1. Federal Actions, Permissions, Permits, Authorizations, and Approvals

Permit/Authorization/Permission	Agency
Request permission under RHA Section 14 (i.e., USC, Title 33, Section 408) — Division Review for the alteration of the SRFCP through levee improvements proposed in the Yolo and Sacramento Bypasses	USACE
CWA Section 404 Individual Permit for discharge of dredge and fill material into waters of the United States also ensuring compliance with CWA Section 401 through receipt of DWR's Section 401 Water Quality Certification	USACE
ESA Section 7 — Consultation and BOs for possible effects on Federally listed species pursuant to Section 7 of the Federal ESA	USACE, NMFS, USFWS
NHPA Section 106 — Consultation and PA or MOA regarding effects on cultural resources pursuant to Section 106 of the NHPA	USACE, SHPO/Advisory Council on Historic Preservation
Fish and Wildlife Coordination Act Review comments on CWA Section 404 permit application and Section 408 permission	NMFS, USFWS
Migratory Bird Treaty Act	USFWS

Notes: RHA = Rivers and Harbors Act; SRFCP = Sacramento River Flood Control Project; USACE = U.S. Army Corps of Engineers; CWA = Clean Water Act; DWR = California Department of Water Resources; ESA = Endangered Species Act; BOs = Biological Opinions; NMFS = National Marine Fisheries Service; USFWS = U.S. Fish and Wildlife Service; NHPA = National Historic Preservation Act; PA = Programmatic Agreement; MOA = Memorandum of Agreement; SHPO = State Historic Preservation Officer
Source: Compiled by GEI Consultants, Inc. in 2016

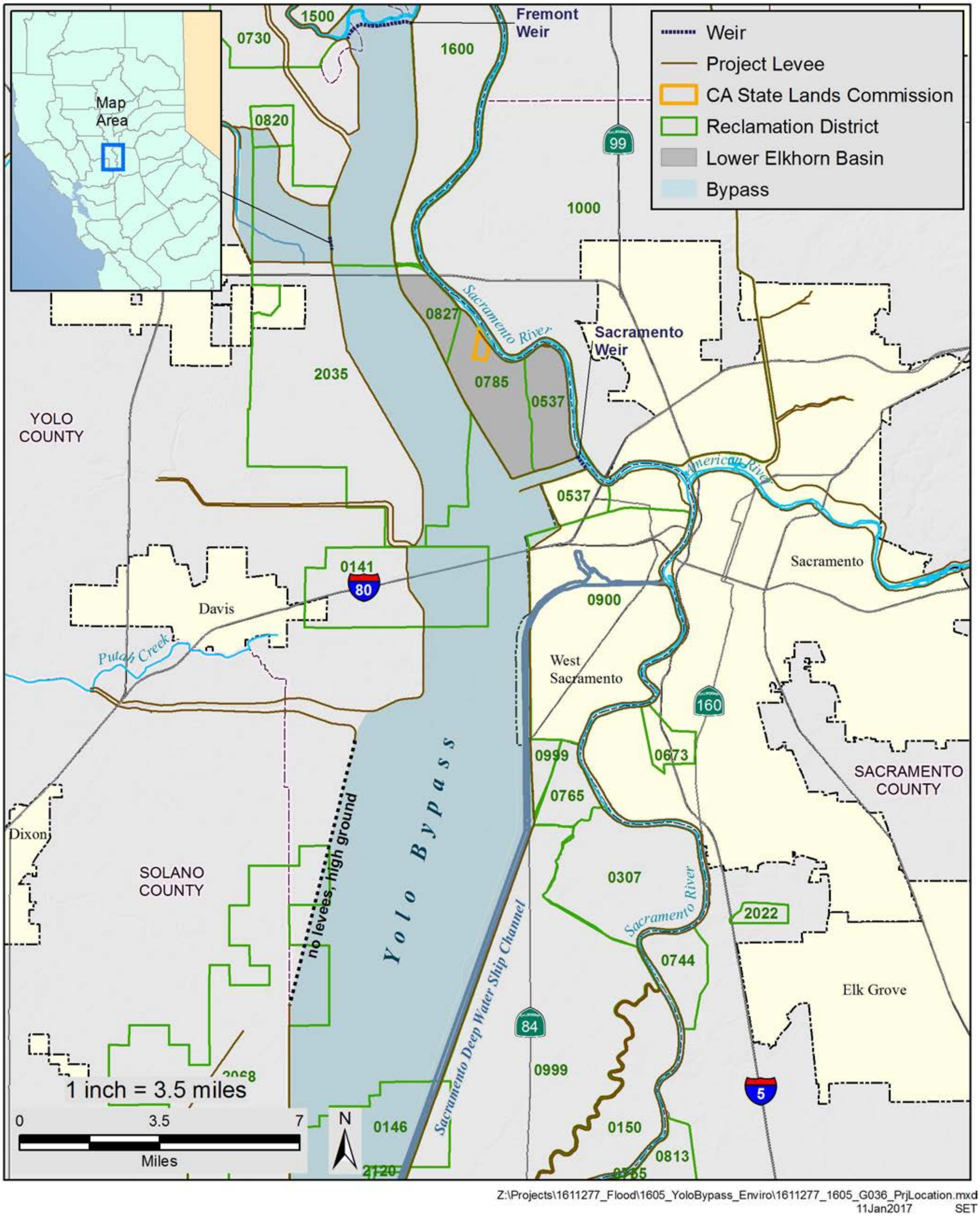
Table 1-2. Potential State, Regional, and Local Actions, Permits, and Approvals

Permit/Authorization	Agency
CWA Section 401 — Water Quality Certification for an Individual Permit for discharge of dredge and fill materials into waters of the United States or waters of the State	CVRWQCB
CWA Section 402 — NPDES for Construction General Permit	CVRWQCB
CWA Section 402 — NPDES for Dewatering and Other Low Threat Permit	CVRWQCB
CESA Section 2081 — ITP	CDFW
LSAA (California Fish and Game Code Section 1602)	CDFW
CCR, Title 23, Section 6 — Encroachment Permit	CVFPB
California PRC, Section 6501.1 — Lease Agreement	CSLC
California Government Code, Section 51200 et seq. — Williamson Act Contract	Yolo County
CBC, Section 1804 — Grading Permit	Yolo County
SMARA — Mining Permit	Yolo County
California Health and Safety Code, Section 42300 et seq. — Authority to Construct	Yolo–Solano AQMD

Notes: CWA = Clean Water Act; CVRWQCB = Central Valley Regional Water Quality Control Board; NPDES = National Pollutant Discharge Elimination System; AB = Assembly Bill; DWR = California Department of Water Resources; CESA = California Endangered Species Act; CDFW = California Department of Fish and Wildlife; LSAA = Lake and Streambed Alteration Agreement; CCR = California Code of Regulations; CVFPB = Central Valley Flood Protection Board; PRC = Public Resources Code; CSLC = California State Lands Commission; CBC = California Building Code; SMARA = Surface Mining and Reclamation Act; AQMD = Air Quality Management District
Source: Compiled by GEI Consultants, Inc. in 2016

The Yolo Bypass (Bypass) is an approximately 59,000-acre, mostly leveed floodway through the natural-overflow Yolo Basin on the west side of the Sacramento River, between Verona at its confluence with the Sutter Bypass/Feather River and Rio Vista in the Delta, and immediately west of the Sacramento and West Sacramento metropolitan area (Figure 1-1). The Bypass is located in Yolo and Solano Counties and extends generally north to south, and from the Fremont Weir downstream to Liberty Island. The Bypass is an operative feature of the Sacramento River Flood Control Project (SRFCP). The Bypass is lined by approximately 27 and approximately 42 miles of right- and left-bank levees, respectively.

Figure 1-1. Project Vicinity



Source: GEI Consultants, Inc., 2016

Flows from the Sacramento River, the Sutter Bypass, and the Feather River converge in the area just upstream of Fremont Weir, where during major floods, approximately 80 percent of the flood flows of the Sacramento Valley watershed spill over the Fremont Weir into the Yolo Bypass. This provides direct flood relief for the Cities of Sacramento, West Sacramento, and Woodland; regional transportation infrastructure; small communities; rural-agricultural lands; and other important assets. The area in and adjacent to the Bypass is comprised of urban, agricultural, and environmental land use areas.

Urban lands adjacent to the Yolo Bypass are located within Sacramento, Yolo, and Solano Counties. The Cities of Sacramento, West Sacramento, Davis, Woodland, and Rio Vista are located adjacent to the Bypass.

The Bypass is seasonally inundated depending on flows in the Sacramento River. Many of the 500 species of native plants and wildlife found in the Central Valley rely, to some extent, on habitat existing within the Yolo Bypass. Many of the habitat resources are located within wildlife refuge areas that are situated within the Bypass. Agricultural areas within the Bypass also provide valuable habitat for wintering waterfowl within flooded rice fields and Swainson’s hawk foraging habitat within alfalfa fields. Vegetation in the wildlife refuge areas is managed by DWR and the California Department of Fish and Wildlife (CDFW) to maintain the design flood conveyance capacities of the Yolo Bypass and Sacramento Bypass while achieving significant wildlife habitat benefits.

1.4.2 Project Site

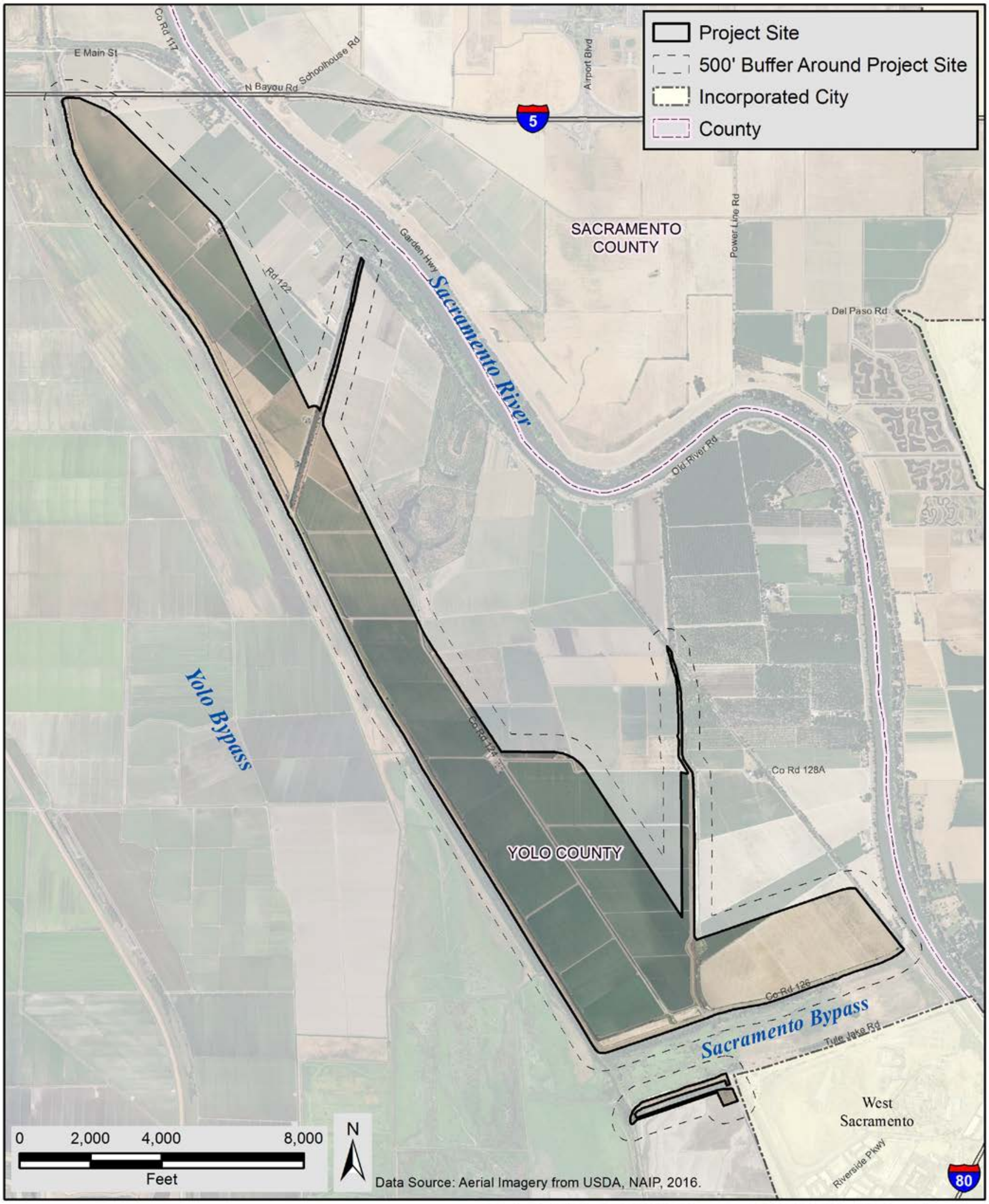
The project site is comprised of lands within an area known as the Lower Elkhorn Basin. The Lower Elkhorn Basin is located in Yolo County and is bounded by the Sacramento River on the east, the Tule Canal and Yolo Bypass on the west, the Sacramento Bypass on the south, and Interstate 5 (I-5) on the north (Figure 1-2). The project study area includes the Yolo Bypass east levees, Sacramento Bypass north levees, cross levees, construction staging and equipment laydown areas, the Sacramento Bypass south training levee, and areas between the existing levees and setback levee footprints.

The Lower Elkhorn Basin is primarily used for agricultural production of row crops (e.g., tomatoes, sunflowers, safflowers); alfalfa; and nut-bearing orchards. The Lower Elkhorn Basin (Basin) population is generally less than 100 people, and less than 100 building structures including farm buildings, permanent and temporary residences, and commercial buildings. The Basin is subdivided by interior drainage canals forming three subbasins identified as Reclamation Districts (RD): RD 537 (southeast half of Basin), RD 785 (southwest half of Basin), and RD 827 (northern part of Basin). The RDs each operate their own interior drainage canals and pump systems for crop irrigation and interior drainage. The topography of the Lower Elkhorn Basin area is relatively flat and slopes gently from northeast to southwest. The ground surface elevations range from about 10 to 25 feet (North American Vertical Datum of 1988 [NAVD88]). The Yolo Bypass is oriented generally north to south. The Sacramento Bypass channel is oriented east to west.

1.5 Public Scoping

On September 7, 2016, USACE issued a Notice of Intent (NOI) (see Appendix A, “Lower Elkhorn Basin Levee Setback Project Scoping Report”) to inform agencies and the general public that a joint EIS/EIR was being prepared and invited comments on the scope and content of the document and participation at a public scoping meeting. At that time, USACE announced that it had developed a public involvement program allowing opportunities for public participation and involvement in the NEPA process. The NOI also provided information on the date and time of the public scoping meeting. The

Figure 1-2. Project Study Area and Site



Z:\Projects\1611277_Flood\1605_YoloBypass_Enviro\1611277_1605_G002_ProjectArea_v2.mxd
23Feb2018 RS/SET

Source: GEI Consultants, Inc., 2016

NOI was published in the *Federal Register*, Vol. 81, No. 174, on September 8, 2016, USACE sent email notices to its EIS mailing list, and was posted on USACE's website. The public comment period on the NOI ended on October 7, 2016, as stated in the *Federal Register* notice and public notice email.

On September 7, 2016, DWR issued a Notice of Preparation (NOP) (see Appendix A, "Lower Elkhorn Basin Levee Setback Project Public Scoping Report") to inform agencies and the general public that a joint EIS/EIR was being prepared, and invited comments on the scope and content of the document and participation at a public scoping meeting. The NOP was filed by the State Clearinghouse and circulated to applicable State agencies, was noticed in the *Sacramento Bee* (local newspaper of largest general circulation), and was posted on DWR's website. The NOP was circulated for 30 days in compliance with CEQA. The public comment period for the NOP closed on October 7, 2016.

USACE and DWR jointly held a public scoping meeting to solicit input from the community and public agencies to be considered in project design, alternatives selection, and on the scope and content of the EIS/EIR. The meeting was held on September 15, 2016 at 4 p.m. at the West Sacramento Civic Center, 1110 West Capitol Avenue, West Sacramento, CA 95691. In addition to the project team, three private consultants and two agency representatives (Central Valley Flood Protection Board [CVFPB] and City of West Sacramento) attended the meeting. Appendix A presents all comment letters received during scoping.

In addition to scoping activities, other public outreach activities have included more than 30 meetings with interested parties organized by DWR at the request of agencies and stakeholder groups. Interagency coordination has assisted DWR in determining the scope of this EIS/EIR; developing project components and objectives; identifying the range of alternatives; identifying constraints; and defining potential environmental impacts, impact significance, and feasible mitigation measures.

This EIS/EIR includes an evaluation of 21 environmental issue areas and other NEPA- and CEQA-mandated issues (e.g., cumulative impacts, growth-inducing impacts). The 21 environmental issue areas are as follows:

- Aesthetics
- Air Quality
- Biological Resources – Fish and Aquatic Organisms
- Biological Resources – Vegetation and Wildlife
- Biological Resources – Wetlands and Other Waters
- Climate Change (including Greenhouse Gas Emissions)
- Cultural Resources (Archaeological, Historical, and Tribal)
- Energy
- Environmental Justice
- Geology, Soils, and Paleontological Resources
- Groundwater Resources
- Hazards and Hazardous Materials
- Hydrology, Hydraulics, and Flood Risk Management
- Land Use and Planning, and Agricultural and Forestry Resources
- Mineral Resources
- Noise and Vibration
- Recreation
- Socioeconomics (including Population, Housing, and Employment)
- Traffic and Transportation

- Utilities and Service Systems
- Water Quality

1.6 Areas of Known Controversy

Areas of known controversy and issues to be resolved are summarized below.

- Land ownership, use, and management of affected lands in the Yolo Bypass floodplain at the project site after project construction. DWR continues to engage stakeholders, but the future ownership and management of lands in the Yolo Bypass expanded floodplain has not yet been decided.

- Agricultural-based issues such as maintaining agricultural lands and minimizing farmland loss, impacts on the agricultural economy, conflicts with adjacent land uses, potential loss of property tax revenues, levee setback alignments that minimize farmland loss, cumulative habitat restoration project impacts on agriculture in the Yolo Bypass, potential drainage and access impacts and the timing of proposed inundation, and appropriate mitigation to offset farmland loss and related agricultural impacts. This EIS/EIR includes analysis of agricultural impacts related to these identified issues.

- Potential impacts from changes in flood flow frequency and duration on downstream agriculture and managed wetlands in the Yolo Bypass, as well as financial burdens on local reclamation districts, local communities, and the Counties of Yolo and Solano. The project would not substantially affect the flood-flow frequency, duration, or stage in downstream areas of the Yolo Bypass during 100- and 200-year flood events.

- Potential impacts to threatened and endangered species, critical habitat, and Tribal and cultural resources. DWR continues to work with Tribal interests to ensure that potential impacts to tribal and cultural resources are avoided or minimized, and USACE is pursuing ESA Section 7 consultation with USFWS and NMFS. These impacts have been evaluated in Chapter 4, "Affected Environment, Environmental Consequences, and Mitigation Measures," and impact analyses have been prepared to incorporate input received from interested agencies and Tribes.

1.7 Public Participation in Environmental Review Process

The Notice of Availability (NOA) for this DEIS/DEIR is being distributed to all cooperating, responsible, and trustee agencies, as well as to other potentially interested agencies, stakeholder organizations, non-governmental organizations, Native American Tribes, and individuals. This distribution ensures that interested parties have an opportunity to provide comments on the DEIS/DEIR, and to ensure that information pertinent to permissions, permits, authorizations, and approvals is provided to decision makers for USACE, DWR, NEPA cooperating agencies, and CEQA responsible and trustee agencies.

The DEIS/DEIR is available for review online at USACE's website, http://www.spk.usace.army.mil/Missions/Regulatory/Permitting/Environmental-Impact-Statements/ and also at DWR's project website, https://www.water.ca.gov/Programs/Flood-Management/Flood-Projects/Lower-Elkhorn-Basin. The DEIS/DEIR is also available for review by the public during normal business hours at DWR's office located at 3634 El Camino Avenue, Sacramento, CA. The DEIS/DEIR is being distributed for a 45-day review period that will end on July 9, 2018. Written comments on the DEIS/DEIR must be postmarked no later than 5 p.m. on July 9, 2018.

If comments are provided via email, please include the project title in the subject line, attach comments in MS Word format, and include the commenter's mailing address. Comments should be sent to the following addresses:

Federal (NEPA) Lead Agency Contact:
Tanis Toland
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, CA 95814-2922
Email: Tanis.J.Toland@usace.army.mil

State (CEQA) Lead Agency Contact:
Erin Brehmer
California Department of Water Resources
3464 El Camino Avenue
Sacramento, CA 95821
Email: Erin.Brehmer@water.ca.gov

A joint public meeting on the DEIS/DEIR will be conducted by USACE and DWR on Thursday, June 7, 2018 from 4 p.m. to 6 p.m. at West Sacramento City Hall, 1110 West Capitol Avenue, West Sacramento, California 95691. Comments on the DEIS/DEIR will be accepted during the meeting and will be recorded at the public comment table. Written comments may also be submitted throughout the comment period as described above. Once all comments have been assembled and reviewed, responses will be prepared to address substantive environmental issues that have been raised in the comments. The responses will be included in a FEIS/FEIR. All comments received by USACE and DWR are public records, subject to disclosure under the Freedom of Information Act or the Public Records Act.

The FEIS/FEIR will be prepared and circulated in accordance with NEPA and CEQA requirements and will include responses to all comments. The FEIS/FEIR will constitute a reprint of the entire DEIS/DEIR, as required by USACE. When the FEIS/FEIR is complete, two processes will occur: 1) USACE will publish the document, and the NOA will be printed in the *Federal Register*, which will mark the start of a 30-day public review period before USACE can issue a ROD describing its decision whether or not to approve a Section 404 permit and provide permission under Section 408 for the project, and 2) DWR will publish a Notice of Completion (NOC), which will mark the start of a 10-day public review period before DWR can certify the FEIR, issue Findings of Fact and a Statement of Overriding Considerations (if necessary), file the Notice of Determination (NOD), and approve DWR's Preferred Alternative or another alternative, including the No Project Alternative. Once the NOD is filed, a CEQA statute of limitations period will run for an additional 30 days.

1.8 Relationship to Other Related Programs and Studies

The project is an implementation action identified in the 2012 CVFPP (DWR 2012a). As such, the 2012 CVFPP Program EIR (PEIR) addressed setback levees and similar flood-risk reduction projects at a program-level under CEQA (DWR 2012b). For purposes of CEQA, this EIS/EIR incorporates analyses from the CVFPP PEIR, but because of the integration of NEPA analysis into this document, the EIS/EIR does not tier from the CVFPP PEIR. Furthermore, new information is documented in a series of detailed studies including two Basin-wide Feasibility Studies (BWFS) for the Sacramento River Basin and the San Joaquin River Basin, respectively, including six Regional Flood Management Plans (RFMPs); a draft Central Valley Flood System Conservation Strategy (CVFSCS); and the Draft 2017 CVFPP Update and its accompanying Draft Supplemental PEIR. These documents are identified below and most are discussed in more detail in Appendix B, "Project Background and Context."

This EIS/EIR formulated analyses and conclusions after consideration of several key documents with respect to flood risk reduction at the project site and vicinity:

- 2012 CVFPP (DWR 2012a) and 2012 CVFPP PEIR (DWR 2012b)
- Draft CVFPP 2017 Update (DWR 2016a) and Draft Supplemental PEIR (DWR 2016b)
- Draft CVFPP Conservation Strategy (DWR 2016c)
- Sacramento Basin-wide Feasibility Study (DWR 2016d)
- American River Common Features General Reevaluation Report EIS/EIR (USACE 2015)
- Lower Sacramento/Delta North Regional Flood Management Plan (Flood Protect 2014)
- Local Funding Mechanism for Sacramento Area Flood Control Improvements Subsequent Program EIR (Sacramento Area Flood Control Agency [SAFCA] 2016)

1.9 Document Terminology

As described earlier in this chapter, NEPA and CEQA require preparation of environmental analyses to evaluate the potential environmental effects of projects and alternatives that are subject to governmental approval or funding. While many concepts are common to NEPA and CEQA, there are several differences between the two in terminology, procedures, environmental document content, and substantive mandates to protect the environment. For this EIS/EIR, the more rigorous of the two laws was applied in cases in which NEPA and CEQA differ. Table 1-3 compares NEPA and CEQA terminology.

In some cases in this document, both NEPA and CEQA terminology are used, as in the next 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 the word "impacts" is used for consistency. A list of acronyms and abbreviations, as well as a glossary, precedes Chapter 1, "Introduction."

Table 1-3. Correlated NEPA and CEQA Terminology

NEPA Term	CEQA Term
Affected Environment	Environmental Setting
Cooperating Agency	Responsible Agency, Trustee Agency
Council on Environmental Quality regulations require an EIS to identify the direct and indirect effects "and their significance" (40 CFR 1502.16)	Threshold of Significance/Potentially Significant and Significant Direct, Indirect, and Cumulative Impacts
Environmental Consequences/Effects	Environmental Impacts

Table 1-3. Correlated NEPA and CEQA Terminology

NEPA Term	CEQA Term
Environmental Impact Statement	Environmental Impact Report
Environmentally Preferable Alternative	Environmentally Superior Alternative
Lead Agency	Lead Agency
No Action Alternative	No Project Alternative
Notice of Intent	Notice of Preparation
Preferred Alternative and Alternatives	Proposed Project and Alternatives/Project Description
Purpose and Need	Project Objectives
Reasonably Foreseeable Projects	Probable Future Projects
Record of Decision	Notice of Determination/Findings of Fact and Statement of Overriding Considerations
U.S. Environmental Protection Agency Filing/Federal Register Notice and Agency/Public Review (also known as a Notice of Availability)	Notice of Completion/Notice of Availability

1.10 Document Organization

The content and format of this EIS/EIR are designed to meet the requirements of NEPA, the NEPA regulations issued by CEQ, USACE NEPA regulations and Appendix B to those regulations (NEPA Implementation), and CEQA and the State CEQA Guidelines. This EIS/EIR is organized into the following key sections so that the reader can easily obtain information about the project, project alternatives, and their specific environmental issues.

- The **Abstract** identifies lead and any cooperating, responsible, and trustee agencies; contact information for the lead agencies; the title of the project and its location; a brief description of the alternatives under consideration; and comment submission information.

- The **Executive Summary** presents an overview of the alternatives under consideration; lists environmental impacts/consequences before and after mitigation implementation and mitigation measures in tabular format and identifies the next steps in the NEPA/CEQA process.

- **Chapter 1, "Introduction,"** explains the NEPA and CEQA processes; the type of EIS/EIR and its intended uses; discusses the lead, cooperating, responsible, and trustee agencies that may have discretionary authority over the project; identifies regulatory permissions, permits, authorizations, and approvals; presents known areas of controversy and issues to be resolved; provides information on public scoping and participation; and outlines the EIS/EIR organization.

- **Chapter 2, "Statement of Purpose and Need, and Project Objectives,"** describes the project's purpose and need, along with the CEQA-required project objectives.

- **Chapter 3, "Alternatives,"** presents the detailed descriptions of the actions that would be taken under each alternative under consideration. This chapter also contains the project description for CEQA purposes and describes the project location, characteristics, and components. This chapter also describes the alternatives eliminated from further consideration, and discusses the environmentally superior alternative as required under CEQA. The environmentally preferable alternative under NEPA is identified in the ROD.

- **Chapter 4,** "**Affected Environment, Environmental Consequences, and Mitigation Measures**," is divided into 22 sections. Section 4.1 explains the approach to the affected environment (i.e., environmental setting under CEQA), presents the assumptions used in the environmental analysis, and provides definitions of the types of environmental impacts. Each of the remaining sections in Chapter 4 is devoted to a particular environmental issue area and describes the baseline, or existing conditions, and summarizes the regulatory setting, then provides an analysis of impacts at an equal level-of-detail for all alternatives and describes mitigation measures that would avoid, minimize, rectify, reduce, or compensate potentially significant and significant adverse impacts, where available and feasible. At the beginning of each impact analysis discussion, a comparison of the impacts is presented. Each section also contains the cumulative impacts analysis and the residual significant impacts after mitigation implementation.

- **Chapter 5,** "**Cumulative Impacts**," introduces the analysis of cumulative impacts, and includes the cumulative impact methodology, cumulative context, and geographic scope; a list and brief summary of past, present, and reasonably foreseeable future projects; and the cumulative impact analysis for each topic area.

- **Chapter 6, "Other Statutory Requirements,"** contains the analysis of growth-inducing impacts, irreversible or irretrievable commitment of resources, relationship between short-term uses of the environment and maintenance and enhancement of long-term productivity, and significant and unavoidable adverse environmental impacts of the alternatives under consideration.

- **Chapter 7, "Consultation and Coordination,"** provides a summary of consultation and coordination with other Federal, State, regional, and local agencies with jurisdiction over the project, or components of the project.

- **Chapter 8, "Compliance with Applicable Laws, Regulations, Policies, and Plans,"** summarizes the project's compliance with Federal and State environmental laws, regulations, policies, and plans.

- **Chapter 9, "Public Involvement,"** provides a summary of public involvement activities implemented to actively engage with interested agencies and the public, and to comply with NEPA and CEQA requirements.

- **Chapter 10, "List of Preparers,"** lists individuals who were involved in oversight or preparation of sections of this EIS/EIR, their education, and years of experience.

- **Chapter 11, "References,"** provides a bibliography of sources cited in this EIS/EIR.

- **Chapter 12, "Index,"** contains the NEPA-required index for easy reference of topics and issues in this EIS/EIR.

- **Technical Appendices** contain the background information that supports the analysis contained in this EIS/EIR.

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Chapter 2. Statement of Purpose and Need, and Project Objectives

2.1 Introduction

The Council on Environmental Quality (CEQ) regulations require a statement of "the underlying purpose and need to which the agency is responding in proposing the alternatives, including the proposed action" (40 CFR 1502.13). The State CEQA Guidelines require a clearly-written statement of objectives, including the underlying purpose of a project (Section 15124[b]). DWR's Preferred Alternative and other action alternatives have been formulated to achieve the purpose and need of the project, as defined by USACE under NEPA. The project objectives, as identified by DWR, are consistent with the CVFPP and support the underlying purpose and need for the project to which USACE is responding, in conformance with NEPA requirements. Project background and context is described in Appendix B, "Project Background and Context."

2.2 Project Purpose

The project purpose is to reduce flood risk to the Cities of Sacramento, West Sacramento, and Woodland by improving the flood management system consistent with the State-approved 2012 Central Valley Flood Protection Plan.

2.3 Project Need

The need for the project is described below.

- A high risk of flooding threatening life and public safety, property, critical infrastructure, and the environment exists throughout the areas protected by the Yolo and Sacramento Bypasses, including but not limited to portions of the Cities of Sacramento, West Sacramento, and Woodland.

- The Sacramento River Flood Control Project, including the Yolo and Sacramento Bypasses, has inadequate capacity to convey large flood events and needs improvement, as measured in the Yolo Bypass upstream of I-5 and in the Sacramento River at the I Street Bridge.

- The existing Sacramento Bypass North Levee and portions of the Yolo Bypass East Levee are deficient (do not meet current design standards), as evidenced by several slope failures, sloughing, boils, and slope cracking in early 2017.

- The long-term operation, maintenance, repair, replacement and rehabilitation costs for the flood management facilities are expected to continue to increase as these facilities age.

- Climate change may increase hydrologic variability and may put further stress on the flood management system and erode the level of protection provided from previous flood system investments; an increase in system capacity is needed to provide resiliency in the face of uncertain future flow conditions due to climate change.

- Impaired hydrologic and geomorphic processes; eliminated, fragmented, and degraded habitat; and other stressors have reduced the abundance, distribution, and diversity of native aquatic and terrestrial species in the Sacramento Basin.
- Native fish and riparian habitats have been greatly reduced in the Sacramento River Basin.
- Yolo Bypass projects provide unique opportunities to help restore native fish habitat and/or improve fish passage to produce systemwide benefits.

2.4 Project Objectives

The project objectives are described below.

- Improve public safety by providing localized and substantial flood stage reduction in the Yolo Bypass (as measured at I-5) and Sacramento River (as measured at I Street Bridge), consistent with CVFPP goals and objectives.
- Improve flood system resiliency in the face of uncertain future climate and flow conditions by increasing Sacramento Bypass and Upper Yolo Bypass capacities for a 100-year flood event, consistent with CVFPP goals and objectives.
- Provide additional Sacramento Bypass conveyance capacity to enable increased flows over the existing Sacramento Weir and accommodate potential future weir expansions.
- Reduce flood facility operations and maintenance requirements, repairs, and costs.
- Minimize impacts to agricultural production to the extent feasible, consistent with CVFPP objectives.
- Identify potential locations for improving ecosystem functions and contributing to meeting Central Valley Flood System Conservation Strategy (CVFSCS) objectives, consistent with CVFPP goals, while still meeting river stage and bypass conveyance goals.
- Maximize multiple project benefits within funding constraints.
- Minimize impacts to aviation safety to the extent feasible.
- Minimize environmental impacts to the extent feasible.
- Enter into a construction contract by 2020 to meet existing funding requirements.

The project purpose and objectives also require that the project be consistent with CVFPP goals and objectives (DWR 2012a, 2016a).

Taking the project purpose, need, and objectives into account, the project would be implemented by:

- coordinating with Federal, State, regional, and local entities to help ensure that the project aligns with applicable laws and adopted plans, objectives, and policies;
- considering existing and potential future land uses at the project site; and
- designing the project to initiate construction in 2020, considering the amounts and constraints of assumed funding sources, and optimizing the use of those funds.

2.5 Central Valley Flood Protection Plan Goals and Objectives

The project purpose and objectives require that the project be consistent with CVFPP goals and objectives (DWR 2012a, 2016a). The CVFPP identifies a primary goal (Improve Flood Risk Management) and several supporting goals, presented below:

- **Improve Flood Risk Management**. Reduce the chance of flooding, and damages once flooding occurs, and improve public safety, preparedness, and emergency response through the following:
    - Identifying, recommending, and implementing structural and nonstructural projects and actions that benefit lands currently receiving protection from facilities of the State Plan of Flood Control (SPFC).
    - Formulating standards, criteria, and guidelines to facilitate implementation of structural and nonstructural actions for protecting urban areas and other lands of the Sacramento and San Joaquin River Basins and the Delta.
- **Improve Operations and Maintenance**. Reduce systemwide maintenance and repair requirements by modifying the flood management systems in ways that are compatible with natural processes, and adjust, coordinate, and streamline regulatory and institutional standards, funding, and practices for operations and maintenance (O&M), including significant repairs.
- **Promote Ecosystem Functions**. Integrate the recovery and restoration of key physical processes, self-sustaining ecological functions, native habitats, and species into flood management system improvements.
- **Improve Institutional Support.** Develop stable institutional structures, coordination protocols, and financial frameworks that enable effective and adaptive integrated flood management (designs, operations and maintenance, permitting, preparedness, response, recovery, and land use and development planning).
- **Promote Multi-Benefit Projects.** Describe flood management projects and actions that also contribute to broader integrated water management objectives identified through other programs.

The California Central Valley Flood Protection Act of 2008 (Senate Bill 5) defined objectives, codified in California Water Code Section 9616, for reducing the risk of flooding in the Central Valley. Per California Water Code Section 9616, the CVFPP is to describe both structural and nonstructural means for improving the performance and eliminating the deficiencies of levees, weirs, bypasses, and other SPFC facilities. Wherever feasible, these actions should meet multiple objectives, including the following:

- Reduce the risk to human life, health, and safety from flooding, including protection of public safety infrastructure.
- Expand the capacity of the flood management system in the Sacramento-San Joaquin Valley to either reduce floodflows or convey floodwaters away from urban areas.
- Link the flood protection system with the water supply system.
- Reduce flood risks in currently nonurbanized areas.
- Increase the engagement of local agencies willing to participate in improving flood protection, ensuring a better connection between State flood protection decisions and local land use decisions.
- Improve flood protection for urban areas to the urban level of flood protection.
- Promote natural dynamic hydrologic and geomorphic processes.
- Reduce damage from flooding.
- Increase and improve the quantity, diversity, and connectivity of riparian, wetland, floodplain, and shaded riverine aquatic habitats, including the agricultural and ecological values of these lands.
- Minimize flood management system O&M requirements.
- Promote the recovery and stability of native species' populations and overall biotic community diversity.
- Identify opportunities and incentives for expanding or increasing use of floodway corridors.
- Provide a feasible, comprehensive, and long-term financing plan for implementing the CVFPP.
- Identify opportunities for reservoir reoperation in conjunction with groundwater flood storage.

Chapter 3. Alternatives

3.1 Introduction

This chapter describes the action alternatives evaluated in detail in this EIS/EIR, including DWR's Preferred Alternative ("Proposed Project" under CEQA) and the No Action Alternative, and compares these alternatives. Alternatives that were considered but rejected are also presented. Project alternatives were developed to reduce or eliminate the significant or potentially significant adverse environmental effects identified as a result of DWR's Preferred Alternative, while still meeting most if not all of the basic project objectives.

3.2 Requirements for Alternatives Development, Selection, and Evaluation

NEPA and CEQA require consideration of the potential effects of a range of action alternatives that would feasibly attain the majority of a project's basic objectives and accomplish the specified project purpose and need, while avoiding and/or minimizing adverse environmental impacts, in addition to the No Action Alternative (which also constitutes the No Project Alternative under CEQA). NEPA and CEQA require consideration of future conditions No Action/No Project Alternative as a basis of comparison with the action alternatives.

3.2.1 National Environmental Policy Act

NEPA requires that all alternatives, including the preferred alternative, be evaluated at a comparable level of detail (Title 40, Code of Federal Regulations [CFR] Part 1502.14[b]). Similarly, the Council of Environmental Quality (CEQ) regulations for implementing NEPA (Title 40, CFR Part 1502.14) require a range of reasonable alternatives to be objectively evaluated in an EIS so that each alternative is evaluated at an equal level of detail. Alternatives that cannot reasonably meet the project purpose and need do not require detailed analysis.

3.2.2 California Environmental Quality Act

CEQA requires that the lead agency consider alternatives that would avoid or reduce one or more of the significant impacts of a project. The State CEQA Guidelines state that an EIR needs to describe and evaluate only those alternatives necessary to permit a reasonable choice and to foster informed decision-making and informed public participation (Section 15126.6[f]). Consideration of alternatives focuses on those that can either eliminate significant adverse environmental impacts, or reduce them to less-than-significant levels; alternatives considered in this context may include those that are more costly, and those that could impede, to some degree, the attainment of all project objectives (Section 15126.6[b]). CEQA does not require the alternatives to be evaluated at the same level of detail as DWR's Preferred Alternative.

3.3 Alternatives Development and Screening Process

To develop a broad spectrum of possibilities to support DWR's goals for multi-benefit flood management in the State Plan of Flood Control, initial action alternatives were developed from recent planning documents and further screened to characterize the environmental effects, feasibility, and costs associated with the initial action alternatives. Effects of both project construction and long-term operations and maintenance (O&M) were identified and analyzed for the final alternatives.

3.3.1 Initial Alternatives Development and Screening

Several initial alternatives were developed based on the outcome and recommendations of previous related flood management planning studies for facilities of the State Plan of Flood Control. These plans (with the exception of the 2017 update to the Central Valley Flood Protection Plan [CVFPP], which incorporates the Sacramento Basin-wide Feasibility Study [BWFS] and the Draft Central Valley Flood System Conservation Strategy [CVFSCS]) have been finalized, adopted, and/or approved by DWR, USACE, or local agencies as of the release of the DEIS/DEIR, as detailed in Appendix B, "Project Background and Context," and summarized briefly below.

- **2012 CVFPP, CVFPP PEIR, Draft CVFPP 2017 Update and Draft Supplemental PEIR, Sacramento Basin-wide Feasibility Study (BWFS), and Draft Central Valley Flood System Conservation Strategy (CVFSCS) –** The 2012 CVFPP and CVFPP 2017 Update explored options for improving flood risk management at a programmatic level. The Draft CVFSCS further refined goals and objectives related to ecosystem functions, and the BWFS explored, in greater detail, potential flood system improvements that would enhance flood system capacity.

  - **2012 CVFPP, 2012 CVFPP PEIR, Draft CVFPP 2017 Update and Draft Supplemental PEIR –** Through a detailed analysis of each program alternative regarding how well they met program objectives, how feasible they would be to implement, and comparison of environmental impacts, the 2012 CVFPP PEIR (DWR 2012b), as updated with the Supplemental PEIR (DWR 2016b) concluded that the State Systemwide Investment Approach (SSIA) would be the most feasible to implement while best meeting program objectives identified in the 2012 CVFPP and Draft CVFPP 2017 Update (DWR 2012a; DWR 2016a). The 2012 CVFPP PEIR also analyzed an alternative that included fix-in-place improvements to existing levees, without any setbacks. This alternative was ultimately rejected because it failed to meet most of the 2012 CVFPP program objectives, and was determined to be infeasible from a cost-benefit perspective. CVFPP's analysis found that fix-in-place improvements would cost approximately ⅓ to ½ as much as setback levees. Although fix-in-place improvements would meet CVFPP's primary goal of improving flood risk management, these improvements would not meet any of the four supporting goals (discussed in Section 2.5 of this EIS/EIR), would cause downstream flood impacts, and showed the lowest reduction in potential flood damages of all the CVFPP scenarios. Furthermore, in the case of this project, the purpose is to improve flood protection for the Cities of West Sacramento, Sacramento, and Woodland, and although fix-in-place would reduce flood risk in the Lower Elkhorn Basin, it would not meet the project purpose. Therefore, a fix-in-place alternative was not further analyzed in a project-level analysis for the LEBLS project. (DWR 2012a, b; DWR 2016a, b.)

  - **Sacramento BWFS and CVFSCS –** The BWFS evaluated and refined options for improving the flood management system to achieve resiliency in a manner consistent with 2012 CVFPP recommendations. Objectives and recommendations from the CVFSCS were incorporated into the BWFS analyses and management actions, including weir widening and setback levees, and were evaluated to balance public safety, ecosystem enhancements, and economic sustainability. (DWR 2016c, d.)

- **Lower Sacramento River/Delta North Regional Flood Management Plan (RFMP) –**The RFMP studied regional solution alternatives for meeting CVFPP program goals and objectives while taking into consideration local objectives and constraints. Based on benefits related to reduced water surface elevations and proximity to the urban areas where the benefits would be realized, the RFMP identified a levee setback 2,000 feet east of the existing Yolo Bypass East Levee and a levee setback 1,500 feet north of the existing Sacramento Bypass North Levee. (FloodProtect 2015.)

- **American River Common Features (ARCF) General Reevaluation Report (GRR) –** The ARCF GRR and associated EIS/EIR analyzed alternatives designed to reduce the flood risk in the greater Sacramento area. While the majority of the ARCF GRR study area is outside of the Yolo Bypass, it did include a recommendation to extend the Sacramento Weir and widen the Sacramento Bypass, which would reduce water surface elevations in the Sacramento River adjacent to the City of Sacramento. The study determined that a levee setback of 1,500 feet north of the existing Sacramento Bypass North Levee would best meet project needs and objectives while considering constraints and feasibility. (USACE 2015.) The plan recommended in the USACE Chief's Report, dated April 26, 2016, was authorized by Congress in the Water Resources Development Act (WRDA) of 2016, P.L. 114-322, December 16, 2016. WRDA 2016 is Title I of the Water Infrastructure Improvements for the Nation Act (WIIN Act).

Alternative Evaluation Screening Criteria

To evaluate an initial array of alternatives, the evaluation criteria were organized into two tiers focused on 1) meeting project objectives, and 2) avoiding project constraints and minimizing adverse effects to maximize project feasibility. The first tier is a screening to determine how well an alternative meets proposed objectives (as detailed in Chapter 2, "Statement of Purpose and Need, and Project Objectives"). The second tier screens an alternative with regard to feasibility, and potentially significant environmental impacts. Public input on all criteria were solicited during the environmental scoping process. The criteria used for the alternatives screening process are listed below.

Tier 1 – Meeting Project Objectives

As required under the State CEQA Guidelines, an alternative must meet most, but not all, of the project objectives to be considered further in the alternatives screening process. Alternatives not meeting most of the project objectives were eliminated from further consideration. Project objectives are presented in Subsection 2.1.3, "Project Objectives."

Tier 2 – Maximizing Project Feasibility

The following criteria are directly related to some aspect of project feasibility. Certain criteria must be fully met for an alternative to be feasible while, in other cases, certain criteria can be partially met and an alternative could remain feasible. Overall feasibility, therefore, considers the total performance of an alternative against all criteria described below.

- **Institutional Support –** This project may affect local agencies. An alternative should be designed to minimize adverse effects to local agencies.

- **Land Use Compatibility –** Alternatives may affect current or proposed land uses. An alternative should be compatible with existing and future land uses.

- **Agricultural Production Maintenance –** Agriculture in the Yolo and Sacramento Bypasses is important to the Statewide and local economies. An alternative should minimize impacts to agricultural production.

- **Consistency with Related Flood Plans –** The CVFPP, ARCF GRR, and RFMP all provide guidance for flood risk reduction in the project site and vicinity (see Appendix B, "Project Background and Context," for further information). An alternative should be consistent with related flood plans.

- **Environmental Impact Minimization –** Pursuant to CEQA statute and guidelines, alternatives should reduce one or more potentially significant environmental impacts. An alternative should minimize environmental impacts and reduce one or more potentially significant environmental impacts.

- **Regulatory Acceptance –** Implementation of any large infrastructure project, such as the LEBLS project, will require a number of permits and approvals. An alternative must be permittable and able to meet all permit conditions.

Substantially reducing stage on the Sacramento River at the I Street Bridge and in the Yolo Bypass upstream of Interstate 5 (I-5) are specific project objectives that can best be achieved by increasing the capacities of the Yolo and Sacramento Bypasses to convey flood flows down the bypasses, flows that would otherwise stay in the Sacramento River and increase flood risk to Sacramento, West Sacramento, and Woodland.

3.3.2 Alternatives Considered, but Rejected from Detailed Analysis

As described below, three alternatives from the Sacramento Basin-wide Feasibility Study and the potential for location alternatives were evaluated based on Tier 1 and 2 criteria, and rejected.

Sacramento Basin-Wide Feasibility Study – Lower Elkhorn Basin Alignment Option 1

This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south, which would be set back approximately 2,000 feet east of the existing alignment. The alignment would begin just south of I-5 and continue approximately 5.5 miles south, ending at a new Sacramento Bypass levee. The Sacramento Bypass would be expanded by constructing a new setback levee approximately 800 feet north of the existing levee, which would be approximately 1.3 miles long.

Screening Evaluation – While this alternative meets project objectives and would be relatively feasible, the 800-foot setback of the Sacramento Bypass Levee is inconsistent with the Congressionally authorized ARCF GRR project that DWR supports as a project partner. The recommended plan in the final ARCF GRR, dated December 2015, includes construction of a setback levee approximately 1,500 feet to the north which was found to be the optimal setback by USACE. This alternative is also inconsistent with the RFMP and would not receive local agency support. Therefore, this alternative would not be implementable and was eliminated from further analysis.

Sacramento Basin-Wide Feasibility Study – Lower Elkhorn Basin Alignment Option 3

This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south, which would be set back approximately 3,500 feet east of the existing alignment. It would begin just south of I-5 and continue approximately 5.5 miles south, ending at a new Sacramento Bypass levee. The Sacramento Bypass would be expanded by constructing a new setback levee approximately 1,500 feet north of the existing levee, which would be approximately 1.3 miles long.

Screening Evaluation – This alternative meets the project objectives, but would cause impacts to an active mitigation site on an adjacent property, implemented as biological resources mitigation, for levee project impacts and is managed by Reclamation District (RD) 1000 and RD 900. It would significantly increase project costs, potentially cause unreasonable project delays, and result in significant biological resource impacts. The Sacramento BWFS evaluated several wider footprints like Option 3, as part of a suite of possible changes for the entire Yolo Bypass Area, and the projected cost for the approximately 3,500-foot Lower Elkhorn setback segment was approximately 1.5 times the cost of the proposed project. The exact footprint presented in this EIS/EIR is different than what was evaluated in the BWFS, since additional refinement occurred based on engineering, hydraulic analysis, and feasibility. However, the inclusion of the wider footprint into Option 3 added considerable cost due to increased land acquisition costs, mitigation costs for increased project effects on agricultural and biological resources, and increased hauling distances for borrow and waste material resulting from construction. This alternative would also have difficulty overcoming competing public interests in current land use. Therefore, this alternative would not be implementable, and was eliminated from further analysis.

Sacramento Basin-Wide Feasibility Study – Lower Elkhorn Basin Alignment Option 4

This alternative would include a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south, beginning just south of I-5. It would be set back approximately 5,000 feet east of the existing alignment, and would span a distance of approximately 5.5 miles, ending at a new Sacramento Bypass levee. The Sacramento Bypass would be expanded by constructing a new setback levee approximately 1,300 feet north of the existing levee, which would be approximately 1.3 miles long.

Screening Evaluation – While the alternative meets the project objectives, the approximately 1,300-foot setback of the Sacramento Bypass Levee is inconsistent with the ARCF GRR, which DWR supported as a partner. It is also inconsistent with the Lower Sacramento River/Delta North RFMP, and would not have local agency support. This alternative also requires impacts to an active mitigation site (see above "Alignment Option 3"). This alternative would significantly increase project costs, as well as impacts to the environment. The Sacramento BWFS evaluated several wider footprints like Option, 4 as part of a suite of possible changes for the entire Yolo Bypass Area, and the projected cost for the approximately 5,000-foot Lower Elkhorn setback segment was nearly double the cost of the proposed project. The exact footprint presented in this EIS/EIR is different than what was evaluated in the BWFS, since additional refinement occurred based on engineering, hydraulic analysis, and feasibility. However, as with BWFS Option 3, the inclusion of the wider footprint into Option 4 added considerable cost due to increased land acquisition costs, increased mitigation costs due to greater project effects on agricultural and biological resources, and increased hauling distances for borrow and waste material resulting from construction. Also, BWFS Option 4 included a smaller Sacramento Bypass setback than what was included in the ARCF GRR Recommended Plan and thus would have been inconsistent with this companion planning document. It would also be difficult to overcome competing public interests in current land use. Therefore, this alternative would not be implementable and was eliminated from further analysis.

Alternative Project Locations

CEQA requires, in appropriate circumstances, that alternative locations to the proposed project be considered where feasible. Other locations are not suitable to provide the localized flood stage reductions in the Yolo Bypass at I-5 and the Sacramento River at the I Street Bridge identified in the project objectives. As a result, other than the alternative configurations considered in this document, it is apparent that flood protection system improvements cannot feasibly achieve the project objectives unless system capacity increases are undertaken in the Lower Elkhorn Basin. For that reason, alternative locations for the project have been determined infeasible and are not evaluated further.

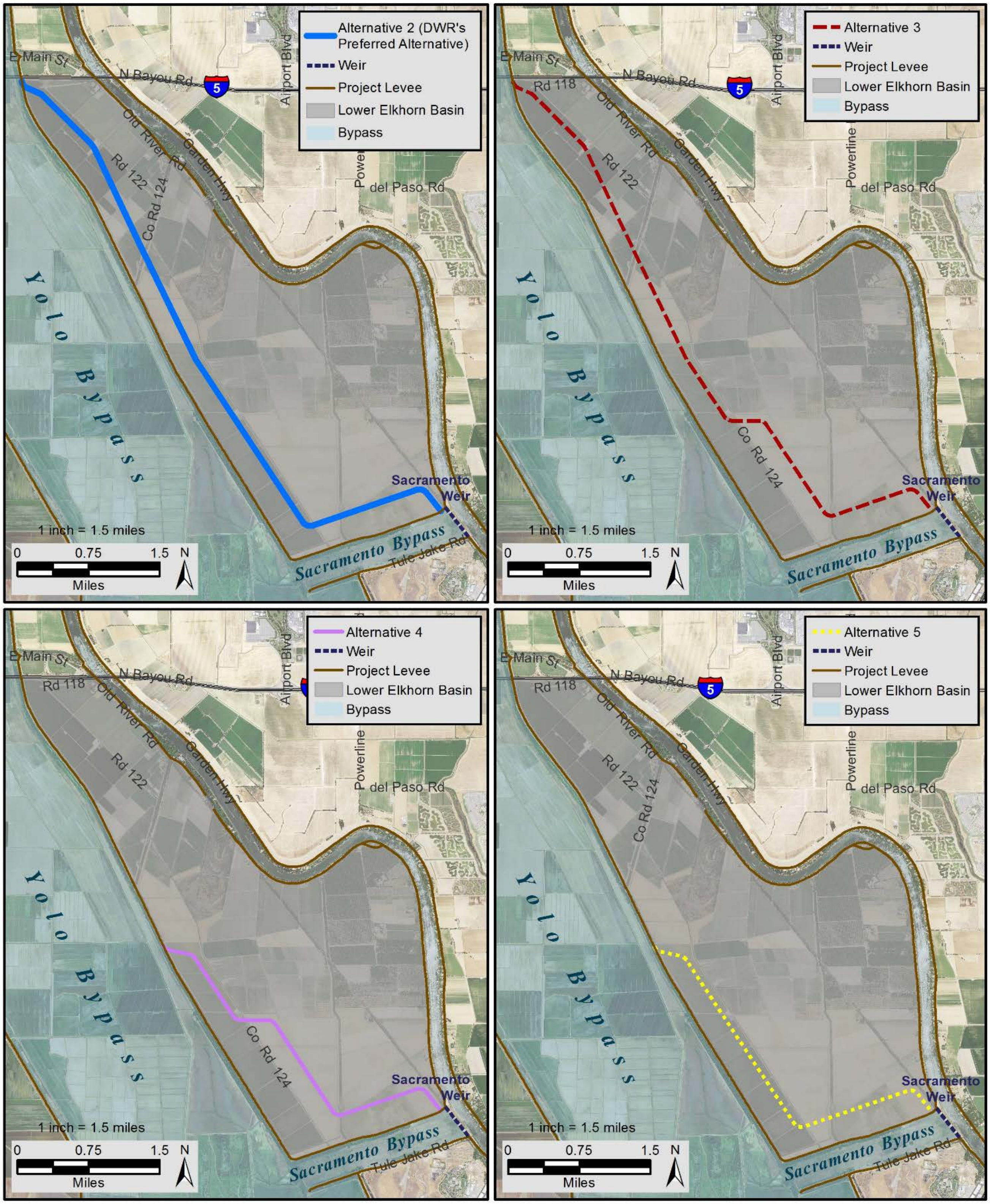
3.3.3 Alternatives Considered and Retained for Detailed Analysis

These alternatives were considered and retained for detailed analysis in the EIS/EIR. Alternative 1 (No Action Alternative) does not meet critical project objectives, but is retained for detailed analysis because it is required under NEPA and CEQA. Alternatives 2 and 3 meet most or all of the project objectives and have a high degree of feasibility based on evaluation against the Tier 2 screening criteria. Alternatives 4 and 5 appear to meet most of the project objectives and have a moderate degree of feasibility based on evaluation against the Tier 2 screening criteria. Alternatives 3 through 5 also reduce at least one environmental impact associated with Alternative 2 (DWR's Preferred Alternative). Figure 3-1 presents each of the action alternatives to visually present the differences in alternative setback levee alignments. Brief summary descriptions of these alternatives are presented below followed by more detailed descriptions later in this chapter.

Alternative 1 – No Action/No Project Alternative

Under this alternative, no setback levees or related improvements would be constructed. The existing levees would remain in their existing configurations and the existing flood risk would remain. The No Action Alternative would leave the level of flood protection for Sacramento among the lowest for metropolitan areas in the United States, with inadequate bypass capacity, and bypass levees that are deficient per current standards. Under the No Action Alternative, current flood management trends identified in the 2012 CVFPP would likely continue, including: continuing existing Federal, State, and local flood management partnerships under the current funding framework. This framework currently undervalues multi-benefit ecosystem and rural flood projects, results in difficulty conducting annual O&M activities while also being responsive to endangered species and habitat needs within the State Plan of Flood Control, and delays project implementation due to the complex regulatory processes. (A detailed description of O&M activities, which would continue under the No Action Alternative, is contained in subsection 3.4.6, below.) Because funding for the ARCF GRR has not been appropriated, and implementation of the ARCF GRR features on the LEBLS project site (Sacramento Weir widening and Sacramento Bypass North Levee setback) would likely occur later than other improvements included in the ARCF GRR (and so would not be in place at the time the LEBLS project was implemented), the ARCF GRR has not been included in the No Action Alternative for the LEBLS project.

Figure 3-1. Action Alternatives Alignment Comparison



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Source: California Department of Water Resources 2016; adapted by GEI Consultants, Inc. in 2016

Screening Evaluation – This alternative does not meet the project purpose or critical project objectives. Public safety and flood system resiliency would not be improved as localized flood stage reductions would not occur. The efficiency of the existing Sacramento Weir and additional Bypass conveyance capacity would not occur. Flood risk would not be decreased in the Sacramento region because no stage reductions in the Sacramento River would occur. Flood risk in the Elkhorn Basin would not be reduced, and levees that do not meet current standards would not be improved. During high-water events in 2017, multiple levee slope failures occurred along the Sacramento Bypass North Levee and Yolo Bypass East Levee sections that would be replaced by the project. The No Action Alternative is retained for detailed analysis, however, as required by NEPA and CEQA.

Alternative 2 – 7-Mile Setback Partial Degrade (DWR's Preferred Alternative)

This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south, which would be set back approximately 1,500 feet east of the existing alignment. It would begin just south of I-5 and continue approximately 5.6 miles south, ending at the new Sacramento Bypass Levee. The Sacramento Bypass would be expanded by constructing a new setback levee approximately 1,500 feet north of the existing levee, which would be approximately 1.6 miles long. Although most of the existing Yolo Bypass Levee and Sacramento Bypass North Levee would be degraded following construction of the setback levees, up to 3,800 linear feet of levee would remain to provide upland habitat for special-status species (Figure 3-2).

Screening Evaluation – This alternative meets project objectives and is considered highly feasible for implementation.

Alternative 3 – 7-Mile Expanded Setback Full Degrade

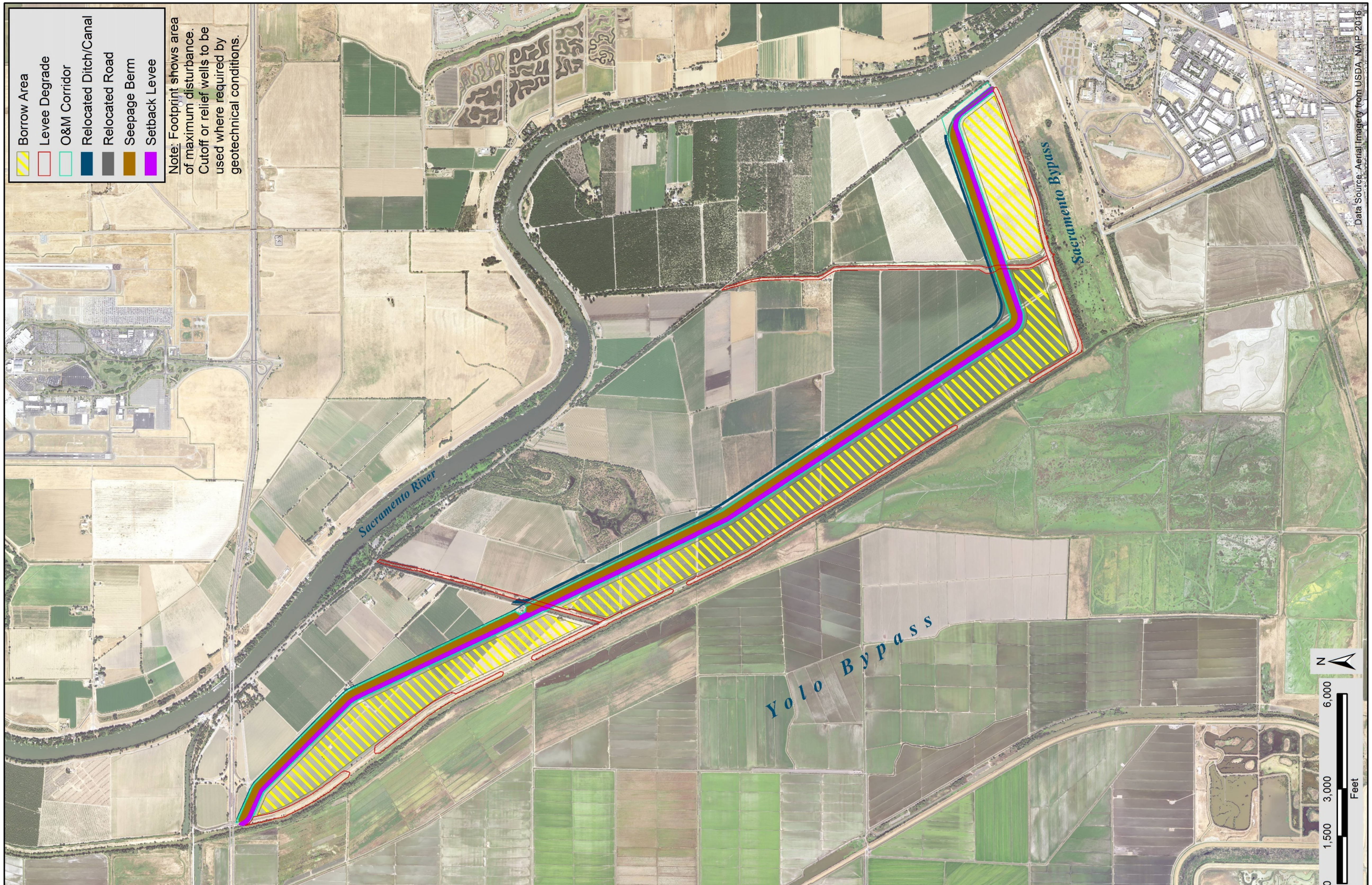
The project includes a setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south. It would begin just south of I-5 and would be set back approximately 1,500 feet east of the existing levee in the northern and middle portions of the Basin. Continuing south from there, the levee setback would expand up to 3,000 feet in the southern portion of the Basin, and continue for a total of 5.8 miles of setback levee along the Yolo Bypass, ending at the new Sacramento Bypass Levee. The Sacramento Bypass would be expanded by constructing a new setback levee approximately 1,500 feet north of the existing levee and would be approximately 1.3 miles long. Following construction of the new setback levees, the existing Yolo Bypass East Levee and Sacramento Bypass North Levee would be degraded in the project site (Figure 3-3).

Screening Evaluation – This alternative meets the project objectives and is considered highly feasible for implementation. This alternative has similar support to Alternative 2, but it may also provide additional resiliency to the flood system. This alternative could also provide protection for additional agricultural lands or opportunities for habitat or farmland protections in-perpetuity.

Alternative 4 – 5-Mile Expanded Setback Partial Degrade

Alternative 4 excludes levee setbacks in the northern part of the Lower Elkhorn Basin to avoid potential land acquisition constraints. This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south. It would begin approximately 2.5 miles south of I-5 (just south of the existing RD 785 Cross Levee), where it would be set back approximately 1,500 feet, and would continue south. From there, the levee setback would expand up to 3,000 feet in the southern portion of the Basin, for a total of 3.3 miles of setback levee along the Yolo Bypass, and ending at the new Sacramento Bypass Levee. The

Figure 3-2. Alternative 2 – 7-Mile Setback Partial Degrade (DWR's Preferred Alternative)



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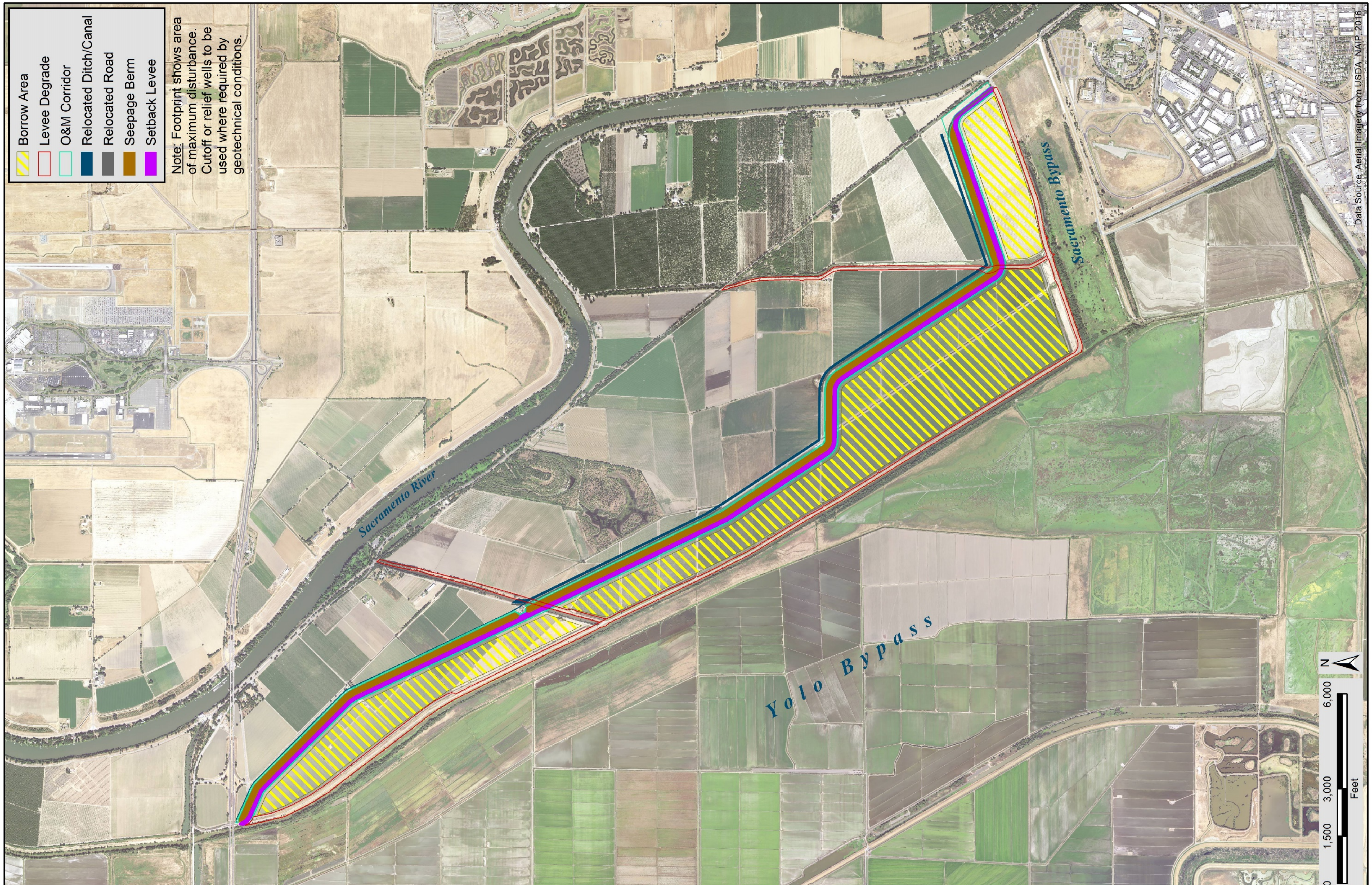
Source: California Department of Water Resources 2016; adapted by GEI Consultants, Inc. in 2016

Figure 3-3. Alternative 3 – 7-Mile Expanded Setback Full Degrade



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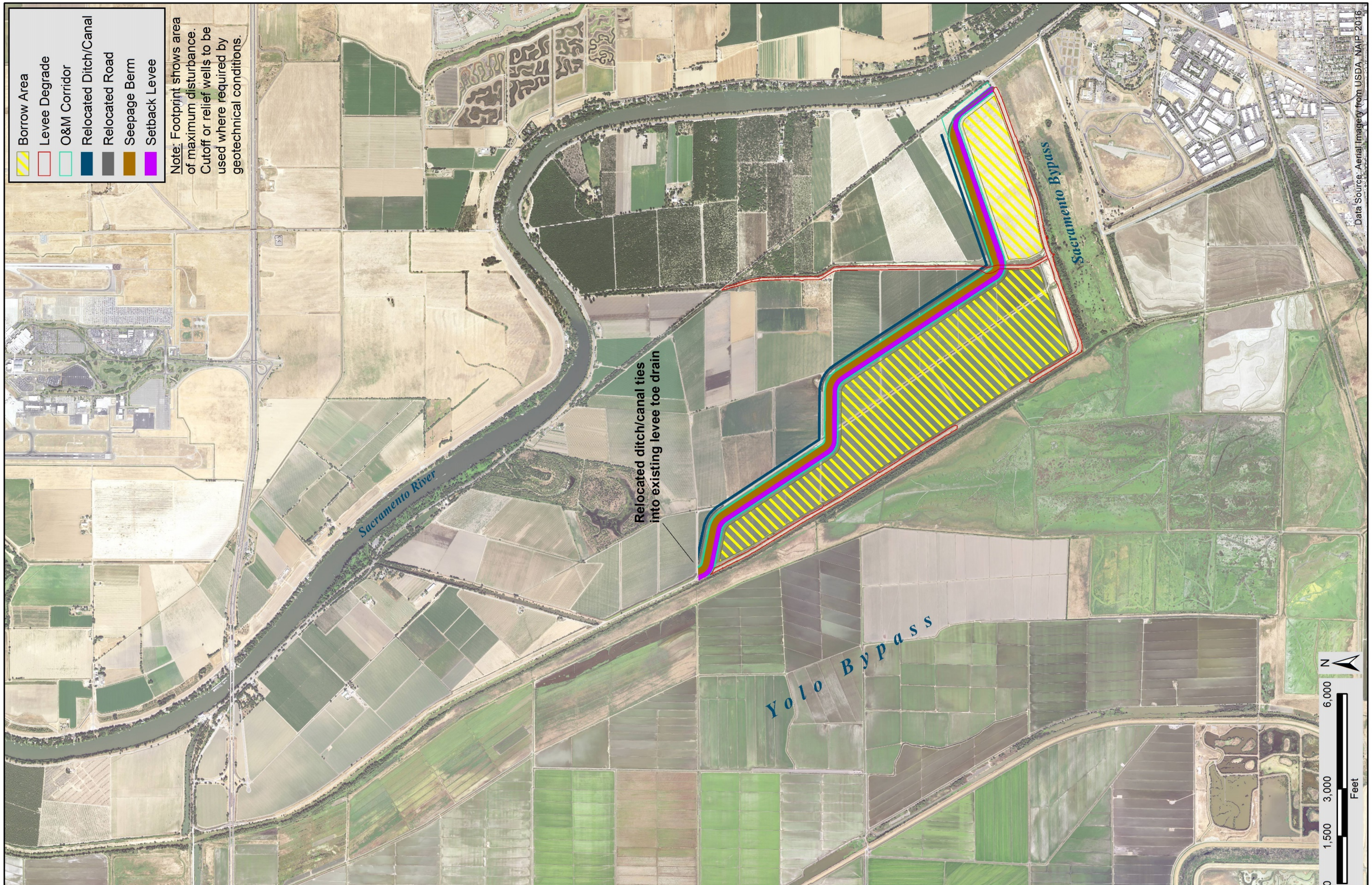
Source: California Department of Water Resources 2016; adapted by GEI Consultants, Inc. in 2016

Figure 3-4. Alternative 4 – 5-Mile Expanded Setback Partial Degrade



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Source: California Department of Water Resources 2016; adapted by GEI Consultants, Inc. in 2016

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Sacramento Bypass would be expanded by constructing a new setback levee approximately 1,500 feet north of the existing levee, which would be approximately 1.3 miles long. Although most of the existing Yolo Bypass Levee and Sacramento Bypass North Levee would be degraded following construction of the setback levees, up to 2,400 linear feet of levee would remain to provide upland habitat for special-status species (Figure 3-4).

Screening Evaluation – This alternative appears to meet most of the project objectives and has a moderate degree of feasibility based on evaluation against the Tier 2 screening criteria. Further analysis, including the environmental analysis in the EIS/EIR, would be necessary to determine if this alternative reduces stage sufficiently in the Sacramento River and Yolo Bypass to achieve system resiliency. This alternative also is not supported by local agencies because it would not replace existing levees in the northern portion of the Lower Elkhorn Basin that do not meet current standards.

Alternative 5 – 5-Mile Setback Full Degrade

Similar to Alternative 4, Alternative 5 excludes levee setbacks in the northern part of the Lower Elkhorn Basin to avoid potential land acquisition constraints, but maintains a full degrade of the affected portion of the Yolo Bypass Levee. This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south, which would be set back approximately 1,500 feet east of the existing alignment. It would begin approximately 2.5 miles south of I-5 (just south of the existing RD 785 Cross Levee) continuing approximately 3 miles south, ending at the new Sacramento Bypass Levee. The Sacramento Bypass would be expanded by constructing a new setback levee approximately 1,500 feet north of the existing levee and would be approximately 1.6 miles long. Following construction of the setback levees, the existing Yolo Bypass East Levee and Sacramento Bypass North Levee would be degraded in the project site (Figure 3-5).

Screening Evaluation – This alternative appears to meet most of the project objectives and has a moderate degree of feasibility based on evaluation against the Tier 2 screening criteria. Further analysis, including the environmental analysis in the EIS/EIR, would be necessary to determine if this alternative reduces stage sufficiently in the Sacramento River and Yolo Bypass to achieve system resiliency. This alternative also is not supported by local agencies because it would not replace existing levees in the northern portion of the Lower Elkhorn Basin that do not meet current standards.

3.4 Common Project Components of All Action Alternatives

The project encompasses a portion of the Phase I Implementation of Yolo Bypass System Improvements pursuant to DWR's Sacramento BWFS, and therefore is focused on reducing flood risk in the Lower Sacramento River Basin. The project would set back levees protecting the Lower Elkhorn Basin, including the Sacramento Bypass North Levee and a portion of the Yolo Bypass East Levee, increasing the capacity of the Yolo and Sacramento Bypasses and reducing flood risk. The project would also include compensatory mitigation, which would be implemented as part of a broader framework of ecosystem project elements.

3.4.1 Setback Levee

A setback levee is an entirely new levee tied into an existing levee and extending for some distance behind the landside of an existing levee section, which is typically breached and removed partially or entirely.

A setback levee addresses flood risk problems resulting from existing levee deficiencies by constructing a new levee to current standards. Constructing a new setback levee has advantages over levee fix-in-place alternatives where an existing levee does not meet standards related to:

- Through-seepage, when a deep or shallow cutoff wall is included
- Underseepage, when a deep cutoff wall or landside seepage berm is included
- Freeboard
- Slope stability and geometry
- Erosion
- Encroachments (including noncompliant vegetation).

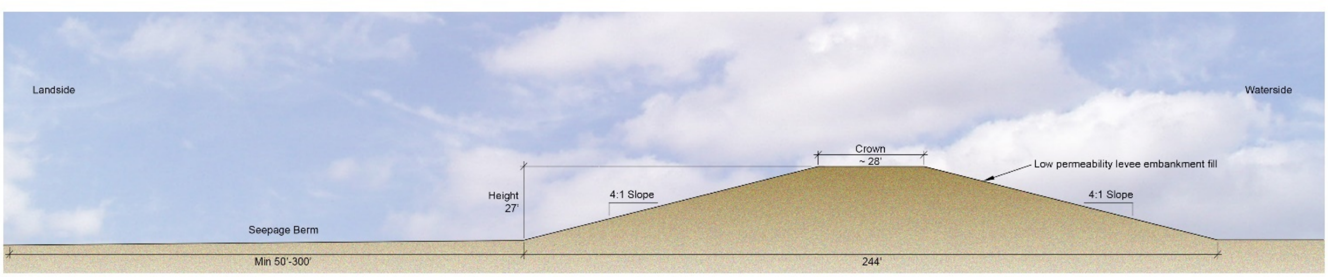
Setback levees also offer advantages over fix-in-place alternatives by increasing floodplain acreage, which provides both flood risk reduction and opportunities for increased habitat. The proposed new setback levee would be approximately 27 feet high, and approximately 244 feet wide at the base, with a crown width of approximately 28 feet. For every 3-4 feet of horizontal distance along the ground, the height of the levee would increase 1 foot. These slopes are described as 3H:1V or 4H:1V horizontal:vertical. The slope would be 4H:1V on the waterside and 3H:1V to 4H:1V on the landside. Figure 3-6 illustrates a cross section of the proposed levee. Setback levees would be maintained free of woody vegetation.

Degraded Levee (Remnant Levee)

Yolo Bypass East Levee

As mentioned previously, segments of the Yolo Bypass East Levee would be left in place in Alternatives 2 and 4 to act as upland refugia habitat for various sensitive and target species. The existing levee is approximately 25 feet high, and approximately 220 feet wide at the base, with a crown width of approximately 20 feet, and 2H:1V to 4H:1V waterside and landside slopes. Segments would be spaced approximately 2,500 feet apart, and

Figure 3-6. Typical Conceptual Schematic of Seepage Berm



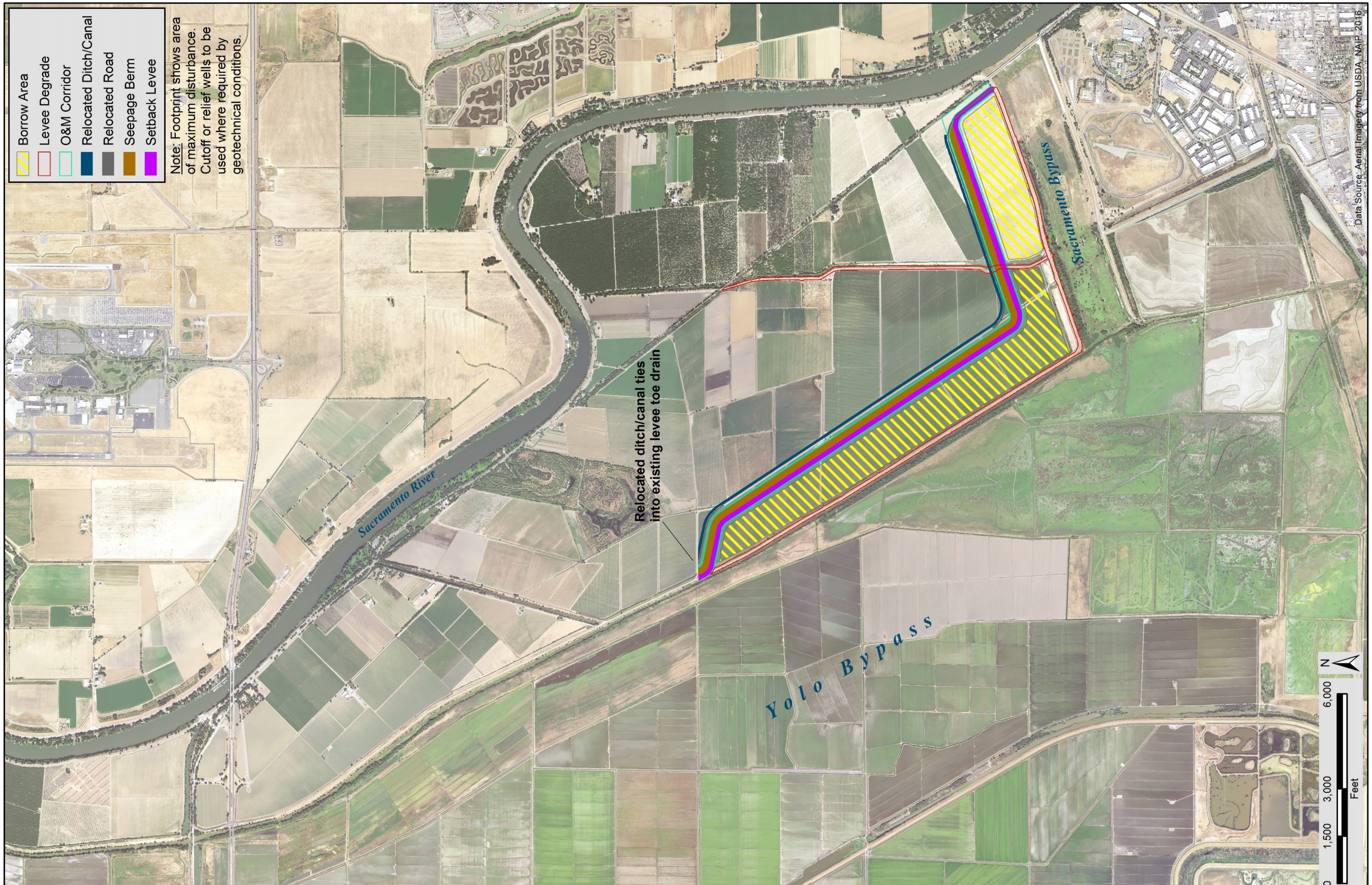
Source: GEI Consultants, Inc. 2017

would be approximately 500 feet long. These segments are referred to as “remnant levees” when discussing post-construction context in this EIS/EIR.

Lower Elkhorn Basin Cross Levees

RD 537 and/or RD 785 Cross Levees currently within the Lower Elkhorn Basin west of the Sierra Northern Railway line would be degraded and used for fill material. This use would provide O&M efficiencies and allow for better drainage conveyance in the new setback areas.

Figure 3-5. Alternative 5 – *5*-Mile Setback Full Degrade



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Source: California Department of Water Resources 2016; adapted by GEI Consultants, Inc. in 2016

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3.4.2 Seepage Berm

Reducing the risk of levee failure caused by underseepage may be achieved by constructing a drained or undrained seepage berm. Built on the landside of an existing levee, a seepage berm is a wide embankment structure that may consist of layers of sand filter material, drain rock, geosynthetic filter fabric, and soil fill. Seepage berms reduce flood risk during sustained high river stage events by collecting seepage that otherwise would flow onto the landside ground surface at and beyond the levee's landside toe of slope, and then conveying the seepage away from the levee (see Figure 3-6 for a typical conceptual seepage berm).

For drained seepage berms, the layer of sand filter material placed on the natural ground surface reduces the transmission of fine-grained soils into the drain rock, thereby maintaining the drain rock's ability to be a conductive soil unit that conveys collected seepage. Similarly, the filter fabric that separates the drain rock from the seepage berm fill soil prevents the migration of finer soils into the drain rock. The weight of the berm acts as ballast, reducing the potential for detrimental boils and piping. An undrained seepage berm serves to increase the thickness of an existing impermeable blanket by adding fill soil in the same configuration as the drained seepage berm, but without the drainage layers and filter fabric.

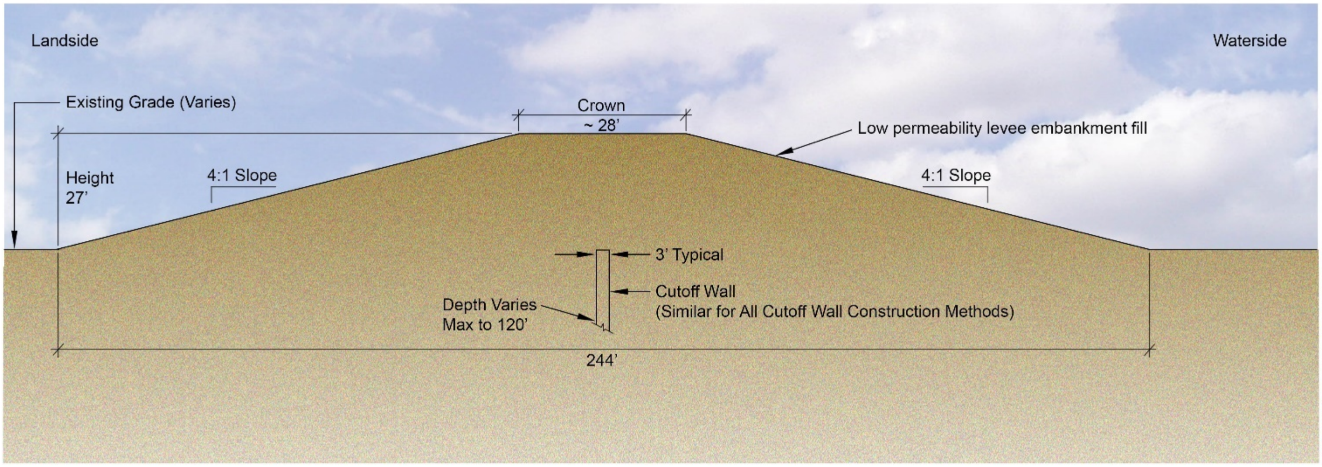
The design width and height of a seepage berm are dependent on the relative permeability of the underlying soil layers and the amount of pressure head that would push water under the levee and through these soils during sustained high-water stages. The higher the water pressure head and the more dissimilar the porosity of the underlying soil layers, the wider and/or taller the seepage berm must be to prevent boils and reduce flood risk.

The seepage berm may be a minimum 50 feet up to 300 feet wide depending on engineering analysis and real estate access. The berm thickness would generally be approximately 5 feet at the toe of the levee and would gradually slope landward to about 3 feet in thickness at the landside edge, with a maximum 3H:1V slope to ground level. A compacted-surface patrol road may be constructed near the outside edge of the seepage berm. The seepage berm would be maintained free of woody vegetation.

3.4.3 Cutoff Wall

Sandy or gravelly soils of higher permeability in the levee or levee foundation can transmit water via seepage during high-water stages. Cutoff walls are designed to reduce levee through-seepage and underseepage by providing a lens of low-permeability material through the higher permeability materials in the levee and levee foundation to essentially cutoff the flow. Cutoff walls are installed to depths sufficient to minimize seepage through the levee and/or beneath it to meet or exceed USACE and State of California levee design criteria. For cutoff walls designed to block through-seepage, the intent is to construct a wall deep enough to block the flow through the levee and alter the flow path of the seepage to reduce landside impacts to acceptable rates. Cutoff walls for underseepage are generally installed to depths that would tie into existing lower permeability soil layers in the levee foundation below the permeable material. For cutoff walls designed to block both underseepage and through-seepage, the intent is to reach and embed the cutoff wall into an existing low-permeability soil layer that would block the water flow through or under the levee and keep the water from flowing under the wall. The depths for cutoff walls necessary to limit underseepage and through-seepage at the design water surface elevation to gradients specified by USACE and the State are determined by geotechnical modeling and analyses; estimated maximum depth is 120 feet. A conceptual design schematic of a cutoff wall installed along the levee centerline is shown in Figure 3-7.

Figure 3-7. Typical Conceptual Schematic of Cutoff Wall



Source: GEI Consultants, Inc. 2016

Cutoff walls constructed as part of the project would be below the existing grade; since the new levees would be constructed of engineered fill. Remediation for through-seepage of the above-grade portion of the levee would not be necessary.

3.4.4 Relief Well

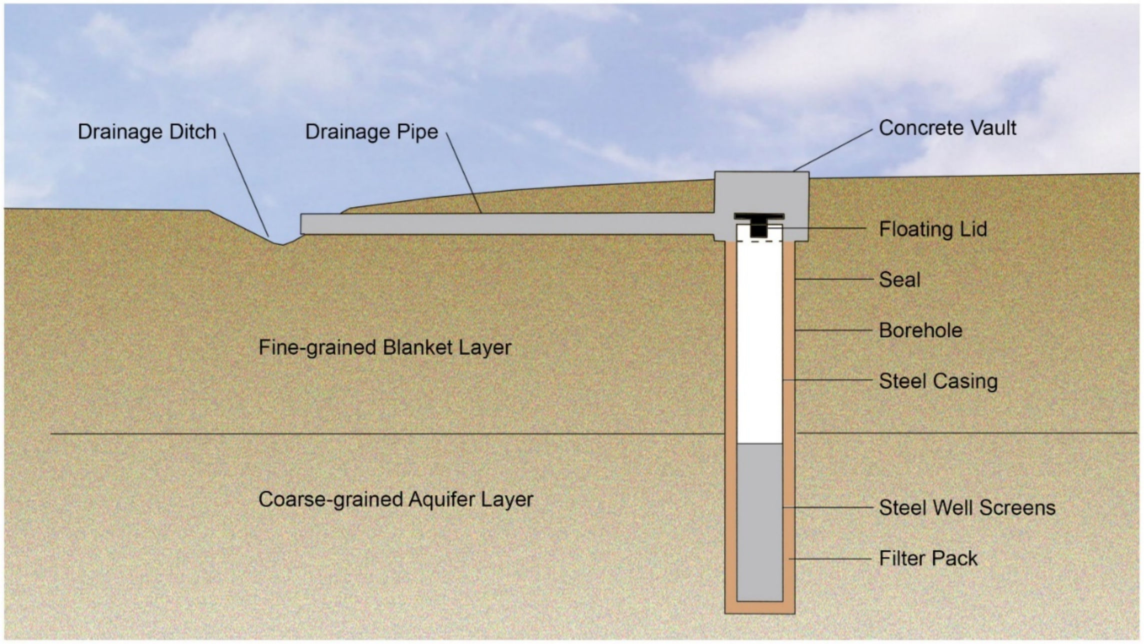
Relief wells protect against levee underseepage by providing a low-resistance pathway for underseepage to exit to the ground surface at the landside toe of the levee without creating sand boils or piping levee foundation materials. Relief wells are an option for addressing underseepage only in reaches where continuous sand and gravel layers have been identified by geotechnical analyses and are overlain by a confining layer of clay or silt.

Relief wells would be constructed near the levee landside toe to provide pressure relief beneath surficial fine-grained soils (clay or silt “blanket”) (a conceptual relief well is shown in Figure 3-8). Relief wells would generally be spaced at 50- to 150-foot intervals, depending on the amount of underseepage, and would extend to depths of up to 150 feet. Relief wells either would discharge onto open ground or would require conveyance to a stormwater drainage system or a pump station. The wells would require regular maintenance to ensure proper operation. Relief wells would be applied only on a limited basis for site-specific conditions rather than a segment-wide application.

3.4.5 Erosion Protection

Insufficient embankment protection may cause a levee to be undermined by erosive forces due to wave action and/or high-flow velocities along the levee bank. In many cases, the placement of embankment protection material on the waterside levee slope or on remnant levees, such as engineered armoring (riprap), would dissipate wave and velocity forces and reduce the potential for erosion to occur. Rock, or another acceptable alternative (e.g., buried rock, articulated concrete blocks, pyramat) may be required to be placed along the waterside levee slopes to protect against erosional forces that could threaten levee stability. The linear footage of engineered armoring on the waterside of the new setback levees would vary depending on the alternative. In addition, a portion of the Sacramento Bypass South Levee, referred to as the “Sacramento Bypass Training Levee,” would require erosion protection, likely engineered

Figure 3-8. Typical Conceptual Schematic of Pressure Relief Well



Source: Sacramento Area Flood Control Agency 2016

armoring, in all action alternatives. The landside of the new levee would be subject to rainfall and minor sheet flow.

Erosion control measures would consist of seeding with native grasses and forbs, riprap or an alternative structural measure, and/or a vegetative buffer. On the waterside, rock, if needed, would be placed in a layer approximately 2.5 feet thick and 30 feet high along the waterside levee slope from the toe toward the crown to protect against erosional forces that may threaten levee stability. Rock placement on the Training Levee would be limited to the upper half of the waterside slope. An approximately 150-foot-wide vegetative buffer would be planted in native vegetation. Native vegetation would include herbaceous species and may include trees and shrubs planted in the buffer area, more than 20 feet from the waterside toe of the setback levee to reduce wind and wave erosion associated with the large area of open water in the Yolo and Sacramento Bypasses.

3.4.6 Operations and Maintenance Access Corridors

A 20-foot-wide permanent O&M access corridor would be established adjacent to the landside toe of the setback levee and seepage berm. Any relocated power poles and other utility infrastructure serving adjacent properties would be located outside this easement. The landside O&M corridor would include an all-weather road surface for ease of access. A 20-foot-wide O&M easement would also be established adjacent to the waterside toe of the setback levee. The landside and waterside O&M corridors would be constructed and maintained free of woody vegetation. The O&M easements would be gated and signed to limit access.

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

The land within the footprint of each action alternative, which includes the setback levee, seepage berm, and waterside and landside O&M easements, would be acquired to prevent structural encroachments in the flood risk reduction area as required by USACE and the Central Valley Flood Protection Board (CVFPB). Land acquisition would also be required for a new road and right-of-way alignment proposed for each action alternative. Acquisition of an entire affected parcel was assumed if the real estate needs cover 60 percent or more of the original parcel size. The project requires that DWR acquire approximately 2,000 acres of real estate, depending on action alternative (Table 3-1). There are 17 parcels and six landowners within the project site. While DWR has condemnation authority for procurement of right-of-way for construction projects, DWR desires to work with landowners to find ways of procuring the right-of way without using condemnation, to the extent feasible. Following construction of the project, the State of California would retain fee-title ownership of the footprint of the setback levees. DWR would also place flood easements on the land located within the newly expanded Yolo and Sacramento Bypasses, and conservation easements as required.

Table 3-1. Land Acquisition Requirements for Action Alternatives

Alternative	Number of Parcels	Total Acreage
Alternative 2	17	2,600
Alternative 3	17	2,600
Alternative 4	9	2,000
Alternative 5	9	2,000

Source: Data compiled by California Department of Water Resources in 2017

Existing structures and facilities located within each action alternative footprint may require removal and nearby replacement, abandonment, or relocation. All pipes and penetrations of the levee would be designed to permit inspection in accordance with USACE requirements. All action alternatives would require relocating and consolidating existing pump stations located in the project site on the landside of the levee. Each action alternative would also require removing and relocating the following facilities: a jet fuel pipeline, overhead power lines located along the landside toe of the existing levee, and underground communication lines within the existing levee prism. Affected sections of Yolo County Roads 124 and 126 would require reconstruction.

The project would also require the relocation/deepening of the Sacramento International Airport Pipeline (Pipeline). The Pipeline provides jet fuel to the commercial airlines operating at the Sacramento International Airport. The Pipeline originates in West Sacramento and heads north through primarily agricultural land until terminating at the airport's fuel facility. All structures or utilities replaced or relocated would meet current design standards.

3.4.8 Borrow Areas, Haul Routes, and Materials

Construction of the new setback levee and seepage berms in each action alternative would require large amounts of fill soil, or borrow. Borrow material would be acquired from multiple sources, summarized below.

- Borrow excavation for the project is primarily planned to originate within the approximately 1,500-foot-wide distance between the existing and new setback levees (referred to as the “setback area”).

- Fill material excavated from the existing levee as part of construction would most likely be used to restore agricultural lands within the setback area to an appropriate grade for agricultural activities, although the types of crops would likely change from existing, and some areas could be used for grazing. The degrade of the existing levees would generally occur after the construction of the setback levee to avoid interim increase in flood risk.

- Other available sources of borrow material, if needed, such as material purchased from permitted commercial borrow locations within 50 miles of the project site, and/or material excavated and available from other nearby projects such as the Sacramento Area Flood Control Agency’s (SAFCA’s) Sacramento River East Levee project and proposed Yolo Bypass fisheries restoration projects.

- Fill material from the existing cross-levees (not part of the Sacramento River Flood Control Project [SRFCP]) would be evaluated for reuse, and material deemed suitable would be used as part of construction of the new levee and berms. Fill material available for construction of the setback levee may also include materials salvaged as a result of the proposed degrading of the existing Yolo Bypass East Levee and Sacramento Bypass North Levee. During degrading, soil would be stockpiled at the proposed levee and berm site.

Potential borrow sites range in location from the area between the existing and proposed setback area levees, immediately adjacent to the levee construction site, to permitted commercial facilities within approximately 50 miles from the area of construction. In the area between the existing and proposed setback area levees, 1 foot of existing topsoil would be scraped and stockpiled within the project footprint, and then borrow material would be excavated using bulldozers, scrapers, and/or excavators. Excavation depths would vary; however, where feasible, excavation depths would avoid the water table due to higher construction costs associated with dewatering. Earth-moving equipment and haul trucks would be used to transport borrow material to the construction area.

Following the completion of each of the two construction seasons, borrow sites would be hydroseeded with native grasses to reduce erosion during winter and to encourage their continued use as upland habitat. Borrow areas would not receive floodwaters during the construction phase because they would be located behind the existing levees. Thus, fish-stranding in the borrow areas during construction would not occur. Finally, following the completion of material excavation, excavation sites within the setback area would be graded to depths appropriate for future agricultural use, although crop types would likely change from existing, and portions of the setback area might be used for grazing. Final elevations within the agricultural fields would be configured to avoid fish stranding. It is anticipated that elevations within the setback would drain from north to south and east to west. The existing drainage canal along the landside toe of the Yolo Bypass East Levee would be retained to facilitate drainage of the setback area and adapted, as necessary, to provide fish passage. If irrigation and/or drainage ditches must be constructed to facilitate future agriculture within the setback area, these features would be configured to avoid fish stranding to the greatest extent feasible. In addition, the setback area drainage system would be designed to minimize attraction of fishes into dead-end drainage and irrigation infrastructure that could impede upstream passage.

To maximize the use of local borrow sites, high-plasticity clay may be used as deeply buried setback levee core fill material, and/or levee slope angles may be less steep. As an alternative to increase the workability and load-bearing characteristics of high-plasticity clay, lime treatment may be performed 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 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 an elevation appropriate for agricultural use. The borrow sites then would be reseeded and returned to pre-use vegetated conditions.

The preliminary estimated borrow material and excess soil disposal requirements for construction of the setback levee and seepage berms are shown in Table 3-2.

Lastly, borrow also could be purchased and hauled on-site from a permitted commercial borrow location within 50 miles of the project site, or from nearby levee, restoration, and other projects generating excess sources of materials suitable for project fill. This borrow material would be transported to the project site via developed roads such as I-5, I-80, U.S. 50, Reed Avenue, South River Road, Harbor Boulevard, Tule Jake Road, and/or Yolo County Roads 124 and 126, possibly augmented by locally developed access roads through agricultural parcels. Final haul routes would be determined in coordination with Caltrans, Yolo County, and the City of West Sacramento, based on project construction schedules. Figure 3-9 illustrates possible access routes for the project.

Other construction materials that would need to be imported to the project site would include (but are not limited to) 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; and coir fabric. Borrow material of poor quality that is not able to be used on-site would be hauled off-site to a permitted disposal site within 50 miles of the project site.

3.4.9 Staging Areas and Access

Three staging areas would be established in the project site. These staging areas would be located within the setback area footprint. These areas would be used for staging construction activities and to store and transfer construction materials, equipment, and bentonite hydration and mixing facilities before and during construction activities.

Bulk material silos, bentonite hydration facilities, and mixing facilities would be required for both deep soil mixing method (DMM) and conventional slurry wall construction. These facilities would need to be located near the landside or waterside toe of slope and staged no farther than 2,000 feet from the point of use, the maximum distance to pump slurry to the excavation or mixing equipment. These staging areas may be separate from material or equipment staging areas.

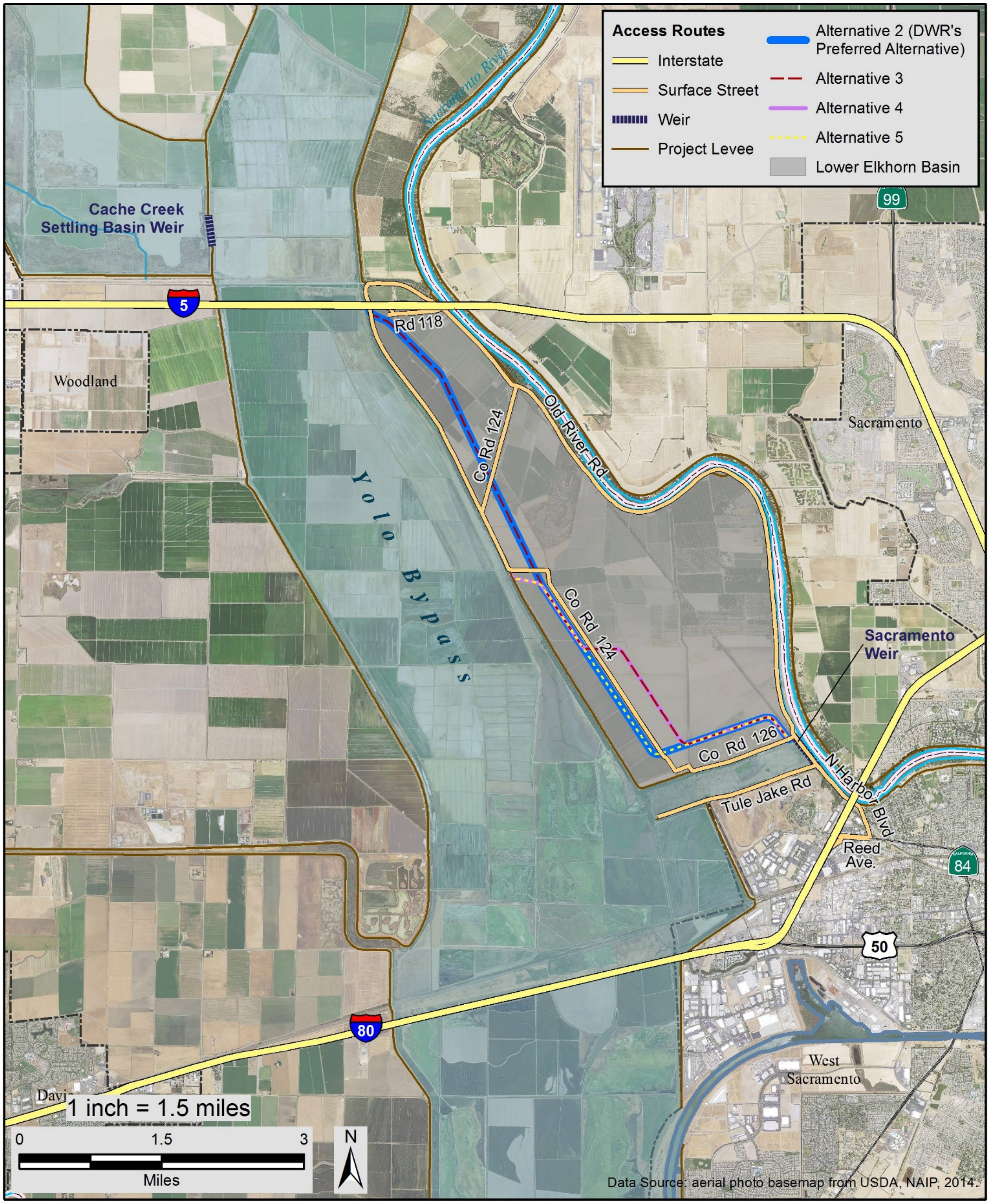
Access for construction would occur entirely within the project footprint, all of which is assumed to be disturbed during construction.

Table 3-2. Preliminary Estimated Construction Volumes

No.	Project Component	Construction Activity/Characteristic	Unit	Alternative			
				2	3	4	5
1	New Levee	Length	feet	38,132	37,639	24,373	24,866
		Total volume (assumes 27-foot-highlevee)	cy	5,296,111	5,227,639	3,385,139	3,453,611
		Core material volume	cy	2,794,652	2,758,520	1,786,270	1,822,402
		Haul distance (core)	mile	0.2	0.2	0.2	0.2
		Shell material volume	cy	2,501,459	2,469,118	1,598,869	1,631,210
		On-site shell volume	cy	1,479,936	1,447,595	1,447,595	1,479,936
		Haul distance (on-site shell)	mile	0.2–3.5	0.2–3.5	0.2–3.5	0.2–3.5
		Off-site shell volume	cy	1,021,523	1,021,523	151,274	151,274
		Haul distance (off-site shell)	mile	50	50	50	50
2	Seepage Berm	Width (assumes 5-foot height)	feet	200	200	200	200
		Volume	cy	1,694,756	1,672,844	1,083,244	1,105,156
		Haul distance	mile	0.3	0.3	0.3	0.3
3	Cutoff Wall	Depth (assumes 2-foot width)	feet	60–100	80–100	60–100	60–100
		Volume	cy	211,108	222,175	140,145	129,079
4	Rock Slope Protection	Volume	cy	156,440	154,797	110,577	112,220
	Vertical height 30 to 50 feet		ton	234,660	232,195	165,865	168,330
	Depth 3 feet	Haul distance	mile	100	100	100	100
5	Relief Wells	-	each	-	-	-	-
6	Pump Station Removal	-	each	4	4	1	1
7	Pump Station Installation	-	each	1	1	1	1
8	Road Removal	Length	feet	11,300	15,080	15,140	11,360
9	New Road Construction	Length	feet	19,400	25,900	25,900	19,400
10	Building Demolition	-	each	3	3	1	1
11	Levee Degrade	-	cy	3,178,000	3,364,111	2,021,000	2,102,333
12	Utility Trench	-	cy	1,675,000	1,675,000	732,000	732,000
13	Site Restoration	Area	sf	51,733	69,067	69,067	51,733

Notes: sf = square feet; cy = cubic yards
Source: Data compiled by California Department of Water Resources in 2016 and 2017

Figure 3-9. Project Site Haul and Access Routes



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Source: California Department of Water Resources 2016

3.4.10 Ecosystem Project Elements

The LEBLS project is consistent with the approach to flood risk reduction reflected in the CVFPP that calls for implementing multi-benefit flood risk reduction projects, which include flood risk reduction, ecological restoration, and recreational components.

The ecosystem project elements have been designed to offset biological resource impacts resulting from LEBLS project construction. Establishment, O&M, and monitoring of the ecosystem project elements would be conducted in close coordination with applicable resource agencies and their requirements. The project would include construction of adequate habitat acreage to provide compensatory mitigation for project impacts, as specified by DWR’s funding sources. Ecosystem project elements would be constructed in the entire footprint of the existing levee and a 150-foot-wide vegetative buffer area along the waterside toe of the proposed setback levee. Furthermore, ecosystem project elements which are constructed as part of the project will be specifically designed to avoid foreclosing broader-scale habitat restoration activities.

The actions described below would not only increase ecosystem function in the project site, but are compatible with a DWR’s comprehensive ecosystem integration effort being implemented in accordance with the principles, goals, and ecological objectives of the CVFSCS, a component of the 2017 CVFPP Update. The project has been designed, wherever feasible, to avoid or reduce impacts to sensitive biological resources and incorporate enhancement features for sensitive species.

Overview of Ecosystem Project Elements

The design of the ecosystem project elements has been carefully balanced with many other factors including: flood risk reduction requirements, hydraulic constraints, the need to preserve viable agricultural lands, O&M requirements, LEBLS mitigation expectations and regulatory permit authorizations, and restoration implementation costs. Within funding and schedule constraints, the following ecosystem project elements will be incorporated into the project footprint as detailed on Figures 3-2 to 3-5:

- **Setback Levees to Create Floodplain Habitat –** Setting back the levees within the Bypass would increase the amount of area subject to periodic inundation. This has the potential to benefit native fish species, which use seasonally inundated floodplains as rearing habitat. Studies have shown that the Yolo Bypass, the primary floodplain of the Lower Sacramento River, provides better rearing and migration habitat for juvenile Chinook salmon and supports substantially higher growth rates than adjacent river channels (Sommer et al. 2001). The CVFSCS emphasizes floodplain inundation as a core objective to achieve the goal of improving dynamic hydrologic and geomorphic processes, and identifies seasonally inundated floodplains as an important habitat for target fish species.

- **Wildlife-Friendly Agriculture –** Maintaining active agriculture within the setback is recognized as a critical management action within the setback area. Agricultural practices would be continued on the majority of the land in the project site, although crop types would likely change and some areas could be used for grazing. Agricultural fields would be graded so that they drain from north to south and east to west to avoid fish-stranding. Irrigation and/or drainage ditches would be configured to avoid fish-stranding to the greatest extent feasible. Conservation easements directing land management practices may be used to incorporate specific actions to benefit wildlife and protect special-status species. Agricultural easements could be established on portions of the project site within the setback levee in Alternatives 2 and 5 to ensure future agricultural uses of this area.

- **Establish Habitat Corridor –** The current Yolo Bypass East Levee footprint would be maintained for habitat enhancements, providing an approximately 200-foot-wide corridor along the east side of Tule Canal.

- **Remnant Levee Habitat –** As described above, the majority of the existing Yolo Bypass East Levee would be degraded. However, in Alternatives 2 and 4, portions of the remnant levee would be retained in place as upland refugia for giant garter snake (GGS) and other wildlife species. Segments would be spaced approximately 2,500 feet apart, and would be approximately 500 feet long. The remnant levee segments would remain at or above the 0.01 annual exceedance probability (AEP) flood elevation. Riprap may be placed on portions of the remnant levee slope to protect from erosive forces. The remnant levees would not be subject to USACE levee vegetation guidance since they no longer provide flood protection. However, they would be subject to guidance for vegetation in floodplains and channel maintenance requirements per California Water Code Section 8361(f) and applicable O&M manuals.

- **Floodplain Benches –** Portions of the existing levee would be degraded and benched to provide floodplain and emergent wetland habitat adjacent to the existing Tule Canal and west side drainage canal. Creating wetland habitat may require earthwork below the ordinary high water mark within the Tule Canal and/or the existing west side drainage canal. These modifications would provide hydrologic connection during some flood events between the Tule Canal and the existing west side drainage canal, especially at the north and south ends of the project site. Benches would be designed to avoid fish-stranding or impacts to water rights in the Tule Canal.

- **Establish Native Grassland –** Native perennial grassland would be established on the new setback levee slopes, seepage berms, and adjacent maintenance and operations rights-of-way. Inspection roads, surfaces with riprap or similar materials, and other maintenance staging areas would remain unvegetated. Soils to be seeded would be prepared by chiseling and disking to reduce compaction and break up dirt clods prior to planting. Seeding would be completed by broadcast seeding and/or using a range drill. To prevent surface erosion during the first rainy season, straw mulch would be applied to seeded areas and secured in place with a tackifier.

  Deep-rooted native grasslands would reduce long-term maintenance requirements and protect levee slopes from erosion as compared to allowing nonnative annual grasses and invasive forbs to establish. Native grasslands would also provide upland habitat for GGS and foraging habitat for Swainson's hawk and other raptor species. Grasslands would be mowed or grazed at key intervals during the growing season to discourage annual grass establishment, and maintain optimal height to provide foraging habitat for Swainson's hawk. The primary purpose and management priority of levees and seepage berms would continue to be flood risk reduction, and they would be maintained in accordance with USACE and CVFPB O&M requirements.

- **Irrigation/Drainage Improvements –** Once borrow activities within the levee setback area have been completed, agricultural irrigation and drainage would be reestablished in coordination with the farming needs. To address agricultural drainage needs within the remaining basin, between the Sacramento River and the new Yolo Bypass East Levee, a new drainage canal would be established and/or existing drainage canal improved along the eastern edge of the new levee and seepage berm footprint. Habitat elements to benefit GGS could be incorporated into the design of the drainage canal, and/or to the design of the canal adjacent to the existing levee. To provide improved habitat, the canal design would include: more gentle side slopes (at least 3H:1V) to reduce erosion and improve water quality; a bench on one side of the canal to establish emergent marsh vegetation, predominantly native tules (*Schoenoplectus* spp.) to provide cover for GGS; and hibernacula (rock clusters, grassy berms, or mounds) installed approximately every 1,000 feet along the banks above the water line to provide basking areas for the snakes. The cross canal that bisects the expanded Sacramento Bypass would be hydraulically disconnected. This area may be modified to create additional natural marsh for giant garter snake. There is also potential for habitat improvements to include portions of Tule Canal and the canal adjacent to the waterside toe of the Sacramento River Bypass North levee, if necessary, to avoid fish-stranding or to enhance hydrologic connectivity with canals in the setback area.

- **Riparian Preservation and Enhancement –** Existing riparian vegetation would be preserved to the greatest extent feasible. Along Tule Canal, borrow activities would be designed to avoid impacting existing riparian vegetation, wherever feasible, by retaining the existing levee at a higher elevation adjacent to existing riparian vegetation in the Tule Canal. However, any nonnative invasive species (i.e., species listed in the Cal-IPC invasive plant inventory database) would be removed. Within the existing Sacramento Bypass, existing riparian vegetation would also be retained. Maintaining existing riparian vegetation would provide wind/wave protection to the newly constructed levees and preserve valuable nesting habitat for raptors and other bird species, including special-status species such as Swainson's hawk.

- **Riparian Plantings –** In some cases, there would be unavoidable impacts to existing trees and riparian vegetation within the project footprint during construction, and/or during future maintenance activities. To mitigate for loss of tree canopy, new riparian plantings would be established within the project footprint. New riparian plantings may be established in one or more of the following locations: along the eastern edge of the newly established Tule Canal habitat corridor, along the edge of the newly constructed setback levee as a wind/wave buffer, and/or within the existing Sacramento Bypass within the footprint of the existing Sacramento Bypass North Levee. These plantings would provide additional wind/wave protection for the newly constructed levees. A mixture of native riparian and woodland species would be planted. The botanical species composition of individual clusters and rows would mimic native vegetation types commonly found along the Sacramento River, including: willow riparian scrub, mixed riparian forest, and/or valley oak riparian forest.

Table 3-3 provides estimated habitat acreages analyzed in each action alternative. (No habitat would be created under the No Action Alternative.) As described above, the project would include constructing habitat as compensatory mitigation for project impacts and in accordance with DWR's CVFSCS.

Table 3-3. Estimated Habitat Acreages Analyzed by Action Alternative

	Native Perennial Grassland	Riparian Habitat	Open Water	Freshwater Emergent Marsh
Alternative 2	185 – 610	52 – 171	0 – 13	0 – 24
Alternative 3	165 – 605	56 – 180	0 – 13	0 – 24
Alternative 4	115 – 375	28 – 109	0 – 8	0 –- 14
Alternative 5	105 – 385	34 – 121	0 – 8	0 – 14

Source: Acreages calculated by GEI Consultants, Inc. in 2017

3.4.11 Construction Techniques, Equipment, and Schedule

Construction techniques described in this subsection are common to all action alternatives.

Setback Levees

The new setback levee would be designed and constructed in accordance with the State of California Code of Regulations Title 23 and USACE criteria. According to Title 23, the geometry for Bypass levees has a maximum steepness requirement of 4H:1V for waterside slopes and 3H:1V for landside slopes. The levee heights are anticipated to be approximately 27 feet tall, as determined by the 100-year water surface elevation plus a minimum 6 feet of freeboard. Additionally, to provide resiliency for future climate change adaptation that may necessitate adding additional freeboard, the levee crown would be approximately 28 feet wide, and the foundation system would be designed to withstand underseepage pressure gradients up to an additional 1 foot of water surface elevation. Levee tie-ins to the existing system are planned along the Sacramento Bypass approximately 300 feet (minimum) west of the Sierra Northern Railway Railroad and also along the Yolo Bypass south of I-5.

Setback levee and seepage berm foundation preparation would include construction of a levee "keyway," an area excavated 3 to 5 feet below the ground surface across the entire proposed setback levee footprint and backfilled with engineered fill. A smaller but deeper excavated inspection trench (up to 20 feet wide and 10 feet deep), centered beneath the new waterside hinge point of the setback levee, would be constructed beneath a small portion of the keyway, to meet required standards. The levee embankment and landside seepage berms would be constructed as an engineered fill. Fill would be placed in lifts by motor graders. Each lift would be moisture-conditioned using water trucks and would be compacted consistent with USACE and CVFPB requirements for lift thickness and compaction densities to the specified density using a suitable compactor, such as a sheepsfoot roller or smooth-drum roller. A "frac-out" plan, along with a spill prevention and countermeasure plan and other standard construction specifications, would be prepared as warranted.

Seepage Berm

Seepage berms would be constructed on the landside of the new setback levee using an engineered fill. Fill would be placed in lifts by motor graders. Each lift would be moisture-conditioned using water trucks and would be compacted consistent with USACE and CVFPB requirements for lift thickness and compaction densities to the specified density using a suitable compactor, such as a sheepsfoot or a smooth-drum roller.

Cutoff Walls

Cutoff walls can be constructed by a number of methods to suit the specific site conditions, required depth of treatment, and schedule requirements. The most common methods consist of the installation of cutoff walls consisting of a soil-bentonite (SB) mix, cement-bentonite (CB) mix, or soil-cement-bentonite (SCB) mix using conventional trench methods, DMM, trench remixing deep (TRD) techniques, one pass trench (OPT) techniques, and interlocking steel or vinyl sheet piles. Additionally, cutoff walls can be constructed at either the levee centerline or at the levee waterside toe. The required working area for construction depends on the method used. For conventional slurry trench methods, the working platform must be at least 30–40 feet wide for shallow cutoff walls, with deeper walls requiring a wider platform. Deep cutoff walls using DMM, TRD, or OPT methods do not require as wide of a working platform.

Conventional slurry cutoff walls are typically constructed using an excavator with a long-stick boom capable of digging a trench to a maximum depth of approximately 80 feet. Bentonite slurry is placed in the trench during trench excavation to prevent caving while the backfill material is mixed and placed. Excavated soil is then mixed with bentonite clay (and cement for a SCB wall) to achieve the required cutoff wall strength and permeability properties, and is backfilled into the trench. In the case of CB walls, the CB slurry that is placed in the trench during trench excavation to prevent caving hardens in place to form the permanent low-permeability backfill, and all of the soil excavated from the trench is taken to an appropriate disposal site or reused elsewhere.

The DMM, TRD, and OPT methods of slurry wall construction differ from the conventional trench method in that the existing subsurface soils are mixed in place with cement and/or bentonite injected through augers or cutting chain equipment used to construct the wall and provide the low-permeability barrier. These in-place methods of mixing do not require bentonite slurry to maintain open trench stability while backfill is being mixed and placed. Excess soil displaced from the trench by the addition of cement and bentonite is taken to an appropriate disposal site or reused elsewhere.

For cutoff walls constructed using interlocking steel or vinyl sheet piles, the sheet piles are typically driven by a hydraulic or pneumatically operated vibratory pile-driving head attached to a crane. Depending upon the soil types and depth requirements, pre-drilling may be required before driving. Depending on the subsurface soil conditions, sheeting may also be hydraulically pushed into place to minimize vibration.

Cutoff walls expected to extend deeper than 85 feet would require the DMM method (described previously). However, DMM, TRD, or other mix-in-place methods may be considered if a shallower wall is required. Depending on the method of construction, a “frac-out plan” detailing the response to unintended release of slurry material may be required.

After installation of the cutoff wall, properly selected and moisture-conditioned embankment materials would be transported to the site and placed in accordance with accepted levee construction standards for lift thickness and compaction to achieve the desired setback levee height. Each lift would be moisture-conditioned and compacted to the specified density using a suitable compactor, such as a sheepsfoot roller or a smooth-drum roller. After the setback levee is constructed, aggregate base or asphalt concrete would be placed on the levee crown road, similar to the existing levee conditions, and the disturbed slopes would be planted with approved vegetation.

Relief Wells

Relief wells would be constructed using techniques typically used for drilling water wells. A drill rig would bore a hole vertically into the ground through the fine-grained blanket layer and into the coarse-grained aquifer layer beneath. Pipe casings and filters would be installed to allow the pressurized water to flow to the ground surface in the well casing, thereby relieving the pressures beneath the clay blanket. The well would then be developed by pumping water from the well to clean out the bentonite drilling fluid and to consolidate the well’s filter pack. After the solids are settled out, water from the well development operations would be discharged to existing or new drainage facilities. The drill rig likely would be an all-terrain, track-mounted rig that could access the well locations from the levee toe.

Erosion Protection

Quarry stone riprap, which would be transported to the project site by loaders from a quarry within 100 miles and stockpiled at the project site, would be applied to the waterside levee slope to armor the newly completed setback levee and the Sacramento Bypass Training Levee to protect against erosion. Excavators would be used to place the embankment protection material from the levee crown or the waterside of the levee as per design.

Stormwater Pollution Prevention

Temporary erosion/runoff best management control measures would be implemented during construction to minimize stormwater pollution resulting from erosion and sediment migration from the construction, borrow, and staging areas. These temporary control measures may include implementing construction staging in a manner that minimizes the amount of area disturbed at any one time; secondary containment for storage of fuel and oil; and the management of stockpiles and disturbed areas by means of earthen berms, diversion ditches, straw wattles, straw bales, silt fences, gravel filters, mulching, revegetation, and temporary covers as appropriate. Erosion and stormwater pollution control measures would be consistent with National Pollution Discharge Elimination System (NPDES) permit requirements and would be included in a Stormwater Pollution Prevention Plan (SWPPP).

After construction is complete, the temporary facilities would be demobilized and the site would be restored to pre-project conditions. Site restoration activities for areas disturbed by construction activities, including borrow and staging areas, may include regrading, reseeding, constructing permanent diversion ditches, using straw wattles and bales, and applying straw mulch and other measures deemed appropriate. Reseeding would vary depending on the future use of specific areas, but would generally entail the use of native species (only grasses and forbs), sterile wheat, or woody vegetation in restoration areas. Woody vegetation would not be planted on or within 50 feet of the toe of the setback levees.

Structure and Road Demolition

Existing roadways would require reconstruction and/or relocation as part of the project. Structure and road demolition activities would consist of removing standing structures within the action alternative footprints (including up to four residences); removing up to three pump stations on the landside of the existing levee; and removing sections of County Road 124, a two-laned asphalt rural County road in the project site. All structural demolition would be done in compliance with existing regulations, including asbestos abatement requirements. These activities would require the use of a bulldozer and excavator with a percussion hammer attachment for breaking up concrete foundations as needed. Rubble would be loaded into waste containers using a front-end loader and then transported by haul truck to a permitted disposal site within 50 miles of the project site. Pavement design would use California Department of Transportation (Caltrans) and Yolo County standards supported by subgrade resistance R-value testing. Based on the predominately fat clay conditions, subgrade resistance values for flexible pavement design are anticipated to be as low as R-value 5.

Vegetation Removal

Vegetation removal would include clearing, grubbing, and stripping activities. Clearing activities would involve removal of larger woody vegetation, such as trees and shrubs using excavators and bulldozers. Grubbing would consist of root removal using excavators and bulldozers, and stripping would involve excavating approximately 6 inches of organic material from the land surface using a wheel tractor scraper.

Overhead Power Line Relocation

The project would remove and replace existing wood electrical transmission and distribution poles and related equipment. Pacific Gas and Electric Company (PG&E) would remove approximately 100 existing poles within the project footprint to accommodate the project. New facilities would be constructed within the designated utility corridors, in advance of other construction activities to minimize utility outages.

PG&E work areas are approximately 125 feet long by 125 feet wide and typically located in close proximity to installation activity locations. On average, PG&E would require up to 10 work areas per project segment, which would be located within the construction footprint, access roads, and identified staging areas. Planned vegetation removal throughout the utility and O&M corridors would accommodate pole installation activities. Vegetation removal on access roads to facilitate PG&E equipment may also be required.

Pole Removal

Electrical transmission and distribution pole removal would be conducted by a line crew, typically accessing each pole site with a line truck/auger and trailer or a boom truck. A crane may be used in those instances when the pole is located on the levee crown.

Pole Installation

The new poles would be installed and wired before the old poles would be removed. A drill rig would be required to install the new poles and boom trucks would be used to remove the old poles. PG&E would perform this work and the old poles would either be reused or disposed of in accordance with hazardous waste disposal requirements by PG&E.

Site Restoration

Site restoration for areas disturbed during overhead powerline relocation activities may include regrading, reseeding, constructing permanent diversion ditches, using straw wattles and bales, and applying straw mulch and other measures deemed appropriate. Reseeding would vary depending on the future use of specific areas, but would generally entail the use of native species (only grasses and forbs), sterile wheat, or woody vegetation in restoration areas. Woody vegetation would not be planted on or within 50 feet of the toe of the setback levees.

Underground Utility Relocation

A portion of the Sacramento International Airport Pipeline would be replaced via horizontal directional drilling (HDD) at least 50 feet below the Sacramento Bypass and new setback levee, and new tie-ins would be made to the north and south of the project. This relocation would require preparing two work areas up to 500 feet in diameter at each end of the pipeline alignment to operate a drill rig to horizontally drill the new pipeline location beneath the Sacramento Bypass, the setback area, and the new setback levee. HDD is a trenchless pipeline installation method where a drilling head or "shoe" is inserted at a shallow angle into the ground and steered below obstacles to open-cut construction. The directionally drilled pipeline is connected to pipelines on either end installed via open-cut construction. The annular space between the reamer and the final pipe is typically grouted to prevent the preferential flow of water around the outside of the pipeline. Following the relocation of the Sacramento International Airport Pipeline, the existing pipeline will be abandoned in place in accordance with regulatory guidance. This document describes only the segment of the pipeline that would be relocated as part of the proposed project. A description of the existing pipeline, including other portions not being relocated, is included in the Sacramento International Airport Jet Fuel Pipeline & Tank Farm Project Environmental Impact Report (Sacramento County 2001a and 2001b).

Several additional utility pipe relocations and/or deepening efforts would be required to complete the project in accordance with agency standards. Pipe penetrations anticipated within the levee foundation would include one to three pump stations to facilitate the removal of interior drainage water and other existing communications lines.

Pump Station Relocation

Up to three pump stations (maintained and used by RD 537, RD 785, and RD 827) are located along the existing levee alignment. Two or three of these pump stations (depending on which action alternative is implemented) would be combined into one new pump station, but the location has yet to be determined. New pumps would be required to pump water across the new setback levee at two locations for agricultural use.

Riparian Plantings

Establishing woody vegetation would likely require more than one technique, including planting nursery stock, live cuttings, and acorn planting in winter, sustained by flood irrigation, drip, or agricultural-scale spray heads. Taking into account predictable and unavoidable mortality within the first 5 years of establishment, the intent is to have an average stem density of approximately 50–100 trees and shrubs per acre within 5–10 years of growth. Planting sites would require soil preparation in late summer/early fall (e.g., disking, ripping, and/or soil amendments) prior to planting efforts that would occur during fall and/or early winter. During a 3- to 5-year establishment period, providing irrigation water and managing weed species by mowing, hand removal, and/or herbicide application would be necessary. To provide irrigation water, groundwater wells may need to be drilled in the vicinity of the plantings. Drilling of well holes would take 72 hours or more. Because the drilling process must be continuous once started, 24/7 operation of the drill rig would be required. Wells would be located 1,000–1,500 feet from sensitive noise receptors to minimize the disturbance from 24/7 construction.

Access Roads and Temporary Access Facilities

To facilitate project construction, earthen ramps would be constructed to ease equipment access between the existing levee crown, and construction and staging areas.

Winterization

At the end of 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 LMA. Maintenance activities would be conducted as described in the “Operations and Maintenance” subsection above.

Construction Equipment

Contractor plant equipment could include construction office and equipment trailers, warehousing and equipment maintenance facilities, batch plant, and fuel pumps and fuel storage tanks. Mobile construction equipment would depend on the selected contractor’s planned operations. Typical equipment that may be used throughout the project, along with an approximation of the duration of each activity, is shown in Table 3-4.

Table 3-4. Typical Equipment that May Be Used for Construction of the New Setback Levees

Construction Activity	Equipment Type	Alternative 2		Alternative 3		Alternative 4		Alternative 5	
		Number of Units	Estimated Duration of Use (work days in Year 1/work days in Year 2)	Number of Units	Estimated Duration of Use (work days in Year 1/work days in Year 2)	Number of Units	Estimated Duration of Use (work days in Year 1/work days in Year 2)	Number of Units	Estimated Duration of Use (work days in Year 1/work days in Year 2)
Underground Utility Relocation	Excavator	1	30/20	1	30/20	1	30	1	30
	Dump Truck	3	30/20	3	30/20	3	30	3	30
	Front End Loader	1	30/20	1	30/20	1	30	1	30
	Pipe Layer	1	30/20	1	30/20	1	30	1	30
Site Preparation/Stripping	Wheel Tractor Scraper	3	60/20	3	60/20	2	42/14	2	42/14
	Bulldozer	1	60/20	1	60/20	1	42/14	1	42/14
	Dump Truck	10	60/20	10	60/20	7	42/14	7	42/14
	Excavator	1	60/20	1	60/20	1	42/14	1	42/14
Structure Demolition	Bulldozer	1	5/10	1	5/10	1	4/7	1	4/7
	Front-end Loader	1	5/10	1	5/10	1	4/7	1	4/7
	Excavator	1	5/10	1	5/10	1	4/7	1	4/7
	Haul Truck	1	5/10	1	5/10	1	4/7	1	4/7
Existing Pump Station Removal	Bulldozer	1	10/10	1	10/10	1	7/7	1	7/7
	Front-end Loader	1	10/10	1	10/10	1	7/7	1	7/7
	Excavator	1	10/10	1	10/10	1	7/7	1	7/7
	Haul Truck	1	10/10	1	10/10	1	7/7	1	7/7
Pump Station Installation	Crane	1	30/0	1	30/0	1	21/0	1	21/0
	Front-end Loader	1	30/0	1	30/0	1	21/0	1	21/0
	Concrete Truck	1	30/0	1	30/0	1	21/0	1	21/0
Existing Road Removal	Cold Planer Scraper	1	20/10	1	20/10	1	14/7	1	14/7
	Scraper	1	20/10	1	20/10	1	14/7	1	14/7
	Dump Trick	1	20/10	1	20/10	1	14/7	1	14/7
	Bulldozer	1	20/10	1	20/10	1	14/7	1	14/7
	Excavator	1	20/10	1	20/10	1	14/7	1	14/7
New Road Construction	Dump Truck	13	60/30	13	60/30	1	42/21	1	42/21
	Vibratory Compactor	2	60/30	2	60/30	1	42/21	1	42/21
	Asphalt Paver	1	60/30	1	60/30	1	42/21	1	42/21
	Asphalt Compactor	1	60/30	1	60/30	1	42/21	1	42/21
	Motor Grader	2	60/30	2	60/30	1	42/21	1	42/21
	Bulldozer	2	60/30	2	60/30	1	21/14	1	21/14
Trench Excavation and Force Main Installation	Excavator	1	30/20	1	30/20	2	21/14	2	21/14
	Dump Truck	3	30/20	3	30/20	1	21/14	1	21/14
	Front-end Loader	1	30/20	1	30/20	1	21/14	1	21/14
	Pipe Layer	1	30/20	1	30/20	7/3	96/64	7/3	96/64
New Levee/Seepage Berm and Soil Borrow Extraction	Scraper	10/5	135/90	10/5	135/90	3/3	96/64	3/3	96/64
	Excavator	4/4	135/90	4/4	135/90	59/28	96/64	59/28	96/64
	Haul Truck	84/40	135/90	84/40	135/90	1/1	96/64	1/1	96/64
	Sheepsfoot Compactor	1/1	135/90	1/1	135/90	1/1	96/64	1/1	96/64
	Bulldozer	2/2	135/90	2/2	135/90	1/1	96/64	1/1	96/64

Table 3-4. Typical Equipment that May Be Used for Construction of the New Setback Levees

Construction Activity	Equipment Type	Alternative 2		Alternative 3		Alternative 4		Alternative 5	
		Number of Units	Estimated Duration of Use (work days in Year 1/work days in Year 2)	Number of Units	Estimated Duration of Use (work days in Year 1/work days in Year 2)	Number of Units	Estimated Duration of Use (work days in Year 1/work days in Year 2)	Number of Units	Estimated Duration of Use (work days in Year 1/work days in Year 2)
	Motor Grader	1/1	135/90	1/1	135/90	1/1	96/64	1/1	96/64
	Dump Truck	1/1	135/90	1/1	135/90	1/1	96/64	1/1	96/64
	Fuel Maintenance Truck	1/1	135/90	1/1	135/90	1/1	96/64	1/1	96/64
	Water Truck	2/2	135/90	2/2	135/90	1	21/11	1	21/11
Erosion Protection Installation	Crane	4	30/15	4	30/15	1	21/11	1	21/11
	Bulldozer	2	30/15	2	30/15	1	21/11	1	21/11
	Hydraulic Excavator	2	30/15	2	30/15	76	0/64	76	0/64
Offsite Borrow Material Transport	Haul Truck	108	0/90	108	0/90	1	85/43	1	85/43
Cutoff Wall Installation (Open Trench Method)	Scraper	1	120/60	1	120/60	1	85/43	1	85/43
	Excavator	1	120/60	1	120/60	1	85/43	1	85/43
	Long Reach Excavator	1	120/60	1	120/60	1	85/43	1	85/43
	Bulldozer	1	120/60	1	120/60	1	85/43	1	85/43
	Front-end Loader	1	120/60	1	120/60	1	85/43	1	85/43
	Telehandler Forklift	1	120/60	1	120/60	4	42/21	4	42/21
Existing Levee Degrade	Scraper	6	60/30	6	60/30	1	42/21	1	42/21
	Bulldozer	1	60/30	1	60/30	7	42/21	7	42/21
	Dump Truck	10	60/30	10	60/30	1	42/21	1	42/21
	Excavator	1	60/30	1	60/30	1	21/0	1	21/0
Relief Well Installation	Trench Excavator	1	30/0	1	30/0	1	21/0	1	21/0
	Scraper	1	30/0	1	30/0	1	21/0	1	21/0
	Drill Rig	1	30/0	1	30/0	1	7/7	1	7/7
Ecosystem Project Elements (including irrigation installation)	Tractor-mounted Equipment	2	0/45	2	0/45	2	0/30	2	0/30
	Bulldozer	1	0/20	1	0/20	1	0/15	1	0/15
	Bulldozer	2	0/40	2	0/40	2	0/25	2	0/30
	Scraper	2	0/40	2	0/40	2	0/25	2	0/30
	Drill Seeder	2	0/25	2	0/25	1	0/30	1	0/35
	Water Truck	1	0/40	1	0/40	1	0/25	1	0/30
	Drill Rig*	1	0/5	1	0/5	1	0/5	1	0/5
Site Restoration and Demobilization	Haul Truck	1	10/10	1	10/10	1	7/7	1	7/7
	Water Truck	1	10/10	1	10/10	TBD	TBD	TBD	TBD
	Motor Grader	1	10/10	1	10/10	TBD	TBD	TBD	TBD
	Hydroseeding Truck	1	10/10	1	10/10	TBD	TBD	TBD	TBD
	Sheepsfoot Compactor	1	10/10	1	10/10	TBD	TBD	TBD	TBD

Note:
* Drilling of irrigation supply well holes would take 72 hours or more. Because the drilling process must be continuous once started, 24/7 operation of the drill rig would be required. Wells would be located 1,000–1,500 feet from sensitive noise receptors to minimize the disturbance from 24/7 construction.
Source: Data compiled by GEI Consultants Inc. in 2016 and 2017, based on California Department of Water Resources in 2016 and 2017

Additional equipment would likely include utility equipment to install power lines, an air compressor, welding equipment, pumps and piping, communications and safety equipment, erosion control materials, miscellaneous equipment customary to the mechanical and electrical crafts, and vehicles used to deliver equipment and bulk materials (including soil, bentonite, and cement). It is expected that any concrete would be shipped to the site in ready-mix trucks.

Site Access and Construction-related Traffic

Personnel, equipment, and imported materials would reach the project site via I-5 and I-80, U.S. 50, Reed Avenue, Old River Road, Harbor Boulevard, Tule Jake Road, and/or Yolo County Roads 124 and 126. Figure 3-9 illustrates the potential haul routes which could be used to access work areas within the project site, along with potential site access routes. These potential routes are shown as the likely access routes from the primary access points to the levee, but only some of them would be used. Once the trucks access the levee, they would travel along the levee to project construction areas. Trips may not necessarily be a round trip; they may access the levee from one location and exit from another.

The potential primary access to the project site would likely be from the southeast via Harbor Boulevard. From there, trucks would travel northwest on Old River Road and select the streets they need to access the levees, most likely County Road 126 or Tule Jake Road (County Road 127) on the south side of the project site and Yolo County Roads 124 and 126 on the north side of the project site. Final access points would be determined in coordination with Caltrans, Yolo County, and the City of West Sacramento, based on project construction schedules.

It is expected that about 100 trailer ("low-boy") truck round trips would be required to transport the contractor's plant and equipment listed above to the site. A similar number of round trips would be needed to remove the equipment from the site as the work is completed.

Necessary aggregate base rock material would be obtained from a commercial sand and gravel operation, most likely in the Sacramento area. Riprap material would be obtained from quarries located within about 50 miles of the project site. The construction contractor would select the specific supplier based on suitability and pricing. The number of highway truck trips that would be needed to bring the levee fill to the site from the borrow area(s) would vary by action alternative and are discussed below in Section 3.6, "Action Alternatives." Transportation of all aggregate, asphalt, dry bentonite, geotextile fabric, erosion control materials, piping, well casings, and ancillary equipment from suppliers to the site is expected to occur via highway. The bentonite would probably be processed in Wyoming, Utah, or South Dakota and transported to the Sacramento area by rail. In addition, highway truck trips would be required to dispose of surplus material from levee excavation (if hauled off-site), and may be needed to carry demolition debris, construction debris, and other materials to a suitable landfill. Highway truck trips vary by alternative and are discussed and analyzed in detail in Section 4.20, "Traffic and Transportation."

The primary corridor for construction traffic would include the crown of the existing levee, temporary construction access roads, and local County roads. Within the construction areas, the main sources of construction traffic would be hauling levee degrade material to and from on-site borrow and staging areas, installing the slurry cutoff wall, transporting material for the slurry cutoff wall (including borrow from elsewhere on site, a commercial facility, or a nearby project producing excess borrow), and transporting borrow material for berm and setback levee construction. Dust control measures would be applied to roads and work areas on a systematic basis.

Labor Force

The construction labor force is estimated to average about 50–60 persons over the construction period of approximately 1 to 2 years. Peak staffing could be close to 200 depending on the contractor's schedule.

Construction Sequencing

For purposes of this EIS/EIR, an approximate construction sequence for each segment includes the steps identified below (final construction sequencing would be developed at a later design phase and according to contractor preference):

- *Pipeline Relocation* – the relocation of the Sacramento Airport Pipeline would include HDD drilling to deepen and relocate the jet fuel pipeline.
- *Mobilization* – Mobilization would include setting up construction offices and the slurry batch plant and transporting heavy earthmoving and mixing equipment to staging areas.
- *Site Preparation* – Structure and road demolition, vegetation removal, utility relocation, and construction of temporary access ramps would occur prior to initiating construction of the new setback levee and seepage berms.
- *Setback Levee and Seepage Berm Construction* – Construction of the new setback levee and seepage berms would begin as soon as sufficient lengths of levee foundation are prepared and weather conditions allow. The new setback levee and seepage berms would be constructed concurrently.
- *Cutoff Wall Installation* – Cutoff walls would be installed concurrently with construction of the new setback levee.
- *Erosion Protection* – Rock slope protection along the waterside of the new setback levee would be installed concurrently with construction of the new setback levee.
- *Relief Wells* – Relief wells would probably be installed and developed toward the end of the construction period to reduce the likelihood of damage by construction traffic.
- *Existing Levee Removal* – Upon completion and certification of the newly constructed setback levee and seepage berms, portions or all of the existing Yolo Bypass East Levee and the Sacramento Bypass North Levee in the Lower Elkhorn Basin would be removed.
- *Ecosystem Project Element Construction* – Construction of the ecosystem project elements required to mitigate for project impacts would generally occur concurrently with removal of the existing levee. Certain activities (such as planting of the new setback levee) would occur at other stages of the construction process.
- *Site Restoration and Demobilization* – Upon completion of the main construction activities, the contractor would resurface the levee patrol road, revegetate disturbed areas, restore staging and borrow areas, and demobilize from the site(s).

Construction would be staged and sequenced with the appropriate stakeholders, including the County, and utility and service providers, and taking into account biological resource construction work windows and other environmental and land use/real estate constraints, to the greatest extent feasible to minimize impacts.

Construction Schedule

Construction of Alternatives 2 or 3 is expected to take 2 years to complete. Construction of Alternatives 4 or 5 is expected to take 1 year to complete. Please refer to the description of the individual action alternatives later in this chapter for a discussion of which segments would be constructed in each year by action alternative.

Construction activities would primarily occur during the typical construction season, April 15 to October 31. This season is typically prescribed by CVFPB encroachment permits for work on project levees, although extension of the CVFPB encroachment permit may be sought if weather conditions permit. Because many of the project improvements would occur outside of the areas governed by the CVFPB encroachment permit, all construction activities could potentially occur outside the primary construction season, including, but not limited to, structure and vegetation removal, roadway removal and replacement, revegetation activities, and utility removal and replacement. All construction activities would be subject to the conditions of permits and authorizations to be issued by USACE, U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), CVFPB, the California Department of Fish and Wildlife (CDFW), Central Valley Regional Water Quality Control Board (CVRWQCB), 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 to avoid start and stop of sensitive work and/or to condense construction into shorter windows.

3.4.12 Operations and Maintenance

Agencies and organizations that currently have management responsibility for the levees along the Yolo and Sacramento Bypasses would continue to provide O&M post-implementation of the LEBLS project. DWR would be responsible for the design and construction of all levee improvements, and maintenance access. CVFPB is the non-Federal sponsor for the project and is responsible for performing O&M and/or overseeing O&M responsibilities transferred to other entities, At the end of the project construction period, all project lands would be in public ownership and/or would be under the permanent control of an LMA or natural resource conservation entity, with easements on the lands to facilitate O&M activities. LMAs, DWR, and CVFPB may continue their routine O&M responsibilities, as they occur under existing conditions. Alternately, a Joint Powers Authority for continued O&M may be created among local partner agencies.

The LEBLS project falls within the vicinity of the following units of the SRFCP authorized by the 1917 Flood Control Act and officially transferred to the CVFPB in 1944 as the operating and maintaining authority and maintained in accordance with USACE's SRFCP *Operation and Maintenance Manual* (USACE 1955).

- *Unit No. 116* – left bank of Sacramento Bypass – The levees of this unit are located in RDs 537, 811, and 900, and Washington Levee District. Levees are maintained by RDs 900 and 537 and Maintenance Area No. 4.

- *Unit No. 121* – right bank of the Yolo Bypass – The levee provides direct protection to agricultural lands within RD 2035. Levees are maintained by DWR.

- *Unit No. 122.1* – right bank of Sacramento Bypass and left bank of the Yolo Bypass – Levees of this unit protect the lands of RD 537, 752, 785, and 827. DWR maintains the northerly 2 miles of this unit and the remainder is maintained by RDs 1660, 827, 785, 537, 900, 765, and 999.

- *Unit No. 158* – Sacramento Weir – Operated by DWR, Sacramento Maintenance Yard.

- *Sacramento and Yolo Bypass Channels* – Maintained by DWR per California Water Code Section 8361(f). Entails sediment, debris, and vegetation removal to maintain as-built bypass capacities as detailed in O&M manuals for Units 116, 121, and 122.1.

Presently, to meet Federal flood management regulations (33 CFR 208.10) and State requirements (California Water Code Section 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 LMAs inspect 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 Flood Protection Integrity and Inspection Branch (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 State-licensed Pest Control Advisors. Monthly herbicide application reports are filed with Yolo County. Erosion control and repair activities include backhoe fill of eroded areas and placement of gravel along the levee crown 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.

Regular O&M activities under DWR's Preferred Alternative would consist of inspections, weed abatement, encroachment and high-hazard vegetation removal, and erosion control and repair to ensure levee integrity, and adequate levee access along the levee toe road. The patrol road would be used, as currently used, to access the length of the levees during these activities and during high-flow events for flood-fighting purposes. However, these activities would not require heavy and noisier equipment than under current conditions. O&M inspections would consist of a patrol vehicle traveling along the levee, and small machinery for weed abatement such as mowers (i.e., standard riding lawnmower, specialized slope mower, and tractor with a mower boom), herbicide applicator trailers, weed whackers/trimmers, or other equipment. Erosion control and repair activities would involve the use of a backhoe to fill eroded areas and place gravel along the levee crest shoulder to reestablish and maintain the minimum crown width. These activities would only occur periodically, as under existing conditions. O&M activities would not introduce substantial new land uses into the area. Existing gates in the area would be removed temporarily to undertake levee construction, but would be replaced following construction completion to restrict public access. Specific O&M activities, timing and frequency are detailed in Table 3-5 and discussed below.

3.5 No Action/No Project Alternative

3.5.1 Introduction

NEPA requires the Federal lead agency to identify and analyze a no action alternative. CEQA requires its lead agency to identify and analyze a no project alternative. The no action or no project alternative can 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 does not grant Section 408 permission nor a permit under Section 404 of the CWA. For purposes of this EIS/EIR, this alternative is referred to as the “No Action Alternative.”

For CEQA, the no project analysis must discuss the existing conditions at the time the Notice of Preparation (NOP) is published, as well as what would be reasonably expected to occur in the foreseeable future, based on current plans and consistent with available infrastructure and community services, if DWR were not to adopt and implement the LEBLS project (State CEQA Guidelines Section 15126.6[e][2]). Thus, to comply with both NEPA and CEQA, the No Action Alternative analysis discusses effects in the context of both a reasonably foreseeable future condition and existing environmental conditions. A more detailed description of the No Action/No Project Alternative follows.

The existing conditions under CEQA are established at the time of the NOP release, which was September 2016. Because LEBLS project implementation is on a short time frame with construction initiated in 2020 and full project implementation by 2022, the existing conditions under CEQA are essentially the same as the CEQA No Project Alternative because there would be minimal reasonably foreseeable changes in existing conditions that would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services (State CEQA Guidelines Section 15126.6[e][2]). However, reasonably foreseeable projects and conditions that would be included in the NEPA No Action Alternative would differ slightly; the remediation of the Old Bryte Landfill (described in detail in Section 3.5.2, “No Action/No Project Alternative Description,” is included in the NEPA No Action Alternative because it would be completed prior to implementing the project. Other changes are minor because most future flood risk reduction projects are only in preliminary planning stages without budget authorizations and are speculative at this time (the two notable exceptions are the SAFCA and West SAFCA flood risk reduction projects located downstream on the Sacramento River). Therefore, the primary difference between existing conditions, the No Project Alternative, and the No Action Alternative in the Lower Elkhorn Basin at the LEBLS project site is the remediation of the Old Bryte Landfill. Consequently, the commonly used baseline for evaluating impacts under CEQA (existing conditions) and NEPA (No Action Alternative) are sufficiently similar such that NEPA and CEQA impact analyses were unified with impacts measured against this common baseline. Where differences arise because of the inclusion of the Old Bryte Landfill in the NEPA No Action Alternative (but not in the existing conditions or the CEQA No Project Alternative), such differences in the NEPA and CEQA

Table 3-5. Timing and Frequency of Operations and Maintenance Activities

Activity Category	Activity		Timing[1]	Frequency[2]
Levee Maintenance				
Rodent Abatement and Damage Repair	Rodent abatement	Baiting (pesticide)	April–October – Conducted during rodent active season: may be done year-round when conditions require maintenance	Annually
		Fumigating		
		Depredating		
	Rodent damage repair	Grouting	April–December – Once a year, after herbaceous vegetation has been mowed	Annually
		Excavating and backfilling		
Levee Vegetation Management	Physical/mechanical treatments	Mowing	Typically March–October, may extend through November due to various circumstances	Annually
		Cutting/limbing year-round	Cutting/limbing year-round	
		Dragging typically June–October, but could be extended	Dragging Typically June–October, but could be extended	
	Applying herbicide (pesticide)		Year-round	Annually
	Controlled-burning		June–October	
	Grazing		April–November	
Erosion Repair	Controlling and repairing erosion sites		April–November	As-needed based on inspections
Levee, Levee Crown, and Access Road Maintenance	Levee grading		Once in the spring and once in the fall	Twice annually
	Road Grading and minor repairs		Once in the spring and once in the fall	Twice annually
	Levee crown gravel replenishing		July–November	As-needed every several years
Encroachment Removal	Removal of unauthorized construction, landscaping, or materials that may impact SRFCP facilities		Year-round	As-needed
Fencing/Levee Protection	Install or repair gates and signs on levees		Year-round	As-needed
Remnant Levee Maintenance	Controlling and repairing erosion sites		April–November	As-needed based on inspections
Channel Maintenance				
Sediment Removal	Sediment removal around structures		April–November	Varies based on facility, rate of accumulation, and magnitude of sediment accumulation effects on conveyance and facility function
	Sediment removal from collecting canals		Generally, May–October and extending into January based on canal conditions	Up to 20 miles per year
	Large sediment removal projects (dry sediment removal)		May–October and extending into November when conditions allow	Based on specific facility considered, the rate of sediment accumulation at the site, and the magnitude of sediment accumulations effect on conveyance capacity and functioning of specific facilities

Table 3-5. Timing and Frequency of Operations and Maintenance Activities

Activity Category	Activity		Timing[1]	Frequency[2]
Debris/Obstruction Removal	Removal of all trash and debris collected in the channel (including burning and/or chipping/scattering of organic debris). Debris consists of trash, beaver dams, flood-deposited woody and herbaceous vegetation, downed trees and branches, and any other human debris		Year-round	As-needed based on results of inspections
Channel Vegetation Management	Aquatic vegetation removal	Mechanical removal with excavator or dragline	May–October	Annually or every other year/several years based on size and density of the vegetation cover
		Applying herbicide (pesticide)		
	Woody vegetation removal	Trimming/limbing/cutting using hand tools	Typically May–December: Trimming/limbing/cutting using hand tools year round when conditions allow	Woody vegetation removal typically occurs every several years but is done on an as-needed basis
		Masticating		
		Bulldozing		
		Applying herbicide (pesticide)	March–October	Applying herbicide (pesticide) – as needed to kill undesirable plants
	Mowing		May–December	Annually
	Strip disking		May–December	Annually
	Burning		Year-round	Annually
	Grazing		April–October	Annually
	Vegetation management in large channels[3]		May–December	Herbaceous vegetation mowed annually
			May–August – Woody vegetation treatment with equipment Year-round using hand tools	Woody vegetation averages every several years but is done as-needed
Channel Scour Repairs	Repair dry portions of the channel by scraping, disking, filling, leveling, and regrading the ground surface		April–November	As-needed
Flood Control Structure Maintenance and Repair for Regular Maintenance				
Pumping Plant Maintenance and Repair	Debris and sediment/silt removal		May–November – Prior to high-water season, and as needed to ensure proper pumping plant function	Pumping plant – annually
	Repairing things like wing walls, bulkheads, splash aprons, and the superstructure		Year-round	As-needed
Pipe/Culvert Repair, Replacement	Inspections		Year-round	Annually
	Pipe/culvert repair		April–November. Year-round for minor repair work	All pipes and culverts in levees would be inspected and maintained in the first 2-3 years and then in subsequent years as-needed, based on inspection results; all other
	Pipe/culvert replacement		April–November	
	Pipe abandonment		April–November	

Table 3-5. Timing and Frequency of Operations and Maintenance Activities

Activity Category	Activity	Timing[1]	Frequency[2]
			pipes and culverts would be maintained as-needed.
Data Collection			
Data Collection	Geotechnical borings (land-based and in-water)	Year-round	As-needed
	Surveying (bathymetry and other topography)	Year-round	As-needed
	Biological surveys	Year-round	As-needed
	Facility inspection	Year-round	Once or twice yearly
	Ongoing facility monitoring	Year-round	As-needed

Notes:

[1] The timing presented in this table is when maintenance activities generally occur; however, these activities may occur outside of these time frames if work is required or conditions allow. Timing does not represent special-status species or habitat impact avoidance windows.

[2] Because of funding and resource limitations, DWR may not be able to complete all maintenance activities annually or on a set rotational basis. DWR's maintenance activities are limited by operational capacity; therefore, maintenance activities are in some areas conducted on an as-needed basis. In some cases, maintenance activities may be conducted at an interval of several years to decades, while in other areas maintenance activities are conducted annually or on an every-couple-of-years rotation, when more frequent maintenance activity is required.

[3] Vegetation management in large channels is typically conducted in a similar way to what is described for channel vegetation management description. The description provided in the large channel vegetation management section provides additional detail on approaches/strategies that DWR has used and may continue to use to meet design flow of the channels, while preserving wildlife habitat values, to the extent feasible.

Source: Data provided by California Department of Water Resources, Flood Maintenance Office, from Environmental Permitting for Operation and Maintenance Draft EIR, January 2017 analysis are specifically identified. Furthermore, only with respect to flood flows and hydraulics were there differences between existing conditions and the No Action Alternative such that impact analyses were evaluated both under existing and future conditions separately (see Section 4.14, "Hydrology, Hydraulics, and Flood Risk Management").

3.5.2 No Action/No Project Alternative Description

Because the action alternatives all would require Section 408 permission from USACE for DWR to implement the project, the No Action/No Project Alternative (called the No Action Alternative in this document) consists of continuation of current conditions and O&M practices that reasonably would be expected to occur in the foreseeable future if the project was not implemented.

Under the No Action Alternative, DWR would not conduct any work to improve flood system capacity and conveyance in the Yolo Bypass and Sacramento Bypass or to address levee seepage, slope stability, and erosion concerns that have been identified in the Yolo Bypass or the Sacramento Bypass Levees. Because the capacity of the bypasses would not be increased, the stage in the Sacramento River would not be reduced, and a 200-year level of flood risk reduction would not be achieved for urban areas in the Lower Sacramento Basin, including portions of the Cities of Sacramento, West Sacramento, and Woodland. Approximately 780,000 people in the Lower Sacramento River Basin area would continue to be subject to an unacceptable high risk of levee failure and subsequent catastrophic flooding, defined as a risk of flood in excess of the state's 200-year standard for urban areas (DWR 2012a, DWR 2016a), because the system capacity would not be increased and flood stages would not be reduced. Achieving 200-year flood risk reduction for these urban areas without the project could require much more costly and higher risk options. These options might include increasing the height of levees in other parts of the system, which could be substantially more costly and with greater impacts to urban residents living along the levees.

Under the No Action Alternative, current O&M activities by DWR, USACE, and the LMAs would continue as described in Subsection 3.4.12, "Operations and Maintenance." The levees would continue to require risk reduction measures to meet current levee design criteria and the Federal Emergency Management Agency's (FEMA's) minimum level of performance necessary for participation in the NFIP, 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, property, the environment, 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 LMAs.

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.

Future State or Federal Action

As the Yolo Bypass East Levee and Sacramento Bypass North Levee do not meet current standards, even if DWR was not pursuing flood risk reduction measures, it is possible that USACE and/or the State of California would implement other related projects at some time in the future 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 ARCF GRR. USACE recommended extending the length of the Sacramento Weir and setting back the Sacramento Bypass North Levee as part of the Locally Preferred Plan (LPP) formulated under the ARCF GRR (USACE 2015). The ARCF GRR has been approved by USACE, authorized by the U.S. Congress, and initial funding has been appropriated for the design phase of the project. If the ARCF GRR recommendations were implemented, the constructed improvements would be similar to those included in the LEBLS project, but would have a reduced project footprint, since the Yolo Bypass East Levee would not be set back. Whereas the LEBLS project is anticipated to be constructed beginning in 2020, ARCF GRR levee improvements may not be completed until a later date. Because implementation of the ARCF GRR features on the LEBLS project site (Sacramento Weir widening and Sacramento Bypass North Levee setback) would likely occur later than other improvements included in the ARCF GRR (and so would not be in place at the time the LEBLS project was implemented), the ARCF GRR has not been included in the No Action Alternative for the LEBLS project.

Other Federal programs, such as Sacramento River Bank Protection Project and Public Law (PL) 84-99, have implemented repairs on area levees; however, these programs are targeted at dynamically shifting site-specific emergent conditions (most typically erosion) across a geographic scope widely ranging far beyond the Lower Elkhorn Basin. Therefore, any future repairs under these programs, even if they were to occur in the Lower Elkhorn Basin, would not comprehensively address the flood risk in the Lower Elkhorn Basin associated with the performance of the Yolo Bypass levees. Further, future authorization and appropriation of these programs is uncertain, making them unreliable from a flood risk management planning perspective.

Despite the possibility of other eventual Federally or State-led flood risk reduction projects, this EIS/EIR assumes that flood risk reduction measures would not occur for the purpose of evaluating effects under the No Action Alternative. This assumption provides the most conservative approach for disclosure and comparison of potential environmental 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.

Bryte Landfill Remediation Project

The Old Bryte Landfill is located along the northwestern side of the Sacramento Bypass. Soil contamination investigations at the Old Bryte Landfill have been ongoing since at least 2001. The California Department of Toxic Substances Control (DTSC) recently approved a Remedial Investigation/Feasibility Study for the Old Bryte Landfill, which includes removing landfill materials and relocating certain materials to a Corrective Action Management Unit (CAMU). SAFCA is currently preparing a CEQA compliance document for the Bryte Landfill Remediation project. Remediation work is expected to be conducted and completed in 2018 or 2019. DTSC has mandated the cleanup of the Old Bryte Landfill, and the Bryte Landfill Remediation project will be completed prior to and irrespective of the LEBLS project. The Bryte Landfill Remediation project therefore has independent utility from the LEBLS project but will consider future floodplain location with respect to the siting of the CAMU.

The Old Bryte Landfill remediation project is included in the NEPA baseline, although it is not a part of the CEQA baseline for analysis. Please refer to “Environmental Consequences and Mitigation

Measures" under Section 4.1.1, "Scope, Section Contents, and Resources Not Evaluated in Detail," for a discussion of the differences between CEQA and NEPA baseline for analysis.

Prior to release of the existing landfill site, the California Department of Toxic Substances Control (DTSC) would approve a cleanup program conducted in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and its implementing regulations (40 CFR 300 et seq., National Oil and Hazardous Substances Pollution Contingency Plan referred to as the NCP; EPA 1990). The Presumptive Remedy would involve removing and transporting all contaminated waste to a Corrective Action Management Unit (CAMU), which is an area within a facility that is used only for managing remediation wastes for implementing corrective action or cleanup at a facility.

Geocon conducted groundwater and surface water sample collection activities at the existing landfill site between 2010 and 2012 (Geosyntec 2017a). General mineral and metal concentrations reported in groundwater and surface water are generally similar in up- and downgradient monitoring locations sampled and support the conclusion that the presence of the landfill waste has not resulted in detrimental impacts to groundwater or surface water.

Upon completion of all waste and sediment removal activities from the existing landfill site, confirmatory soil samples would be collected from the bottom of the excavation to verify that all waste material has been removed. It is assumed that four confirmation samples per acre along the bottom of the excavation and one sample from every 150 feet of sidewall along the perimeter would be collected and analyzed for the constituents of concern (COCs, which include antimony arsenic, chromium, copper, lead, seven carcinogenic polynuclear aromatic hydrocarbons [cPAHs], dioxins/furans, and zinc). If additional waste material is found, or if the native soil underlying the waste exceeds the cleanup levels, additional excavation and characterization activities would be conducted. If required, additional confirmation sampling would be performed to ensure that all waste has been removed. If no additional waste material is encountered, a topographical survey along with field notes and photographs of the landfill site would be used to document final removal conditions.

Because "clean" confirmatory samples would be required to obtain DTSC's approval of the Bryte Landfill remediation, and because prior testing has indicated that contamination had not leached or migrated into ground or surface water, no residual contaminated material would be present at the landfill site following the conclusion of the remedial action, and there would be no adverse effect on water quality associated with the remediated landfill site.

Upon excavation of the landfill, the material would be sorted into construction and demolition (C&D) debris, Resource Conservation and Recovery Act (RCRA)-classified waste, and California hazardous waste and temporarily stockpiled at the landfill site on plastic liners with erosion and stormwater control measures around the stockpiles. C&D debris would be trucked to the Yolo County Central Landfill. Any RCRA waste would be stabilized to reduce soluble lead, and the stabilized RCRA waste and all other excavated waste would be relocated to the CAMU. Any material not meeting criteria for containment in the CAMU would be transported to a landfill certified to accept Class I California Hazardous Waste, likely the landfill in Buttonwillow, CA.

Consequences of No Action

Assuming that no levee setback or other related measures would occur under the No Action Alternative on the Yolo Bypass East Levee and Sacramento Bypass North Levee, it is reasonable to assume that these levees would become increasingly vulnerable to failure as a result of identified seepage, erosion, and slope instability, posing an increased risk of catastrophic flooding in the Lower Elkhorn Basin. During early 2017 rains, multiple levee slope failures occurred along the Sacramento Bypass North Levee and the Yolo Bypass East Levee that would be replaced by the project. Furthermore, no additional capacity would be available in the Yolo and Sacramento Bypasses to reduce stage on the Sacramento River. In the absence of this stage reduction in the Sacramento River, levees elsewhere in the system, including along the Sacramento River, would be subject to failure, and these failures could inundate portions of the Cities of Sacramento, West Sacramento, and Woodland. These circumstances are summarized below. In brief, a levee failure could trigger widespread flooding; extensive damage to residential, commercial, agricultural, and industrial structures; substantial impacts to the environment; and potential loss of life and property. Extensive damage to utilities, roadways, and other infrastructure systems likely would occur. Water supply and sewage facilities could potentially 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.

Environmental and agricultural resources could sustain major damage in a flood event. Damage to agricultural equipment, outbuildings, and processing facilities could lead to reduction in agricultural productivity, which could cause depression of the local 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 flood event could cause severe public health hazards as well. Flooding 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 water supply systems 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 a major portion of a 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. Varying levels of damage could be done to public service structures as well, causing delays in fire protection, law enforcement 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, which would likely impact air quality, water quality, and aquatic and riparian habitats and species. 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 greenhouse gas (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.

Repairing flood damage would cause substantial air emissions from clean up and reconstruction activities over an extended period of time. Flood response would likely have high emissions and would occur under emergency conditions with less opportunity to control and mitigate air emissions. The National Association of Homebuilders has estimated GHG emissions from new home construction (material production and transport related) to be 51.4 metric tons CO_2e per home (NAHB 2008). Although future flood scenarios are difficult to predict, only a small reduction in the risk of flooding on the number of potentially damaged homes would be needed to make the net GHG emissions of the No Action Alternative substantially higher than any of the action alternatives.

A flood event could also cause damage to natural and cultural 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. A flood event could also affect cultural resources, including unearthing Native American resources.

During the recovery period after a flood event, flooded 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 and businesses could be sufficiently large that the demand for temporary quarters likely would exceed the available supply of vacant buildings in the area. Thus, many displaced residents and businesses may be forced to relocate to areas a considerable distance away, resulting in substantial intermediate- and long-term economic effects on the flooded 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 clean-up 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 clean-up and repair after flooding could be too great to make restoring the current land use worthwhile, resulting in permanent changes to land use in flooded areas and the potential division of established communities.

A flood event could disrupt State and interstate highway, rail, air, and shipping traffic, causing long-term effects on the region's and the State's economy and ability to move people and goods. The surrounding area has one of the most comprehensive transportation networks on the West Coast, with a central geographic location and extensive north-south and east-west highway access. High volumes of truck and passenger traffic pass through the area on I-5, I-80, and U.S. 50 /Business 80 every day. Major transcontinental rail lines in the area 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 Sacramento, West Sacramento, and Woodland 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-5, I-80, U.S. 50, and numerous other government and commercial buildings and infrastructure.

Finally, a flood event could change the visual character of and recreation opportunities in the Lower Elkhorn Basin. 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 and wildlife areas, and trails unusable until clean-up 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.

3.5.3 Federal Emergency Management Agency Risk Mapping

Further complicating the no action scenario is the FEMA Risk Map process, a national effort to revise Flood Insurance Rate Maps (FIRMs). FEMA is in the process of reevaluating the levels of flood risk management in the region. If surrounding cities were mapped into 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 these cities, which may further delay flood risk reduction funding because a flood risk reduction development fee is incurred for new development. The Lower Elkhorn Basin itself is currently mostly in the AE Zone, which includes areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base flood elevations are shown within these zones, and mandatory flood insurance purchase requirements apply.

3.5.4 Levee Vegetation Policy

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, recreation, and other social values. The USACE Engineering Technical Letter (ETL) 1110-2-583, *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures*, calls for the removal of wild growth, trees, and other vegetation, which could impair levee integrity or flood-fighting access to reduce the risk of flood damage (USACE 2014). In certain instances, to further enhance environmental values or to meet State or Federal laws and/or regulations, a variance can be requested from the standard vegetation guidelines set forth in this ETL.

In an effort to modernize the levee system to meet current engineering standards, vegetation and encroachment issues on the Yolo Bypass East Levee in the project site will likely be addressed through formal agreements. The formal agreements may involve the integrated use of a System Wide Improvement Framework (SWIF) agreement with the LMA and a variance from vegetation standards in ETL 1110-2-583, *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures*. The SWIF is a plan and process under which the LMA addresses systemwide issues, including correction of unacceptable inspection items with the goal of maintaining eligibility under PL 84-99. Under the risk prioritization concept embodied within the SWIF process, the LMA would likely address landside vegetation and encroachment issues (including landside levee access) through the implementation of its standard O&M actions over time and in accordance with the State's Levee Vegetation Management Strategy in the CVFPP over the next 20 to 40 years.

3.6 Action Alternatives

Action alternatives all have similar components described in detail in Section 3.4, "Common Project Components of All Action Alternatives." A summary of the physical components of the action alternatives is presented in Table 3-6.

3.7 Environmentally Preferable/Superior Alternative

Section 1505.2(b) of the CEQ regulations requires the NEPA lead agency to identify the "environmentally preferable alternative" in its Record of Decision on the EIS. The CEQ regulations define the environmentally preferable alternative as "…the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources." (CEQ 1981.) The selection of the preferred alternative is independent of the identification of the environmentally preferable alternative, although the identification of both is based on the information presented in this EIS/EIR.

Similar to the environmentally preferable alternative under NEPA, State CEQA Guidelines Sections 15120 and 15126.6(e)(2) require identification of an "environmentally superior alternative." If the environmentally superior alternative is the "no project" alternative, the State CEQA Guidelines Section 15126.6(e)(2) requires identification of an environmentally superior alternative among the action alternatives.

To identify the environmentally preferable/superior alternative, each of the alternatives was evaluated based on significance thresholds and the potential adverse impacts identified. The relative potential for each action alternative to benefit the resource areas was also identified. The action alternative(s) with the fewest adverse impacts and greatest benefits (where applicable) was identified for each resource category, as summarized below. The determination of the environmentally preferable/superior alternative, however, was not formulaic; the determination considered the context, intensity, and type and degree of resource affected, including any benefits.

Table 3-6. Action Alternatives Comparison

Project Component	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Setback Levee	7.2 miles	7.1 miles	4.6 miles	4.7 miles
Seepage Berm	7.2 miles	7.1 miles	4.6 miles	4.7 miles
Cutoff Wall	7.2 miles	7.1 miles	4.6 miles	4.7 miles
Degrades	6.75 miles	7.5 miles	3.9 miles	7.5 miles
Erosion Protection*	7.9 miles	7.1 miles	5 miles	4.7 miles
Construction Staging and Access	3 Staging areas 3 Access Points	3 Staging areas 3 Access Points	2 Staging areas 2 Access Points	2 Staging areas 2 Access Points
Toe Drain	7.2 miles	7.1 miles	4.6 miles	4.7 miles
Relief Wells	TBD	TBD	TBD	TBD
O&M Corridor	7.2 miles	7.1 miles	4.6 miles	4.7 miles
Land Acquisition	2,600 acres	2,600 acres	2,000 acres	2,000 acres
New Native Perennial Grassland	185 – 610 acres	165 – 605 acres	115 – 375 acres	105 – 385 acres
New Riparian Habitat	52 – 171 acres	56 – 180 acres	28 – 109 acres	34 – 121 acres
New Open Water	0 – 13 acres	0 – 13 acres	0 – 8 acres	0 – 8 acres
New Freshwater Emergent Marsh	0 – 24 acres	0 – 24 acres	0 – 14 acres	0 – 14 acres

Note: Includes erosion protection along length of remnant levees. Seepage berms and cutoff walls are included along the entire length of each action alternative; however, individual levee reaches would use either one or the other, depending on site-specific considerations. This table was prepared based on 30% design, and details may be refined as the design moves forward.

Table 3-7 compares the significance conclusions for selected impacts. Impact mechanisms were included in Table 3-7 if one or more alternatives would result in a significant and unavoidable impact, or if there were substantial differences in the significance conclusions between one or more alternatives. Those environmental impacts not included in Table 3-7 were less than significant or had no impact for any of the alternatives (after mitigation), and were similar across all alternatives. Under all action alternatives, temporary construction and long-term O&M impacts, as well as long-term flood risk reduction, riparian/shaded riverine aquatic habitat, and other habitat benefits, would occur compared to the No Action Alternative and existing conditions.

Table 3-8 summarizes key hydraulic changes at selected locations that compare differences between the alternatives. Alternatives 2 and 3 exhibit the greatest flood risk reduction at key points in the Sacramento River Flood Control System (Yolo Bypass upstream of I-5, Sacramento River at I Street Bridge, and Sacramento River at Freeport), meeting the first project objective. Small, relatively equal stage increases occur with all action alternatives in the Yolo Bypass downstream of the Sacramento Bypass, as flood waters are conveyed through the Sacramento and Yolo Bypasses as intended during 100- and 200-year flood events. Alternatives 4 and 5 result in smaller flood reduction benefits, and hence the largest potential risk of a catastrophic flood within the Cities of Sacramento, West Sacramento, and Woodland.

Table 3-7. Comparison of Key Impacts and Benefits between Alternatives

Impact	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Aesthetics					
VIS-2: Changes in Scenic Vistas and Existing Visual Character	LTS	SU	SU	SU	SU
Biological Resources – Fish and Aquatic Organisms					
FISH-2: Loss or Degradation of Riparian and Shaded Riverine Aquatic Cover Associated with Levee Construction and Degradation	LTS	**B**	**B**	**B**	**B**
FISH-4: Fish Stranding in Expanded Setback Levee Areas Associated with Enhanced Floodplain Inundation	**B**	LTS	LTS	LTS	LTS
Cultural Resources					
CR-1: Damage to or Destruction of Built Environment Historic Properties	NI	SU	SU	SU	SU
Hazards and Hazardous Materials					
HAZ-4: Creation of Potential Safety Hazards, Including Possible Birdstrike, in the Vicinity of a Public or Private Airport	NI	SU	SU	SU	SU
HAZ-5: Creation of Potential Wildland Fire Hazards	PS	LTS(m)	LTS(m)	LTS(m)	LTS(m)
Land Use and Planning, and Agricultural and Forestry Resources					
AG-1: Conversion of Substantial Amounts of Important Farmland to Nonagricultural Uses and Conversion of Land under Williamson Act Contracts to an Inconsistent Use	NI	SU	SU	SU	SU
Noise and Vibration					
NOI-1: Potential Exposure of Persons to or Generation of Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance, or in Other Applicable Local, State, or Federal Standards	NI	SU	SU	SU	SU
NOI-3: Potential for Substantial Temporary or Periodic Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing without the Project	NI	SU	SU	SU	SU
Socioeconomics (including Population, Housing, and Employment)					
SOCIO-2: Cause a Substantial Decrease in Total Agricultural Production Values (NEPA Only)	NI	SU	SU	SU	SU
Traffic and Transportation					
TR-1: Increase in Traffic Volumes or Decrease in Capacity along Designated Roadways in the Project Site and Vicinity	NI	SU	SU	SU	SU

Notes:
B = beneficial
LTS = less than significant
LTS(m) = less than significant after mitigation
NI = no impact
PS = potentially significant
SU = significant impact despite mitigation (i.e., significant and unavoidable)
Source: Data compiled by GEI Consultants in 2017

Table 3-8. Key Hydraulic Results Between Action Alternatives at Selected Locations

		Existing With Project								Future With Project (Cumulative)							
		100 yr				200 yr				100 yr				200 yr			
ID	Index Point	Alt 2	Alt 3	Alt 4	Alt 5	Alt 2	Alt 3	Alt 4	Alt 5	Alt 2	Alt 3	Alt 4	Alt 5	Alt 2	Alt 3	Alt 4	Alt 5
24	Yolo Bypass Upstream of I-5	-0.71	-0.81	-0.29	-0.25	-0.66	-0.75	-0.28	-0.24	-0.72	-0.81	-0.31	-0.26	-0.65	-0.75	-0.28	-0.24
47	Sacramento River at the I Street Bridge	-0.81	-0.76	-0.75	-0.70	-0.87	-0.83	-0.82	-0.77	-1.91	-1.97	-1.80	-1.77	-1.98	-2.04	-1.87	-1.85
48	Sacramento River at Freeport	-0.65	-0.61	-0.60	-0.56	-0.70	-0.66	-0.65	-0.61	-1.42	-1.46	-1.37	-1.35	-1.59	-1.64	-1.51	-1.49
28	Yolo Bypass Downstream of Sac Bypass	0.10	0.10	0.09	0.08	0.13	0.13	0.11	0.10	0.19	0.20	0.18	0.18	0.24	0.25	0.21	0.21
29	Yolo Bypass Upstream of I-80	0.09	0.09	0.08	0.08	0.13	0.13	0.10	0.10	0.19	0.19	0.17	0.17	0.24	0.25	0.21	0.21
30	Yolo Bypass Near West Sacramento	0.09	0.09	0.08	0.07	0.12	0.12	0.10	0.09	0.17	0.18	0.16	0.16	0.21	0.22	0.19	0.19
31	Yolo Bypass Downstream of Putah Creek	0.09	0.09	0.08	0.08	0.11	0.11	0.09	0.08	0.17	0.18	0.16	0.16	0.20	0.21	0.18	0.17
32	Yolo Bypass at Lisbon	0.09	0.09	0.08	0.08	0.11	0.11	0.09	0.09	0.17	0.18	0.16	0.16	0.20	0.21	0.18	0.18
34	Yolo Bypass Upstream of RD 2068	0.10	0.10	0.09	0.08	0.11	0.11	0.09	0.09	0.19	0.20	0.17	0.17	0.20	0.21	0.18	0.18
22	Sutter Bypass Upstream of Fremont Weir	-0.14	-0.14	-0.08	-0.07	-0.14	-0.15	-0.08	-0.07	-0.21	-0.22	-0.15	-0.14	-0.21	-0.22	-0.14	-0.14
45	Sac River Downstream of Knights Landing	-0.16	-0.17	-0.08	-0.07	-0.16	-0.17	-0.09	-0.08	-0.21	-0.23	-0.14	-0.13	-0.21	-0.22	-0.13	-0.12
51	Sac River at Rio Vista	0.02	0.02	0.01	0.01	0.02	0.03	0.02	0.02	-0.37	-0.39	-0.32	-0.31	0.03	0.04	0.03	0.03

Notes:
All stage changes presented in feet
Comparisons are to Existing Conditions (same as Alternative 1, No Action Alternative) for 100-year and 200-year flood events
Green = stage decrease 0.20 feet or greater
Yellow = stage increase 0.20 feet or greater

Several key differences among the four action alternatives (Alternatives 2–5) are summarized below.

- Among the action alternatives, Alternative 3 would entail the greatest amount of construction, would disturb the largest amount of land, and would result in the largest amount of agricultural land being placed into the Yolo Bypass. Therefore, in general, Alternative 3 would have the greatest level of environmental impacts among the action alternatives.

- Because Alternatives 4 and 5 would entail construction of a shorter setback levee along the East Yolo Bypass (as compared to Alternatives 2 and 3), Alternatives 4 and 5 would require less construction and would disturb a smaller area of land. Therefore, the level of impacts under Alternatives 4 and 5 would be less as compared to Alternatives 2 and 3 for all topic areas evaluated in this EIS/EIR, with a key exception that Alternatives 4 and 5 would have the greatest remaining flood risk to the Sacramento area among the action alternatives (and resulting substantial environmental impacts if a flood occurred), and less native habitat benefits.

- Among the action alternatives, Alternative 5 would entail the least amount of construction and would disturb the least amount of land. Therefore, Alternative 5 would have the lowest level of environmental impacts among the action alternatives, with a key exception of having the greatest remaining flood risk to the Sacramento area among the action alternatives (and resulting substantial environmental impacts if a flood occurred), and smaller native habitat benefits than Alternatives 2 and 3.

- Alternatives 4 and 5 would not provide as high of a level of flood risk reduction as Alternatives 2 and 3 as measured at three key locations (Yolo Bypass upstream of I-5, Sacramento River at I Street Bridge, and Sacramento River at Freeport), and therefore would result in reduced but still higher than acceptable flood risk to the greater Sacramento area, as well as substantial environmental impacts if a flood occurred.

Under the No Action Alternative, no flood risk reduction improvements would be constructed. There would be a lost opportunity to substantially reduce flood stages in the Sacramento River and thereby substantially reduce the risk of flooding to the Cities of Sacramento, West Sacramento, and Woodland, as well as the substantial environmental impacts that could result from a flood event. Although an improvement in flood risk reduction, Alternatives 4 and 5, with the shortest setbacks of the Yolo Bypass East Levee, would result in less flood risk reduction than Alternatives 2 and 3. Consequently, Alternatives 4 and 5 could cause substantial environmental impacts if a flood event occurred, as presented in "Consequences of No Action," in Section 3.5.2, "No Action/No Project Alternative Description." While providing a high level of flood risk reduction, Alternative 3 would also entail the greatest amount of construction, would disturb the largest amount of land, and would result in the largest amount of agricultural land being placed into the Yolo Bypass. Alternative 2 (DWR's Preferred Alternative) would have lesser environmental impacts than Alternative 3; provide a high level of flood risk reduction very similar to Alternative 3; and would best meet the project purpose, need, and objectives. Therefore, Alternative 2 is the environmentally superior alternative.

The environmentally preferable/superior alternative may not be the preferred alternative for implementation. USACE and DWR will identify the preferred alternative following additional public participation, including input from stakeholders and interested agencies, and consideration of comments received during the public review period for this EIS/EIR.

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Chapter 4. Affected Environment, Environmental Consequences, and Mitigation Measures

4.1 Introduction

4.1.1 Scope, Section Contents, and Resources Not Evaluated in Detail

Scope

Council on Environmental Quality (CEQ) regulations for implementing NEPA (the "NEPA regulations") specify that a Federal agency preparing an EIS must consider the effects on the environment from the Preferred Alternative (Alternative 2 or "DWR's Preferred Alternative" for this project) and alternatives under consideration; these include effects on ecological; aesthetic; historical and cultural resources; and economic, social, and health effects. The scope of the EIS is determined through the NEPA scoping process. Chapter 1, "Introduction," and Appendix A, "Lower Elkhorn Basin Levee Setback Project Scoping Report," describe the scoping conducted for this EIS. NEPA also requires that an EIS identify relevant, reasonable mitigation measures that are not already included in the Preferred Alternative or alternatives under consideration that could avoid, minimize, rectify, reduce, eliminate, or compensate for the adverse environmental effects of each alternative evaluated (40 Code of Federal Regulations [CFR] 1502.14, 1502.16, 1508.8).

USACE guidance contained in Engineering Circular (EC) 1165-2-216 (Change 1) requires that USACE establish the scope of the EIS to address effects to the specific activity requiring 408 permission and a Department of the Army permit and to those portions of the entire project over which USACE has sufficient control and responsibility to warrant Federal review.

The State CEQA Guidelines require an EIR to include an evaluation of potentially significant effects on the physical environment associated with a "proposed project" (Alternative 2 or "DWR's Preferred Alternative" for this project) and to identify feasible mitigation for any significant adverse effects. As stated in 14 California Code of Regulations (CCR) Section 15126.2:

> 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 must also discuss inconsistencies between the project and applicable adopted general plans and regional plans (14 CCR Section 15125[d]). An EIR must describe potentially feasible measures that could avoid or minimize significant adverse impacts (14 CCR Section 15126.4[a][1]) and feasible and practicable measures that are fully enforceable through permit conditions, agreements, or other legally binding processes (CCR Section 15126.4[a][2]). Under CEQA, mitigation measures are not required for effects that are found to be less than significant.

Section Contents

For ease of reference and to prevent confusion, the environmental setting, impacts, and mitigation measures required by CEQA have been prepared largely using NEPA terminology (e.g., affected environment, environmental consequences, and mitigation measures) but all sections comply with CEQA and NEPA regulations.

Chapter 4, "Affected Environment, Environmental Consequences, and Mitigation Measures," is organized by issue area, generally corresponding to topics in the CEQA Environmental Checklist (State CEQA Guidelines Appendix G, as amended). These issue areas also address USACE public interest review factors, as required in 33 CFR 320.4, and the effects on the physical, chemical, and biological characteristics of the aquatic ecosystem, as required by Clean Water Act Section 404(b)(1) Guidelines. In addition to standard CEQA issue areas, this chapter includes a section on "Environmental Justice," which is required in the NEPA analysis pursuant to Presidential Executive Order (EO) 12898, and sections on "Socioeconomics," and "Biological Resources – Wetlands and Other Waters of the United States."

Each topic area in Chapter 4 of this EIS/EIR contains a discussion of the environmental setting and identifies the impacts of the project on the existing human and natural environment, in accordance with NEPA regulations (40 CFR 1502.16) and the State CEQA Guidelines (CCR Sections 15125 and 15143). As described below, each topic area section follows the same format.

Environmental Setting

The "Environmental Setting" subsection provides an overview of the baseline physical environmental conditions (i.e., the environmental baseline) in the project site and vicinity as appropriate, in accordance with NEPA (40 CFR 1502.10). NEPA requires a description of the "Affected Environment," which is the environment of the area(s) to be affected or created by the Preferred Alternative and the other alternatives under consideration.

The State CEQA Guidelines (14 CCR Section 15125) require that an EIR include a description of the physical environmental conditions in the project vicinity, as they exist at the time the Notice of Preparation (NOP) is published, from both a local and regional perspective (September 7, 2016 for this project). This environmental setting will normally constitute the baseline physical conditions by which a CEQA lead agency (in this case, DWR) determines whether an impact is significant.

Because the concept of a significant effect on the environment focuses on changes in the environment, the “Environmental Setting” of each topic area is described so that the changes can be understood in context.

Regulatory Setting

The “Regulatory Setting” subsection provides a bulleted list of the adopted plans, policies, laws, regulations, and ordinances that are relevant to each topic area. Summary descriptions of each applicable plan, policy, law, regulation, or ordinance are provided in Appendix C, “Summaries of Applicable Laws, Regulations, Policies, and Plans.”

The environmental analysis addresses possible conflicts between the Preferred Alternative or other alternatives under consideration and the objectives of Federal, State, regional, or local formally adopted land use plans, policies, or controls for the area (40 CFR 1502.16[c] and State CEQA Guidelines CCR Section 15125[d]). Although the EIS/EIR discusses inconsistencies with adopted applicable plans and policies for several jurisdictions, the final authority for interpreting policy statements and determining the project’s consistency with adopted policies rests with the governing body of the jurisdiction in question. Where inconsistencies do occur (for example, an inconsistency with a County noise standard or an inconsistency with an adopted habitat conservation plan), they are addressed as specific impacts within each applicable topic area.

Environmental Consequences and Mitigation Measures

- **Analysis Methodology** describes the methods, process, procedures, and/or assumptions used to formulate and conduct the impact analysis. This subsection also summarizes any comments received on the NOP/NOI and how the comment was considered in the impact analysis.

- **Basis of Significance** describes the criteria used to define at what level an impact would be considered significant. Thresholds may be quantitative or qualitative, as appropriate. Generally, the thresholds of significance used in this EIS/EIR are derived from Appendix G of the State CEQA Guidelines, as amended; USACE’s NEPA regulations, where defined; factual or scientific information and data; and regulatory standards of Federal, State, regional, and local agencies. These thresholds, and the impact analysis that follows, include the factors taken into account under NEPA to determine the significance of the action in terms of the context and the intensity (severity) of its effects (40 CFR 1508.27). Thresholds may also be based on examples found in NEPA/CEQA regulations or the CEQ/State CEQA Guidelines; scientific and factual data relative to either lead agency’s jurisdiction; legislative or regulatory performance standards of Federal, State, regional, or local agencies relevant to the impact analysis; County goals, objectives, and policies (e.g., County General Plan); views of the public in the affected area; the policy/regulatory environment of affected jurisdictions; or other factors.

- **Issues Not Discussed Further in this EIS/EIR** lists any significance thresholds where there would be no or only minor (negligible), impacts; provides a brief description of the reasoning as to the impact conclusion, and states that no further evaluation is required.

- **Impact Analysis** provides an assessment of the potential effects of all alternatives under consideration on the affected environment. This assessment also specifies why effects are found to be beneficial, no impact, less than significant, potentially significant, significant, or significant and unavoidable, before and after mitigation implementation. The terms "effect" and "impact" are synonymous as used herein (40 CFR 1508.8).

Three types of project impacts were considered in the impact analysis: direct, indirect, and cumulative impacts, which are defined in the NEPA regulations at 40 CFR 1508.7 and 1508.8 and in the State CEQA Guidelines at 14 CCR 15064(d). Direct and indirect impacts are evaluated in Chapter 4, "Affected Environment, Environmental Consequences, and Mitigation Measures," while cumulative impacts are discussed separately in Chapter 5, "Cumulative Impacts."

The impacts are listed numerically and sequentially throughout each section of the EIS/EIR. For example, impacts in Section 4.2 are identified as 4.2-1, 4.2-2, and so on and are identified first by impact title and then by the name of each alternative. The No Action Alternative (required under NEPA and CEQA [No Project Alternative]), DWR's Preferred Alternative (Alternative 2), and three other alternatives (Alternatives 3, 4, and 5) are evaluated. An impact title precedes the discussion of each effect. The impact analysis for each alternative includes the evidence on which a conclusion is based regarding the level of effect. Impact conclusions are made using the significance criteria described above and include consideration of the "context" of the action and the "intensity" (severity) of its effects in accordance with NEPA guidance (40 CFR 1508.27).

Baseline for Analysis

The level-of-effect of the alternatives under consideration is determined by comparing estimated effects with baseline conditions (current and future). Under NEPA, the No Action Alternative (expected future conditions without the project) is the baseline against which the effects of the other alternatives are compared. Although, in some instances, a NEPA "no action" scenario can involve significant anticipated changes to existing conditions based on actions taken by non-Federal parties, here the NEPA No Action Alternative is generally the continuation of existing conditions, with the exception that certain offsite projects affecting hydraulics of the flood control system and the remediation of Old Bryte Landfill are reasonably foreseeable and are expected to occur prior to project implementation; these projects are included in the NEPA No Action Alternative. Under CEQA, the environmental conditions as they exist at the time the NOP is published is the baseline against which the effects of the alternatives are measured.

For all resource sections except "Hydrology, Hydraulics, and Flood Risk Management," and "Hazards and Hazardous Materials," the existing conditions, the No Project Alternative (under CEQA), and the No Action Alternative (under NEPA) are sufficiently similar that the NEPA and CEQA impact analyses were unified with impacts measured against this common baseline; the existing conditions at the project site would be sufficiently similar in the future. As described above, the primary difference between the NEPA and CEQA baselines for "Hazards and Hazardous Materials" is that the Old Bryte Landfill remediation is included in the a NEPA baseline, but not the CEQA baseline. The "Hydrology, Hydraulics, and Flood Risk Management" section considers project impacts against separate "existing" and "future" conditions, however, as hydraulic modeling results indicate hydraulic differences between the two conditions because the future conditions include Sacramento Bypass and Sacramento Weir expansions by USACE.

Mitigation Measures

Mitigation Measures to avoid, minimize, rectify, reduce, or compensate for adverse effects of the project, where feasible, are recommended for each significant impact in accordance with NEPA regulations (40 CFR Part 1508, Section 20) and the State CEQA Guidelines (14 CCR Sections 15370, 15002[a][3], 15021[a][2], and 15091[a][1]). Specifically, under NEPA (40 CFR Part 1508, Section 20), mitigation includes the following:

a. Avoiding the impact altogether by not taking a certain action or parts of an action.

b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

c. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

d. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

e. Compensating for the impact by replacing or providing substitute resources or environments.

Each mitigation measure is identified numerically to correspond with the number of the impact being reduced by the measure. For example, Impact BIO-1 would be mitigated by Mitigation Measure BIO-1. Where no feasible mitigation is available to reduce effects to a less-than-significant level, the impacts are identified as "significant and unavoidable" and the statement "no feasible mitigation measures are available" is provided with an explanation. (In some cases, all feasible and available mitigation measures are not sufficient to reduce an effect to a "less-than-significant" level. When this occurs, the impacts are described as "significant and unavoidable.")

State CEQA Guidelines Section 15126.4(a)(1)(d) specifies that if a mitigation measure itself would cause a significant impact, the effects of the mitigation measure will be discussed. Each mitigation measure included in this EIS/EIR was considered as to whether it would cause a significant impact upon implementation. It was determined that none of the mitigation measures for any of the action alternatives would cause a significant impact of its own upon implementation. Therefore, impacts generated by mitigation measures themselves are not evaluated or addressed further in this EIS/EIR.

Residual Significant Impacts

This subsection identifies any significant impacts that would still be significant even after implementation of the mitigation measures, as well as any significant impacts that would result from implementation of the mitigation measures themselves. As discussed above, for this project, none of the proposed mitigation measures would themselves result in new significant impacts and, therefore, are not discussed further in this EIS/EIR.

Resources Not Evaluated in Detail

This EIS/EIR evaluates all of the required topic areas under NEPA and CEQA. With respect to the NEPA analysis, a discussion of Indian Trust Assets has been excluded based on the following analysis. Indian Trust Assets are legal interests in property or rights held by the United States for Indian Tribes or individuals. Trust status originates from rights imparted by treaties, statutes, or executive orders. Examples of Indian Trust Assets are lands, including reservations and public domain allotments; minerals; water rights, hunting and fishing rights, or other natural resources; and money or claims. Assets can be real property, physical assets, or intangible property rights. Indian Trust Assets cannot be sold, leased, or otherwise alienated without Federal approval. Indian Trust Assets do not include things in which a tribe or individuals have no legal interest such as off-reservation sacred lands or archaeological sites in which a tribe has no legal property interest. No Indian Trust Assets have been identified within the project site or adjacent areas. As a result, the project would have no adverse effects on Indian Trust Assets.

In addition, Native American Tribal lands are lands that have been deeded to tribes or upon which tribes have a historical claim. There are no such lands within the project site or adjacent lands; therefore, this issue is also not addressed further in this EIS/EIR.

Ecosystem Project Elements

Chapter 3, "Alternatives," identifies a range of ecosystem project elements. The project includes compensatory mitigation for habitat and species impacts, but additional ecosystem improvements are described in Chapter 3. The Federal decisions related to permission under Section 408 or issuance of a Section 404 permit include only the compensatory mitigation required for the project.

4.1.2 Terminology to Describe Impacts

General Terms

The EIS/EIR for this project uses the following terminology throughout the impact analyses.

- **Construction** applies to activities associated with any form of ground-disturbance.
- **Operations** or **Operations and Maintenance (O&M)** apply to actions that would occur at the conclusion of construction activities, i.e., after the proposed new setback levees have been built, existing levees have been degraded, borrow activities have ceased, and compensatory mitigation has been implemented.
- "**The project**" refers to all Lower Elkhorn Levee Setback project components, as described in Chapter 3, "Alternatives," and is used generally to refer to any of the action alternatives evaluated in this EIS/EIR.
- **DWR's Preferred Alternative** (Alternative 2) serves as both the "Preferred Alternative" under NEPA and the "Proposed Project" under CEQA.

Impact Levels

The EIS/EIR for this project uses the following terminology to denote the significance of environmental impacts of the project.

- A **beneficial** impact is an impact that is considered to cause a positive change or improvement in the environment and for which no mitigation measures (which may include measures to avoid, minimize, rectify, reduce, or compensate for effects) are required.
- **No impact** indicates that the construction, operation, and maintenance of the project would not have any direct or indirect impact on the environment. It means no change from baseline conditions. This impact level does not need mitigation.
- A **less-than-significant** impact is one that would not result in a substantial or potentially substantial adverse change in the physical environment. Where appropriate, feasible mitigation measures are

identified even for those impacts that are less than significant to further reduce the level of effect, pursuant to USACE NEPA policy.

- A **significant** impact can vary, based on the change in the baseline physical condition. A "significant" effect is broadly described in the NEPA regulations at 33 CFR 1508.27, and requires consideration of both context (e.g. society as a whole, the affected region, the locality) and intensity (e.g. beneficial and adverse effects; degree of effects on public health, safety, historic properties, threatened and/or endangered species, unique characteristics of the area, and whether the action threatens to violate other laws or requirements). Because the CEQA definition of a significant impact is more descriptive than the NEPA definition of a significant adverse effect, USACE determined it is appropriate for clarity to use the CEQA definition. A significant impact is defined by CEQA Section 21068 as one that would cause "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project." Mitigation measures or alternatives to the project are provided, where feasible, to reduce the magnitude of significant effects.

- A **potentially significant** impact is one that, if it were to occur, would be considered a significant impact as described above; however, the occurrence of the effect cannot be immediately determined with certainty. A potentially significant impact is treated as if it were a significant impact.

- A **significant and unavoidable** impact is one that would result in a potentially substantial or substantial adverse effect on the environment, and that could not be reduced to a less-than-significant level even with the application of all available and feasible mitigation. Under CEQA, a project with significant and unavoidable impacts could proceed, but the lead agency would be required to prepare a "statement of overriding considerations" in accordance with State CEQA Guidelines (14 CCR 15093), explaining why the lead agency would proceed with the project in spite of the presence of significant and unavoidable environmental impacts.

Impact Mechanisms

Mechanisms that could cause impacts are discussed within each topic area. General categories of impact mechanisms are construction of the project and activities related to future O&M, as described in Chapter 3, "Alternatives." The analysis in this EIS/EIR is specific to the project alternatives considered herein, and is not necessarily applicable to other, future projects with different components or effects.

If DWR's Preferred Alternative is approved, site work could begin as early as 2020, assuming all clearances, permissions, and permits are granted. The project is expected to be completed by approximately 2022. Project impacts fall into the following categories:

- A **temporary impact** would occur primarily during construction activities and could last from several days at one site to up to 2 years, the anticipated duration of construction activities for the project.

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

- A **long-term impact** would last longer than 3 years following completion of construction. In some cases, a long-term impact could be considered a permanent impact.

- A **direct impact** is an impact that would be caused by an action and would occur at the same time and place as the action.

- An **indirect impact** is an impact that would be caused by an action but would occur later in time, or at another location, yet is reasonably foreseeable in the future. Examples of indirect impacts include growth-inducing impacts and other impacts related to changes in land use patterns and related effects on the physical environment.

- A **cumulative** impact is an impact resulting from the project (including all action alternatives) under consideration when added to other past, present, and probable future ("reasonably foreseeable" under NEPA) actions (regardless of what agency or person undertakes the actions), referred to in this document as a "related project." A significant cumulative impact occurs when a project (including the action alternatives) makes a "cumulatively considerable" incremental contribution to a significant cumulative impact. "Cumulative considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, current projects, and probable future or related projects (State CEQA Guidelines Section 15064[h][1]).

4.1.3 Geographic Scope of Impact Analyses

State CEQA Guidelines indicate that lead agencies "should define the geographic scope of the area affected by the cumulative effect" (California Code of Regulations [CCR] Section 15130[b][3]). This definition was used when determining direct, indirect, and cumulative impacts. Although the geographic scope of the area affected varies by topic, it consists of four geographic areas, as described below.

- Project Site—Lower Elkhorn Basin (see Figure 1-1, "Project Vicinity), where all new and modified project levees and other facilities would be located, constructed, and operated.

- Project Vicinity and Region—generally the project vicinity and region shown in Figure 1-1, "Project Vicinity," which some topics would affect when considered in a cumulative context such as air quality and climate change (see topic-specific geographic areas below).

- Regional Transportation Network—linear transportation corridors used for truck haul routes during construction (up to 50 miles from the project site primarily along portions of I-5 and I-80, part of which is shown in Figure 1-1, "Project Vicinity").

- Sacramento River Flood Control Project Area—all rivers and bypasses included in Table 4.14-3, "Hydraulic Modeling Results at Representative Index Points for 100- and 200-year Events," and as shown in Figure 4.14-1, "Location of Sacramento River HEC-ResSim System Model Index Points," where project and flood system operations would measurably modify flow conditions during potential flood events, as listed below.

  - Sutter Bypass Upstream of Fremont Weir to Fremont Weir.

  - Yolo Bypass Downstream of Fremont Weir to Cache Slough, including Cache Slough Complex (e.g., Streamboat, Miner, and Lindsey Sloughs) (i.e., entire bypass).

  - Sacramento Bypass at Sacramento Weir (i.e., entire bypass) and Natomas Cross Canal.

  - Sacramento River Deep Water Ship Channel (DWSC) (entire ship channel).

- Sacramento River downstream of Knights Landing to Rio Vista.
- Lower American River, primarily near its confluence with the Sacramento River.

The stage changes in the Sutter Bypass, Natomas Cross Canal, DWSC, and Lower American River were only considered with respect to hydraulic impacts as these changes during potential flood events (including 100- and 200-year flood events) would either be: (1) beneficial stage and flow reductions in Sutter Bypass (including Feather River), the lower American, and Natomas Cross Canal that would not adversely affect other environmental resources or topics in any way, given the sheer magnitude of the flows during project operations; or (2) small stage and flow increases in the Cache Slough Complex and DWSC that also would not adversely affect other environmental resources or topics in any way, given the sheer magnitude of the flows during project operations.

The geographic scope of the area affected by the project for each of the topics addressed in this EIS/EIR is listed below.

- Aesthetics—local (individual improvement sites), and immediate vicinity.
- Air Quality—regional (Sacramento Federal Ozone Nonattainment Area [includes Sacramento and Yolo Counties, the western portion of El Dorado County, and portions of Placer and Solano Counties]).
- Biological Resources (Fish and Aquatic Organisms)—local (individual improvement sites), and regional.
- Biological Resources (Vegetation and Wildlife)—local (individual improvement sites), and regional.
- Biological Resources (Wetlands and Other Waters)—local (individual improvement sites), and regional.
- Climate Change (including Greenhouse Gas Emissions)—local (individual improvement sites), regional, and global.
- Cultural Resources (Archaeological, Historical, and Tribal)—local (individual improvement sites), and regional.
- Energy—local (individual improvement sites), and regional.
- Environmental Justice—local (individual improvement sites).
- Geology, Soils, and Paleontological Resources—local (individual improvement sites), and regional (Sacramento Valley for paleontological resources).
- Groundwater Resources—local (individual improvement sites).
- Hazards and Hazardous Materials—local (individual improvement sites), and nearby construction projects.

- Hydrology, Hydraulics, and Flood Risk Management—local (drainage systems affected within and downstream of individual improvement sites), and regional (Sacramento River Flood Control System).
- Land Use and Planning, and Agricultural and Forestry Resources—local (individual improvement sites), and regional.
- Mineral Resources—local (individual improvement sites), and the Sacramento-Fairfield Production Consumption Region.
- Noise—local (immediate vicinity of the local improvement sites and along access routes to I-5 during construction activities) and regional transport network for truck haul routes during construction (up to 50 miles from the project site primarily along portions of I-5 and I-80).
- Recreation—local (individual improvement sites).
- Socioeconomics (including Population, Housing, and Employment)—local (immediate vicinity of the individual improvement sites), and regional.

4.2 Aesthetics

4.2.1 Environmental Setting

Visual Resource Evaluation Concepts and Terminology

Both natural and created features in a landscape contribute to its visual character. Landscape characteristics influencing visual character include geologic, hydrologic, botanical, wildlife, recreation, and urban features. The basic elements that comprise the visual character of landscape features are form, line, color, and texture. The appearance of the landscape is described in terms of the dominance of each of these elements.

Several sets of criteria have been developed for defining and evaluating visual quality. The criteria developed by the Federal Highway Administration (FHA) (FHA 1988) and the U.S. Forest Service (USFS) (USFS 1995), which are used in this analysis, include the concepts of vividness, intactness, and unity. According to these criteria, none of these is itself equivalent to visual quality; all three must be considered high to indicate high quality visual resources. These terms are defined below.

- "Vividness" is the visual power or memorability of landscape components 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.
- "Unity" is the visual coherence and compositional harmony of the landscape considered as a whole.

Viewer sensitivity, also considered in relation to visual quality, depends on the number and type of viewers and the frequency and duration of views. Visual sensitivity is also affected by viewer activity, awareness, and expectations in combination with the number of viewers and the duration of the view. The viewer's distance from landscape elements plays an important role in the determination of an area's visual quality. Landscape elements are considered higher or lower in visual importance based on their proximity to the viewer. Generally, the closer a resource is to the viewer, the more dominant, and therefore visually important, it is to the viewer. Both FHA and USFS separate landscapes into foreground, middleground, and background views. Although this should be considered on a case-by-case basis, in general, the foreground is characterized by clear details (within 0.25–0.5 mile from the viewer); the middleground is characterized by loss of clear texture within a landscape creating a uniform appearance (foreground to 3–5 miles in the distance); and the background extends from the middleground to the limit of human sight. (FHA 1988; USFS 1995.)

Photographic exhibits showing the regional and local landscape character at various locations at the project site (i.e., key observations points [KOPs]) are provided. These photographs are representative of the types of visual resources that are present in each area. They have also been selected based on viewer groups, primarily residents and recreationists. Brief descriptions of the foreground, middleground, and background characteristics of each KOP are presented.

Existing Visual Resources in the Study Area

Visual Character

The project region is located within the flat alluvial plain of the Sacramento Valley, west of the Sacramento River. The Sacramento River, Sacramento Bypass, Yolo Bypass, and Tule Canal are scenic resources located in the project vicinity and within the project viewshed. The built-environment consists of rural residences and farm equipment, agricultural storage facilities, irrigation ditches, and farm roads associated with agricultural operations. Old River Road provides the primary access to the Lower Elkhorn Basin for residents and recreationists, linking the study area to I-5 in the north and I-80 in the south. Local Yolo County roadways and farm roads, many of which are unpaved, provide access for residents and farm workers.

Old River Road—a Yolo County-designated scenic highway—parallels the west side of the Sacramento River from the southern end of the Sacramento Bypass north to the Fremont Weir. Motorists traveling on the southern end of Old River Road have unobstructed views of the Sacramento Bypass, agricultural fields northwest of the Bypass, the Sacramento River and associated riparian vegetation to the northeast, and private residences and boat docks on the east side of the river (see KOP 1). The viewshed in this area consists primarily of linear elements associated with the roadways, levees, and railroad tracks, and the associated gray colors of concrete, fencing, and overhead power lines. The roadways and the Sacramento Bypass North Levee dominate the views in this area. The mounded forms and green color of mature shade trees along the Sierra Northern Railway railroad tracks, Old River Road, and the Sacramento River provide a sense of visual relief from the human elements.

KOP 1: Looking north from Old River Road (on top of the Sacramento Weir). The Sierra Northern Railway railroad tracks, the Sacramento Bypass, and the concrete-lined sides of the Sacramento Weir are visible in the foreground, agricultural fields and the proposed setback levee alignment are in the middleground to the northwest, and the Sacramento River is visible in the middleground to the east. (Google Earth 2016.)

A portion of the Sierra Northern Railway railroad tracks are located on top of the Sacramento Weir, on the west side of Old River Road. The Sierra Northern Railway operates the Sacramento River Train, which offers dinner excursion trips along the approximately 16-mile “Woodland Branch Line” between the Cities of Woodland and West Sacramento. The excursion ride begins at North Harbor Boulevard in West Sacramento, immediately north of the I-80 Bridge overcrossing (across the river from Sand Cove Park), and travels north at slow speeds along the Sacramento River, across the Sacramento Bypass on the Sacramento Weir, then through the Lower Elkhorn Basin north to the Fremont Bridge (north of I-5), where it turns west towards Woodland. Passengers on the excursion train have expansive scenic views of the Sacramento River and associated riparian vegetation to the east, and the irrigated agricultural land that makes up the Lower Elkhorn Basin to the west (see KOPs 1 and 2). The foreground viewshed consists of tall, green shade trees along the railroad tracks and along the west bank of the Sacramento River, along with the river itself to the east. The middleground viewshed from the excursion train is dominated by the linear nature of low-growing row crops in the Basin to the west, with colors varying from green to brown depending on the crop and season of the year. The background viewshed is dominated by the linear embankment of the Tule Canal and its coarse texture and generally brown color.

Immediately opposite the Sacramento Bypass, on the east side of the river, are private residences with boat docks that line the river. Garden Highway (a Sacramento County-designated scenic highway) is located on the east side of these residences. Motorists traveling on Garden Highway opposite the Sacramento Weir have intermittent views in one location (partially blocked by trees) of the river, the weir, and the extreme eastern end of the Sacramento Bypass (see KOP 2). The nearby residents on the east side of the river have views of the water and adjacent riparian vegetation, and the Sacramento Weir. Views of the Sacramento Bypass from these residences are obstructed by the elevated bridge for Old River Road and the Sierra Northern Railway railroad tracks, as well as the Sacramento River west bank levee (see KOP 2).

KOP 2: Looking west from Garden Highway. Shade trees and riparian vegetation along the Sacramento River are visible in the foreground, the Sacramento Weir and Old River Road are visible in the middleground, and the Sacramento Bypass is visible in the background. (GEI Consultants, Inc. 2016.)

The viewshed from these nearby residences and recreationists on this portion of the Sacramento River is composed of a variety of different elements. The Sacramento River flows in a southerly direction at the back of the residences, and different types of boats and associated recreationists on the river are visible throughout the year. Low-growing perennial grasses along the river and at the eastern edge of the Bypass are green in the spring, but quickly fade and become brown for most of the year. Rounded forms of green, shrubby riparian vegetation and mature green shade trees in summer, along with the river, provide a sense of visual relief from the browns and grays of the perennial grasses and concrete associated with the roadways and weir that dominate the viewshed in this area. The fencing, bridge structure over the weir, power poles, overhead power lines, vehicles, and weir gates all contribute to a lack of unity and cohesiveness in the viewshed.

Construction of the southeastern portion of the proposed Sacramento Bypass North Levee setback, the proposed erosion repair along the Training Levee on the west bank of the Sacramento Bypass South Levee, degrading the existing Sacramento Bypass North Levee, and horizontal directional drilling to reroute the Sacramento International Airport jet fuel pipeline would take place adjacent to the Sacramento Bypass, which occupies an approximately 1.75-mile-long area between the Yolo Bypass on the west and the Sacramento River on the east, approximately 2 miles upstream from the confluence with the American River (see KOP 3).

KOP 3: Looking southwest from County Road 126. The Sacramento Bypass North Levee is visible in the foreground; water, riparian vegetation, and perennial grasses in the Bypass are visible in the middleground; and the Sacramento Bypass South Levee is visible in the background. (GEI Consultants, Inc. 2016.)

The Sacramento Bypass is bounded by existing elevated levees on the north and south sides. In 2011, the WSAFCA reconstructed the south levee of the Sacramento Bypass to correct seepage and geometry deficiencies, including installation of a seepage cutoff wall. The eastern end of the Sacramento Bypass consists of the Sacramento Weir, which is 1,920 feet long and consists of 48 gates that divert Sacramento and American River floodwaters to the west through the Sacramento Bypass to the Yolo Bypass. The approximately 360-acre Sacramento Bypass Wildlife Area, administered by CDFW, encompasses the interior area of the Sacramento Bypass. The wildlife area is an important cover and feeding area for wildlife during late fall, winter, and early spring. Vegetation varies throughout the area from mature cottonwood trees, willows, and valley oaks in some locations to a sparsely covered sandy soil area on the eastern end. Game birds, raptors, songbirds, and native mammals are present. Recreational activities include fishing; wildlife viewing; birdwatching; and hunting for waterfowl (when the area is flooded), ring-necked pheasant, mourning dove, California quail, wild turkey, cottontail rabbit, tree squirrel, and jackrabbit. During summer, much of the vegetation in the Bypass is dry and brown, with the exception of scattered trees and shrubs. A limited amount of water may be present in the Bypass during summer, in pools, depending on the amount of winter rainfall (see KOP 3). During winter and spring, views consist of water and mature shade trees within the Bypass, green riparian vegetation, green perennial grasses, and tall trees. From the surrounding lands, the north and south Sacramento Bypass levees, and the south Sacramento Bypass Training Levee, appear as raised earthen berms with a flat top, covered in many places with grasses. Views to the north and south from the opposite sides of all of these levees are blocked by the intervening height of the levees. Views of these levees from I-80 (to the south) are blocked by intervening vegetation.

The area immediately north of the existing Sacramento Bypass North Levee consists of flat agricultural fields, unpaved farm access roads, and wood power poles and aboveground power lines (see KOP 4). The foreground and middleground of this viewshed are dominated by the linear nature of the row crops, which may appear green or brown depending on the season. In the background, the rounded forms and soft textures of mature trees along the Sierra Northern Railway railroad and the Katchituli Oxbow Restoration Mitigation Site provide a sense of visual relief. The generally brown linear embankment of the south cross-canal to the Sacramento River, which has a few green shrubs and trees scattered along its length, also contributes to the sense of geometric form in this viewshed.

KOP 4: Looking north from County Road 126 (on top of the Sacramento Bypass North Levee). A young walnut orchard and overhead power lines are visible in the foreground; the elevated levee associated with the agricultural drainage to the Sacramento River and the proposed setback levee alignment are in the middleground, and trees along the Sierra Northern Railway railroad along with a rural residence are visible in the background. (GEI Consultants, Inc. 2016.)

County Road 126 runs west along the north side of the Sacramento Bypass North Levee for approximately 1 mile before turning north, where it becomes County Road 124. County Roads 124 and 126 are primarily used by local residents and farm workers. Recreationists wishing to access the Sacramento Bypass and the Tule Canal, including fisherman, bicyclists, hikers, and bird-watching enthusiasts, also use these roadways. Motorists, residents, and recreationists in this area have expansive views of the agricultural land within the Lower Elkhorn Basin, which is covered with row crops such as tomatoes, sunflowers, and safflowers. The topography in this area is level, with the exception of the elevated levee along the Tule Canal and the Yolo Bypass to the west. The angular lines of green and brown row crops dominate the viewshed, along with the angular lines formed by the tan-colored levee embankments to the west and south and the irrigation canal embankment to the northeast (see KOP 5). Traveling north on County Road 124, the first complex of two small farm residences and associated agricultural equipment storage on the west side of County Road 124 would be removed as part of the project. However, the other houses to the east have views similar to that illustrated in KOP 5.

KOP 5: Looking north from the southern end of County Road 124. Safflower crops are visible in the foreground, the proposed Yolo Bypass East Levee setback alignment is in the middleground, and trees along the upper agricultural drainage are visible in the background. (GEI Consultants, Inc. 2016.)

Farther to the north on County Road 124, approximately midway between I-80 and I-5, the proposed Yolo Bypass East Levee setback (under Alternatives 4 and 5) would intersect the corner where the upper agricultural drainage canal meets the embankment of Tule Canal and the existing Yolo Bypass East Levee. Recreationists along the Tule Canal, as well as local residents and farm workers, have expansive views to the south of agricultural fields planted in row crops (green or brown depending on the crop and the season) and the City of Sacramento skyline in the background (see KOP 6). The Tule Canal itself is approximately 175 feet wide, with a variety of green shrubs and trees lining both the east and west banks. Water flows in the Tule Canal, in a southerly direction, year-round. Recreationists along the canal also have expansive views to the west, where the Coast Ranges are visible in the background (see KOP 7).

KOP 6: Looking south from the intersection of County Road 124/Tule Canal/upper agricultural drainage to the Sacramento River. An unpaved farm road and perennial grasses are visible in the foreground; row crops (tomatoes), the proposed Yolo Bypass East Levee setback alignment, and trees at the back of the Katchituli Oxbow Restoration Mitigation Site are in the middleground; the City of Sacramento skyline is visible in the background. (GEI Consultants, Inc. 2016.)

KOP 7: Looking west from the intersection of County Road 124 and the Tule Canal. Water and riparian vegetation associated with the Tule Canal are visible in the foreground, the Yolo Bypass is visible in the middleground, and the Coast Ranges are visible in the background. (GEI Consultants, Inc. 2016.)

The upper agricultural drainage to the Sacramento River travels in a straight line, with irrigation tail water flowing through the drainage canal from southwest to northeast. The north and south sides of the drainage are lined with tall trees and other green riparian vegetation (see KOP 8). Elevated earthen levees are present on both the north and south sides of this drainage.

KOP 8: Looking northeast from County Road 124/Tule Canal intersection. Water in the upper agricultural drainage to the Sacramento River and associated riparian vegetation are visible in the foreground and middleground. Trees along Old River Road are visible in the background. (GEI Consultants, Inc. 2016.)

North of the upper agricultural drainage, on County Road 124, the viewshed is similar to that described previously, consisting of level topography dominated by green row crops. The Tule Canal/Yolo Bypass East Levee embankment is visible in the background (see KOP 9). There are three houses in this area that are located in proximity to the proposed Yolo Bypass East Levee setback (under Alternatives 2 and 3). These houses are immediately north of the upper agricultural drainage, along County Road 124. The house nearest to the Tule Canal/existing Yolo Bypass East Levee would be removed under DWR's Alternatives 2 and 3. However, the proposed Yolo Bypass East Levee setback would be constructed immediately adjacent to the home shown in KOP 9.

In addition, the proposed Yolo Bypass East Levee setback would be constructed approximately 0.35 mile west of the home located just past the intersection of County Roads 124 and 122 (under Alternatives 2 and 3). The existing view from this residence (which is associated with the Elkhorn Volunteer Fire Protection District) looking west towards the proposed Yolo Bypass East Levee setback alignment is shown in KOP 10. All three residences along County Road 124 have expansive views of agricultural fields planted in row crops, and the linear alignment of the elevated Tule Canal/Yolo Bypass East Levee in the background to the west. Looking south, these residences have views of the riparian vegetation associated with the upper agricultural drainage to the Sacramento River (see KOP 8).

KOP 9: Looking northeast from County Road 124, on the north side of the upper agricultural drainage to the Sacramento River. The proposed Yolo Bypass East Levee setback alignment and the house to be retained adjacent to the proposed setback levee are visible in the foreground. Row crops are visible in the middleground. The Tule Canal/Yolo Bypass East Levee embankment is visible in the background. (GEI Consultants, Inc. 2016.)

KOP 10: Looking west from the residence at 19396 County Road 124, just east of County Road 122. Tomato crops and the proposed Yolo Bypass East Levee setback alignment are in the foreground, the Tule Canal/Yolo Bypass East Levee embankment and associated riparian vegetation are visible in the middleground, and the Coast Ranges are visible in the background. (GEI Consultants, Inc. 2016.)

The northwestern end of the proposed Yolo Bypass East Levee setback (under Alternatives 2 and 3) would terminate just before the Tule Canal crosses underneath I-5. The viewshed in this area consists of tall green sunflower plants, the tan-colored elevated Tule Canal/Yolo Bypass East Levee, and the elevated I-5 Bridge with associated vehicles (see KOP 11). I-5 crosses over the northern end of the Lower Elkhorn Basin and the Sacramento River on an elevated bridge in an east-west direction, affording motorists unlimited views of the river and the rural agricultural land within the Lower Elkhorn Basin and the Yolo Bypass.

KOP 11: Looking northwest from the western end of County Road 118. Sunflower crops and the northern end of the proposed Yolo Bypass East Levee setback alignment are in the foreground, the Tule Canal/Yolo Bypass East Levee embankment and I-5 are visible in the middleground, and trees associated with the Tule Canal are visible in the background. (GEI Consultants, Inc. 2016.)

Recreationists and motorists traveling along Old River Road on the south side of I-5, as well as passengers on the Sierra Northern Excursion Train, have intermittent views of the project site to the west (see KOP 12). The viewshed in this area is dominated by the angular nature of green row crops in the foreground, row crops and residential housing in the middleground, and the elevated levee along the Tule Canal/Yolo Bypass East Levee in the background.

Views of the project site, including the borrow area on the south side of the upper drainage canal, from the 55-acre Elkhorn Regional Park are blocked by the intervening topography and vegetation, including the mature shade trees on the west side of the park and along the east and west sides of Old River Road.

Views from boats on the Sacramento River consist of water, residences and associated boat docks, and riparian vegetation that can form a dense wall of multi-layered vegetation in some areas, oftentimes obscuring the levees. In many areas, the thin ribbon of large cottonwood, sycamore, and valley oak on or adjacent to the levees provides the only natural vegetation visible in otherwise urban or open agricultural areas. In other areas, the generally bare elevated levees with dry perennial grasses dominate the view (see KOP 13). The river and associated riparian vegetation provide a sense of isolation and welcome removal from nearby urban areas.

KOP 12: Looking west from Old River Road and the Sierra Northern Railway railroad tracks south of I-5. Row crops and power lines are visible in the foreground, a rural residence and associated landscape trees are visible in the middleground, and the proposed Yolo Bypass East Levee setback alignment and the Tule Canal/Yolo Bypass East Levee embankment with associated riparian vegetation are in the background. (GEI Consultants, Inc. 2016.)

KOP 13: Looking southwest from the Elkhorn Boat Launch Facility on Garden Highway, below the I-5 overcrossing. The Sacramento River and boaters on the river are visible in the foreground. The elevated west bank river levee, associated riparian vegetation, and the Sierra Northern Railway railroad tracks are visible in the middleground. Mature shade trees along Old River Road are visible in the background. (GEI Consultants, Inc. 2016.)

Viewer Sensitivity

Viewer sensitivity is considered high throughout the project site and vicinity. Scenic views of the Sacramento River and associated riparian vegetation, the Sacramento and Yolo Bypass Wildlife Areas and associated water and riparian vegetation, rural agricultural land, the Coast Ranges to the west, and the City of Sacramento skyline to the southeast, abound in all directions. Numerous private residences are located on both sides of the Sacramento River, and several are located within the Lower Elkhorn Basin, which have been purposefully built in their existing locations so that residents can enjoy the scenic views. Thus, viewer sensitivity is high where new setback levees would be placed that could affect those views. The study area is also frequented by recreationists engaged in boating, fishing, bicycling, bird watching, and hiking. In general, as a viewer group, people engaged in recreational activities generally have a heightened awareness of their surroundings, are familiar with the scenic resources in the area, and are generally seeking an experience in a natural setting. Finally, Old River Road and the Sierra Northern Excursion Train provide scenic views of the aforementioned natural resources, and therefore motorists and recreationists traveling along this roadway and railway have a higher sensitivity to visual change. Given the above considerations, viewer sensitivity is considered high for all groups viewing the various project components.

Visual Quality

Vividness

Views of the project site generally have a moderate vividness, because the linear and uniform nature of the row crops throughout the Lower Elkhorn Basin tend to blend with the linear and uniform nature of the roads, the levees associated with the Tule Canal/East Yolo Bypass, and the two agricultural drainages to the Sacramento River (see KOPs 4 and 9). The coarseness and colors of the soil and row crops are also similar to the coarse appearance and colors of the levees. The row crops, levees, and roads tend to blend in with the sky along the horizon, and therefore combine to form a moderate level of distinctive visual patterns. The one exception to this generalization is in the area on the south side of the upper agricultural drainage to the Sacramento River (approximately midway between I-5 and I-80), where memorable views of the City of Sacramento skyline stand out along the horizon in the viewshed to the south (see KOP 6). The viewshed in this area has a high degree of vividness.

Intactness

Views of the project site have a high degree of intactness. Although scattered areas of fencing, overhead electrical transmission lines, roadways, and a few agricultural buildings and residences encroach upon the landscape of the project site, they are limited in nature. These types of structures often exist within agricultural land and do not act as a substantial distraction to the landscape as a whole, which appears as a vast area of row crops and agricultural drainages. There is a high degree of integrity of visual order in the natural and human-built landscape.

Unity

The project site provides a viewer with high levels of visual coherence. This area is exemplary of California's Central Valley agricultural land, including the flat alluvial plain and row crops, which contrasts with urban development in the nearby Cities of Sacramento, West Sacramento, and Woodland. Although there are several encroachments within the area (as discussed above), they are few in number and do not detract from the overall sense of unity; furthermore, the area is essentially surrounded by open space consisting of the Sacramento River, the Sacramento Bypass Wildlife Area, and the Yolo Bypass, allowing for scenery with high levels of visual coherence and compositional harmony.

Considered together, the project site's moderate to high degree of vividness, high degree of intactness, and high degree of unity combine to result in a high degree of visual quality throughout the project site.

4.2.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to aesthetics apply to the alternatives under consideration.

State

No State plans, policies, regulations, or laws related to aesthetics apply to the alternatives under consideration.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to aesthetics are relevant to the analysis of the alternatives under consideration as described below.

- Yolo County 2030 General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding aesthetics are relevant to project design, construction, and/or the impact analysis of the project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

- Sacramento International Airport Land Use Compatibility Plan (Sacramento Area Council of Governments [SACOG] 2013) – Relevant to project design and the impact analysis.

4.2.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

Identification of the visual resources and aesthetics effects of the alternatives under consideration were based on the three steps listed below.

1. An objective inventory of the visual features or visual resources that comprise the landscape.

2. An assessment of the character and quality of the visual resources in the context of the overall character of the regional visual landscape.

3. A determination of the importance to viewers, or sensitivity of the viewers, to the identified visual resources in the landscape.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. No comments specific to aesthetics were received.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to aesthetics if they would do any of the following:

- substantially damage scenic resources, including but not limited to trees, rock outcrops, and historic buildings, within a State scenic highway;
- have a substantial adverse effect on a scenic vista;
- substantially degrade the existing visual character or quality of the site and its surroundings; or
- create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

Impact Analysis

Table 4.2-1 provides a summary of aesthetic impacts and mitigation measures for all alternatives under consideration.

Table 4.2-1. Summary of Impacts and Mitigation Measures—Aesthetics

Impact	Alternative	Level of Impact Significance Before Mitigation	Mitigation Measure	Level of Impact Significance After Mitigation
VIS-1: Damage to Scenic Resources within State- or County-designated Scenic Highways	Alternative 1: No Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
VIS-2: Changes in Scenic Vistas and Existing Visual Character	Alternative 1: No Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	S	VIS-2a: Screen Construction Sites, Staging Areas, and Borrow Sites within 300 Feet of Residences VIS-2b: Incorporate Visual Screening for Permanent Pipeline Control Structure	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
VIS-3: Introduction of New Sources of Light and Glare	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	VIS-3a: Coordinate Nighttime Lighting with Sacramento International Airport Operations and Restrict Night Lighting within and Near Airport Runway Approaches and Near CHP Academy Airport VIS-3b: Provide Shielding from Nighttime Construction Activities or Offer to Temporarily Relocate Affected Residents	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact VIS-1: Damage to Scenic Resources within State- or County-designated Scenic Highways.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

Scenic resources would remain relatively unchanged with continued farming occurring in most of the Lower Elkhorn Basin. Over time, there could be less vegetation on the levees due to implementation of Engineering Technical Letter 1110-2-583 or other agreements. Increasing vegetation and habitat within the Yolo Bypass at or near the Tule Canal at the project site would be difficult because it would reduce conveyance capacity in the absence of the Yolo Bypass East Levee setback. Overall, damages to scenic resources from these minor changes in the landscape would be **less than significant**.

Alternatives 2 and 3: DWR's Preferred Alternative (7-Mile Setback Partial Degrade), 7-Mile Expanded Setback Full Degrade

Old River Road, from Yolo County Road 107 (near the Fremont Weir) south to West Sacramento (at the southern end of the Sacramento Weir), is a Yolo County-designated scenic highway (Yolo County 2009). Old River Road parallels the west side of the Sacramento River. Reconstruction of portions of County Road 124, temporary borrow activities, and construction associated with rerouting the Sacramento International Airport jet fuel pipeline along the Reclamation District 537 Cross Levee adjacent to the lower south cross-canal, the riparian habitat corridor along the east side of the Tule Canal, and riparian plantings between the existing Yolo Bypass East Levee and the proposed Yolo Bypass East Levee setback would not be visible from Old River Road because of the intervening vegetation and topography. Borrow activities from the Reclamation District 785 Cross Levee at the eastern end of the north cross-canal would not be visible from Old River Road because of the existing heavy vegetation at the extreme eastern end of the drainage canal, on both sides of the Sierra Northern Railway railroad tracks, and on the west side of Old River Road. Furthermore, the railroad tracks are elevated, and therefore provide a topographic visual barrier to the west, looking west from Old River Road near the north cross-canal. Finally, none of the project components would be visible from Garden Highway, which is a Sacramento County-designated scenic highway on the east side of the Sacramento River, because of the intervening structures, vegetation, and topography. Therefore, these project components under Alternatives 2 and 3 would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

Construction of the northern end of the proposed Yolo Bypass East Levee setback and the associated new drainage canal on the east side of the setback levee would be visible in a few locations from Old River Road near I-5, where there are gaps in the trees on the west side of the road (see KOP 12). Construction activities associated with degrading the existing Sacramento Bypass North Levee would be visible to motorists traveling in both directions on Old River Road where it crosses the Sacramento Weir. In addition, construction of the southeastern end of the Sacramento Bypass North Levee setback, as well as reconstruction of the southeastern end of County Road 126, would be visible to northbound motorists on Old River Road from the Sacramento Weir (see KOP 1). Construction activities associated with installation of riprap for erosion control along the south Sacramento Bypass Training Levee would be visible (in background views) to motorists traveling southbound along Old River Road from the Sacramento Weir.

As a County-designated scenic highway, Old River Road is traveled by both residents and recreationists, highly-sensitive viewer groups. The existing visual quality along Old River Road is high. However, the project-related construction activities in the locations discussed above would be short-term and temporary in nature. Furthermore, most of the construction activities at the locations discussed above would take place approximately 0.5 mile west of Old River Road, and therefore would visually appear in middleground or background views.

During the project's operational phase, the northern end of the Yolo Bypass East Levee setback, the southeastern portion of the Sacramento Bypass North Levee setback, relocated County Road 126, and the riprap on the south Sacramento Bypass Training Levee would be visible to motorists on Old River Road from the locations specified above. From Old River Road south of I-5, the existing Yolo Bypass East Levee is already present in background views as a brown elevated earthen berm (see KOP 12). During the project's operational phase, the new Yolo Bypass East Levee setback would appear visually similar; however, it would appear in middleground views from Old River Road rather than in background views as it does now. Because of its new location closer to motorists, it would appear visually more prominent in the landscape. However, the study area already contains several levees for flood control that are visually similar in nature. In addition, the Yolo Bypass East Levee setback would be located approximately 0.5 mile west of motorists on this portion of Old River Road, and thus the primary views would continue to consist of agricultural land to the west, and mature shade trees on both sides of the road.

From Old River Road at the Sacramento Weir, the completed Sacramento Bypass North Levee setback would also appear visually similar to the existing Sacramento Bypass North Levee. Again the primary change would be in location; since the levee would be set back farther north, it would recede into middleground views rather than the primary foreground view as it is now. Furthermore, since the area between the existing Sacramento Bypass North Levee and the proposed Sacramento Bypass North Levee setback would either continue to be in agricultural use and/or would receive riparian plantings, it would appear visually similar to the existing land uses. The southeastern end of reconstructed County Road 126 would extend to the north, rather than to the west as it does now. Visually, the road would appear the same: two lanes of asphalt paving with striping in the middle. Finally, riprap installed for erosion protection along the south Sacramento Bypass Training Levee would be located approximately 1.2 miles west of Old River Road; therefore, it would only be visible in the far distance as part of the background view. In addition, the Sacramento Bypass Wildlife Area contains tall mature shade trees north of the Sacramento Bypass Training Levee, which would block nearly all of the views of the riprap from Old River Road. The small area of riprap that would be visible would be darker in color and would be visually less intrusive as compared to the existing concrete waterside of the south Sacramento Bypass, which is very light in color and also causes daytime glare. Therefore, these project components under Alternatives 2 and 3 would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade, 5-Mile Setback Full Degrade

Alternatives 4 and 5 would entail the same types of construction activities as Alternative 2, but the Yolo Bypass East Levee setback would be shorter and would be located farther east, and the Reclamation District 785 Cross Levee would not be used for borrow activities. Because the proposed setback levee would be shorter, construction and operation of this setback levee and the associated drainage canal would not be visible from the northern end of Old River Road near I-5. Although the southern portion of the proposed Yolo Bypass East Levee setback would be constructed farther to the east, the proposed setback levee and associated drainage canal would still not be visible from Old River Road due to the intervening vegetation and topography. Reconstruction of portions of County Road 124, borrow activities along the north cross-canal, the riparian habitat corridor along the east side of the Tule Canal, and riparian plantings between the existing Yolo Bypass East Levee and the proposed Yolo Bypass East Levee setback would not be visible from Old River Road because of the intervening vegetation and topography. Furthermore, none of the project components would be visible from Garden Highway, which is a Sacramento County-designated scenic highway on the east side of the Sacramento River, because of the intervening structures, vegetation, and topography. Therefore, these project components under Alternatives 4 and 5 would have **no impact.**

Mitigation Measure: No compensatory mitigation is required.

The Sacramento Bypass North Levee setback and levee degrade, reconstruction of County Road 126, installation of riprap along the south Sacramento Bypass Training Levee, and horizontal directional drilling associated with rerouting the Sacramento International Airport jet fuel pipeline would be implemented in a visually similar manner under Alternative 4 as compared to Alternative 2. Therefore, for the same reasons discussed above under Alternative 2, these project components under Alternatives 4 and 5 would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Impact VIS-2: Changes in Scenic Vistas and Existing Visual Character.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

Scenic vistas and visual character would remain relatively unchanged with continued farming occurring in most of the Lower Elkhorn Basin. Over time, there could be less vegetation on the levees due to implementation of Engineering Technical Letter 1110-2-583 or other agreements. Increasing vegetation and habitat within the Yolo Bypass at or near the Tule Canal at the project site would be difficult because it would reduce conveyance capacity since the Yolo Bypass East Levee would not be set back. Overall, changes to scenic vistas and existing visual character from these minor changes in the landscape would be **less than significant**.

Alternatives 2 and 3: DWR's Preferred Alternative (7-Mile Setback Partial Degrade), 7-Mile Expanded Setback Full Degrade

At the conclusion of project-related construction under Alternatives 2 and 3, the Yolo Bypass East Levee setback and Sacramento Bypass North Levee setback would appear visually similar to the existing levees. Most of the existing levees would be degraded. The new setback levees would be 5 feet higher, nearly the same width at the base, and twice as wide along the levee crown. The levee crowns would be graded and aggregate base or asphalt paving would be placed on the levee crown patrol road similar to the existing levees. Following construction, most of the temporary earthen access ramps would be removed and levee slopes would be hydroseeded with native vegetation. Some of the levee access ramps created for the project may remain as permanent access. The new setback levees would be similar in form, texture, color, and overall visual appearance as compared to the existing levees. The new drainage canal on the east side of the Yolo Bypass East Levee setback would be visually similar to and consistent with the existing drainage canal that is already present on the east side of the existing Yolo Bypass East Levee. The Sacramento River Train dinner excursion trips would occur in the evening, after the project-related work has ended each day.

Following the completion of each of the two construction seasons, borrow sites would be hydroseeded with native grasses to reduce erosion during winter and to encourage their continued use as upland habitat. At the completion of borrow material excavation, excavation sites for borrow within the setback area would be graded to depths appropriate for future agricultural use, with associated drainage and irrigation.

In the setback area, agricultural activities would continue (although crop types would likely change), along with wildlife habitat plantings along the east side of the Tule Canal, along the edge of the newly constructed Sacramento Bypass North Levee setback, and/or within the existing Sacramento Bypass (within the footprint of the existing Sacramento Bypass North Levee). Thus, at the completion of the project, the setback area would appear visually similar to existing conditions, and would be visually similar to the surrounding land uses which also consist of agricultural land and wildlife habitat.

Construction equipment and personnel associated with horizontal directional drilling necessary to relocate the Sacramento International Airport fuel pipeline underneath the Sacramento Bypass Wildlife Area would not be visible to recreationists in the wildlife area because views of the work areas would be blocked by the elevated height of the existing levees. Because the pipeline would continue to be located underground (as it is now), pipeline operation would also not be visible to recreationists in the wildlife area. Although construction equipment and personnel may be visible to personnel within the CHP Academy Airport, these personnel are not considered to be a sensitive viewer group.

Because these project components would be visually similar to and consistent with the existing visual character of the project site and the Lower Elkhorn Basin as a whole at the completion of construction activities, operation of these project components under Alternatives 2 and 3 would have a **less-than-significant** impact.

In addition to hydroseeding, portions of the watersides of the setback levees may be armored with riprap to provide erosion protection. However, this would not represent a visual change in terms of views of the waterside of the existing levees because they currently contain riprap. In some areas, the existing riprap is covered by vegetation (i.e., weeds); however, this vegetation is periodically removed during O&M activities, at which point the riprap is visible. The waterside of the northern portion of the Yolo Bypass East Levee setback under Alternative 2 would be visible to eastbound motorists traveling on the elevated I-5 Bridge, and from agricultural land in the setback area. It would also be visible to recreationists along the Tule Canal. The waterside of the Sacramento Bypass North Levee setback would be visible from the agricultural land in the setback area, and from within the Sacramento Bypass Wildlife Area (at a distance of approximately 1,700 feet to the north). The riprap installed on the waterside of the south Sacramento Bypass Training Levee would be immediately adjacent to the Sacramento Bypass Wildlife Area, and as such would become part of the foreground views from this area. This would represent a change in the color and texture from the existing levee, which is not armored, and visually would present a rougher and darker aspect. However, other nearby portions of the Sacramento Bypass South Levee are covered with riprap or concrete, and the additional riprap installed as part of this project would not represent a substantial change in this view. Views of large areas of boulder-sized angular rocks for erosion control would be consistent with the existing levees throughout the project site and vicinity and, therefore, would not have an adverse effect on scenic vistas in the areas where the riprap is placed. This project component under Alternatives 2 and 3 would have a long-term permanent **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce these impacts.

Three of the four existing residences along the Yolo Bypass East Levee setback alignment would be demolished under Alternatives 2 and 3. However, the northern portion of the Yolo Bypass East Levee setback would be constructed immediately adjacent to the north, west, and south sides of the existing residence located at 19946 County Road 124, just north of the upper agricultural drainage canal. The existing Yolo Bypass East Levee is located approximately 1,200 feet west of this residence, thus allowing for scenic vistas of rural agricultural land in all directions, and the Coast Ranges to the west, from this residence (see KOPs 9 and 10). After the Yolo Bypass East Levee setback is constructed, the scenic views to the west from the existing residence located at 19946 County Road 124 would be blocked and would be replaced with a 25-foot-high earthen levee located immediately adjacent to the residence. In addition, this residence would have views of construction equipment including excavators, bulldozers, loaders, and haul trucks immediately adjacent to the residence during levee construction, and may have views of the construction staging area (along with associated personnel and equipment), because there are no intervening structures or vegetation to block the views, the land is flat, and the exact locations of the staging areas are not known at this time.

Under Alternative 3, because the southern portion of the new Yolo Bypass East Levee setback and associated drainage canal would be setback farther east, it would be constructed approximately 100 feet west and south of the existing residence located at 21788 County Road 124. The existing levee is currently located approximately 0.75 mile west of this residence, thus allowing for scenic vistas of rural agricultural land in all directions, and the Coast Ranges to the west, from this residence (see KOPs 5 and 6). After the Yolo Bypass East Levee setback is constructed under Alternative 3, the scenic views to the west and southwest from the existing residence located at 21788 County Road 124 would be blocked and would be replaced with a 25-foot-high earthen levee located approximately 100 feet from the residence. In addition, this residence would have views of construction equipment including excavators, bulldozers, front end loaders, scrapers, cranes, fuel trucks, water trucks, and haul trucks approximately 100 feet from the residence during levee construction and may have views of the construction staging area along with associated personnel and equipment, because there are no intervening structures or vegetation to block the views, the land is flat, and the exact locations of the staging areas are not known at this time. In addition, other residents also located in the Lower Elkhorn Basin, as well as recreationists on Old River Road and within the Sacramento Bypass Wildlife Area, would have views of construction equipment and personnel during levee construction. The viewshed of residents and recreationists in close proximity to construction areas, where there is no intervening screening provided by vegetation or topography, would be degraded. A 30- by 15-foot concrete pad with aboveground piping and control boxes would be located at the northern end of the work area associated with relocating the Sacramento International Airport jet fuel pipeline along the south cross-canal. The piping and control structures would extend 8–10 feet above the concrete pad, and the perimeter would be enclosed by a chain link fence. The piping, control structures, and fencing would be clearly visible to the residence located across the street on the adjacent private road, and would be inconsistent with the existing surrounding agricultural land. Therefore, these project components under both Alternatives 2 and 3 would have short-term temporary and long-term permanent **significant** impacts.

Although borrow activities from the Reclamation District 785 Cross Levee along the upper agricultural drainage canal could occur approximately 200 feet south of residences at the eastern end of County Road 124, views of the borrow activities from these residences would generally be blocked by tall, mature trees and lower growing shrubs on both sides of the canal. However, borrow activities from the Reclamation District 537 Cross Levee and construction activities associated with relocating the Sacramento International Airport jet fuel pipeline along the lower agricultural drainage canal would occur immediately adjacent to an existing residence on the west side of the canal. This residence would have views of construction equipment including an excavator, bulldozer, loader, and haul trucks immediately adjacent to the residence while borrow and pipeline relocation activities were occurring, because there is no vegetation to block the views and borrow and pipeline relocation activities would occur on the landside of the drainage levee. At the completion of borrow and pipeline relocation activities, these construction sites would be hydroseeded with native grasses. Therefore, these project components under Alternatives 2 and 3 would have a short-term temporary **significant** impact. Mitigation Measures VIS-2a and VIS-2b, described below, have been identified to address this impact.

Mitigation Measure VIS-2a: Screen Construction Sites, Staging Areas, and Borrow Sites within 300 Feet of Residences.

DWR will locate staging and material storage areas as far away from residences as feasible. Where construction areas, staging and material storage areas, and borrow sites are 300 feet or closer to the residence located at 19946 County Road 124, the residence on the northwest side of the lower drainage canal, and the residence located at 21788 County Road 124, DWR will require its construction contractor to erect a temporary 6-foot-tall screened fence at the edge of the construction/borrow site or staging area, between the work area and the residence.

Timing:	Prior to and during construction activities.
Responsibility:	California Department of Water Resources.

Mitigation Measure VIS-2b: Incorporate Visual Screening for Permanent Pipeline Control Structure.

DWR will incorporate visual screening around the perimeter of the Sacramento International Airport Pipeline control structure on the south cross-canal to block views of the structure from the adjacent residence. Such visual screening may include planting shrubs and low-growing trees around the perimeter, as well as the use of either tan or green plastic slats in the chain link fencing around the perimeter.

Timing:	Upon completion of project construction.
Responsibility:	California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure VIS-2a would reduce the significant short-term temporary impacts associated with changes in scenic vistas and alteration of visual character during construction activities under Alternatives 2 and 3 to a **less-than-significant** level because construction, staging, and borrow areas that are 300 feet or closer to residences will be screened.

Implementation of Mitigation Measures VIS-2a and VIS-2b would reduce the significant short- and long-term impacts associated with changes in scenic vistas and alteration of visual character during operation of the Sacramento International Airport jet fuel pipeline control structure under Alternatives 2 and 3 to a **less-than-significant** level by installing a temporary screened fence and permanent visual screening.

No feasible mitigation is available to reduce the long-term permanent significant impacts from loss of scenic vistas and the change in visual character from construction of the Yolo Bypass East Levee setback adjacent to the residence located at 19946 County Road 124, and in close proximity to the residence at 21788 County Road 124. Therefore, these long-term permanent impacts would be **significant and unavoidable**.

Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade, 5-Mile Setback Full Degrade

Alternatives 4 and 5 would entail construction of the same types of facilities as Alternative 2, but the Yolo Bypass East Levee setback would be shorter, and under Alternative 4 would be located farther east, and borrow would not be obtained from Reclamation District 785 Cross Levee. Operation of the setback levees, new drainage canal, riparian plantings, riprap or similar materials on the new levees, and relocated County roads would occur in a visually similar fashion as described above under Alternative 2. Therefore, for the same reasons discussed above under Alternative 2, these project components would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce these impacts.

Because the proposed Yolo Bypass East Levee setback would be shorter as compared to Alternative 2, the impact from constructing and operating the setback levee immediately adjacent to the existing residence located at 19946 County Road 124 would be avoided. However, under Alternative 4, the new Yolo Bypass East Levee would be set back farther east as compared to Alternative 2; therefore, the Yolo Bypass East Levee setback would be constructed approximately 100 feet west and southwest of the residence located at 21788 County Road 124 thereby blocking the existing scenic views to the west and southwest from this residence. Furthermore, the same aboveground Sacramento International Airport jet fuel pipeline control structure would be located adjacent to a residence along the south cross-canal. Borrow activities from the Reclamation District 537 Cross Levee and construction associated with relocating the Sacramento International Airport jet fuel pipeline along the lower irrigation drainage canal would still occur immediately adjacent to the existing residence on the east side, and riprap would still be installed along the waterside of the setback levees and the south Sacramento Bypass Training Levee. Residents would also have short-term temporary views of construction activities and may have views of construction equipment and personnel at staging areas, at a distance of approximately 100 feet. In addition, other residents also located in the Lower Elkhorn Basin, as well as recreationists on Old River Road and within the Sacramento Bypass Wildlife Area, would also have views of construction equipment and personnel during levee construction. The viewshed of residents and recreationists in close proximity to construction areas, where there is no intervening screening provided by vegetation or topography, would be degraded. Therefore, for the same reasons discussed above under Alternative 2, these project components would have short-term temporary **significant** impacts. Mitigation Measures VIS-2a and VIS-2b, described below, have been identified to address this impact.

Mitigation Measure VIS-2a: Screen Construction Sites, Staging Areas, and Borrow Sites within 300 Feet of Residences.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure VIS-2b: Incorporate Visual Screening for Permanent Pipeline Control Structure.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measure VIS-2a would reduce the significant short-term temporary impacts associated with changes in scenic vistas and alteration of visual character during construction activities under Alternatives 4 and 5 to a **less-than-significant** level because construction, staging, and borrow areas that are 300 feet or closer to residences will be screened.

Implementation of Mitigation Measure VIS-2b would reduce the significant long-term impacts associated with changes in scenic vistas and alteration of visual character during operation of the Sacramento International Airport jet fuel pipeline control structure under Alternatives 4 and 5 to a **less-than-significant** level by installing permanent visual screening.

No feasible mitigation is available to reduce the long-term permanent significant impacts from loss of scenic vistas and changes in visual character from construction of the Yolo Bypass East Levee setback in close proximity to the residence at 21788 County Road 124 (under Alternative 4). Therefore, these long-term permanent impacts would be **significant and unavoidable**.

Impact VIS-3: Introduction of New Sources of Light and Glare.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No

Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

There would be no introduction of new sources of light and glare. Existing levels of light and glare would remain unchanged with continued farming occurring in most of the Lower Elkhorn Basin. Overall, changes in light and glare would not occur and there would be **no impact**.

Alternatives 2 and 3: DWR's Preferred Alternative (7-Mile Setback Partial Degrade), 7-Mile Expanded Setback Full Degrade

No new permanent sources of light or glare would be created under Alternative 2 or 3. Therefore, project construction and O&M would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

The Sacramento River Train dinner excursion trips would occur in the evening, after the project-related construction work has ended each day. Locations where 24-hour construction of slurry cutoff walls might occur, and therefore would be taking place during the time when the dinner trains would be running, would be approximately 0.5–1.2 miles west of the train route, and therefore would only be visible in background views.

In general, construction activities are not expected to be conducted in the evening on a daily basis. However, to provide irrigation water, groundwater wells may need to be drilled in the vicinity of the proposed riparian plantings. Drilling of well holes would take 72 hours or more and may require operation of the drill rig 24 hours per day over a 3-day period, in which case security and construction night lighting would be used. However, as stated in Chapter 3, "Alternatives," wells would be located approximately 1,000–1,500 feet from sensitive receptors to minimize the disturbance from 24/7 construction. Furthermore, installation of riparian plantings would not take place until after the new setback levees have been constructed. Therefore, views of nighttime lighting associated with well drilling for the riparian plantings would be blocked from residences in the vicinity by the intervening 25-foot-tall setback levees. Therefore, this project component under Alternatives 2 and 3 would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Installation of the slurry cutoff walls may require construction 24 hours per day, 7 days per week, in which case security and construction night lighting would be used. Because the exact locations where slurry cutoff walls would be installed have not yet been determined, in order to be conservative, this analysis assumes that 24/7 construction of the cutoff walls could occur at any location along the proposed Yolo Bypass East Levee setback and the Sacramento Bypass North Levee setback.

The northern portion of the project site is within Sacramento International Airport's Referral Area 1, and the remainder of the project site is within Referral Area 2 (Sacramento Area Council of Governments

[SACOG] 2013: Map 1). An Airport Referral Area is an area in which current or future airport-related noise, overflight, safety, or airspace protection factors may affect land uses or necessitate restrictions on those uses, and therefore certain land use proposals are to be referred to the Airport Land Use Commission for review. Referral Area 1 encompasses locations where noise and/or safety represent compatibility concerns. Referral Area 2 includes locations where airspace protection (other than wildlife hazards) and/or overflight are compatibility concerns, but not noise or safety. Projects within either Referral Area 1 or Referral Area 2 that include lighting which could be mistaken for airport lighting and/or could cause glare in the eyes of pilots of aircraft using the airport, require review by the Airport Land Use Commission. The central and southern portions of the project site lie within the approach surfaces for all of the runways at Sacramento International Airport (SACOG 2013: Map 4b). In addition, nighttime lighting could also be used within 0.5–2 miles of the CHP Academy Airport, which is located immediately south of the Sacramento Bypass Wildlife Area. Because nighttime lighting would be required, Alternative 2 and 3 would result in lighting which could be mistaken for airport lighting, and/or could cause glare in the eyes of pilots or aircraft using these airports.

In addition, nighttime lighting for construction of slurry cutoff walls along the Yolo Bypass East Levee setback could be located immediately adjacent to the residence located at 19946 County Road 124. There are no structures or tall vegetation that would block views of the nighttime construction lighting, and the land is flat. Therefore, construction of the slurry cutoff wall would result in nighttime lighting and glare, and could result in sleep disturbance to the occupants at 19946 County Road 124 under both Alternatives 2 and 3. Under Alternative 3, similar nighttime lighting could also be used within 100 feet of the residence located at 21788 County Road 124 in the southern portion of the project site.

Furthermore, nighttime lighting associated with construction of slurry cutoff walls adjacent to I-5 at the north end of the proposed Yolo Bypass East Levee setback, and adjacent to Old River Road at the southeastern end of the proposed north Sacramento Bypass setback levee, would result in glare effects for motorists on these roadways.

Finally, nighttime lighting associated with construction of slurry cutoff walls along the length of the proposed Yolo Bypass East Levee setback and the Sacramento Bypass North Levee setback would create a new source of nighttime light and glare that would adversely affect views of the night sky for the duration of the two construction seasons.

For all of the reasons listed above, these project components would have **significant** impacts. Mitigation Measures VIS-3a and VIS-3b, described below, have been identified to address these impacts.

Mitigation Measure VIS-3a: Coordinate Nighttime Lighting with Sacramento International Airport Operations and Restrict Night Lighting within and Near Airport Runway Approaches and Near CHP Academy Airport.

DWR will implement the following measures to reduce airport safety hazards associated with project-related nighttime lighting.

- All project-related nighttime lighting that would be located within Sacramento International Airport's runway approach zones, as well as all nighttime lighting that would be located within 2 miles of the CHP Academy Airport, will be shielded and directed downward to reduce interference with nighttime airport operations and aircraft flight paths.

- Sacramento County Airport System (SCAS) and the CHP Academy Airport will be notified at least 10 days prior the start of nighttime lighting operations within the Sacramento International Airport runway approach zones or within 2 miles of the CHP Academy Airport, and will coordinate with SCAS and the CHP Academy Airport during final project design to ensure that all appropriate safety precautions are incorporated into the construction plans.

- Prior to the start of nighttime construction activities that would be located within Sacramento International Airport runway approach zones, as well as all nighttime lighting that would be located within 2 miles of the CHP Academy Airport, DWR's construction contractor will hold a safety meeting for all nighttime construction personnel informing them of the necessity of ensuring that all lighting is shielded and directed downward at all times, along with other safety measures that may be required by SCAS or the CHP Academy Airport. The safety briefing will include emergency contact information for SCAS and the CHP Academy Airport. If nighttime lighting activities are necessary throughout the course of the construction season (i.e., April–October), then at least two safety meetings will be held by the construction contractor, at evenly spaced intervals over the course of the construction season.

Timing: Before and during construction activities.

Responsibility: California Department of Water Resources.

Mitigation Measure VIS-3b: Provide Shielding from Nighttime Construction Activities or Offer to Temporarily Relocate Affected Residents.

To reduce nighttime light and glare effects on residents and motorists, DWR will ensure that the following measures are implemented as defined below.

- All nighttime lighting will be shielded and directed downward.

- For Alternatives 2 and 3, solid screened temporary construction fencing at least 6 feet high will be provided along the boundary of the construction site where nighttime lighting would occur, between the construction site and the residence located at 19946 County Road 124. A minimum of 200 linear feet of shielded construction fencing will be provided. The shielded fencing will be proximate to the location of the lighting (e.g., if lighting is required on top of the levee, then the fencing will also be placed on top of the levee).

- For Alternatives 3 and 4, solid temporary screened construction fencing along the boundary of the construction site where nighttime lighting would occur, between the construction site and the residence located at 21788 County Road 124 will be provided. A minimum of 200 linear feet of shielded construction fencing will be provided. The shielded fencing will be proximate to the location of the lighting (e.g., if lighting is required on top of the levee, then the fencing will also be placed on top of the levee).

- In lieu of screened construction fencing, DWR may offer to temporarily relocate the residents at 19946 County Road 124 and 21788 County Road 124 to a hotel during the period when nighttime lighting would occur. The hotel will not be located more than 10 miles from the residences. Reimbursement of hotel accommodations will be limited to $100 per night, and will be limited to the duration of nighttime lighting activities within 300 feet of the residence.

Timing:	Prior to and during construction activities.
Responsibility:	California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measures VIS-3a and VIS-3b would reduce the significant impacts associated with creation of nighttime light and glare effects under Alternative and 3 to a **less-than-significant** level because all nighttime lighting would be shielded and directed downward, DWR will coordinate with SCAS and the CHP Academy Airport to provide notification and include safety measures during project design and construction, and an on-site safety meeting will be held prior to the start of nighttime construction. In addition, nighttime construction activities will either be screened from affected residences, or DWR will offer to temporarily relocate affected residents during nighttime operations.

Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade, 5-Mile Setback Full Degrade

No new permanent sources of light or glare would be created under Alternatives 4 or 5. Therefore, project construction and O&M would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

As with Alternative 2, wells drilled to supply irrigation water for riparian plantings under Alternatives 4 and 5 would be located approximately 1,000–1,500 feet from sensitive receptors to minimize the disturbance from 24/7 construction. Furthermore, installation of riparian plantings would not take place until after the new setback levees have been constructed. Therefore, views of nighttime lighting associated with well drilling for the riparian plantings would be blocked from residences in the vicinity by the intervening 25-foot-tall setback levees. Therefore, this project component would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Installation of the slurry cutoff walls may require construction 24 hours per day, 7 days per week, in which case security and construction night lighting would be used. Although Alternatives 4 and 5 would be shorter than Alternative 2, nighttime lighting for project-related construction of slurry cutoff walls would still occur in the Sacramento International Airport runway approach zones and within 2 miles of the CHP Academy Airport. Therefore, Alternatives 4 and 5 would result in nighttime lighting which could be mistaken for airport lighting, and/or could cause glare in the eyes of pilots or aircraft using these airports.

Alternatives 4 and 5 would entail the same types of construction activities as Alternative 2, but the Yolo Bypass East Levee setback would be shorter and would be located farther east, and borrow would not be obtained from the Reclamation District 785 Cross Levee along the north cross-canal. Because the proposed setback levee would be shorter as compared to Alternative 2, the impact from construction-related nighttime light and glare immediately adjacent to the existing residence located at 19946 County Road 124 would be avoided. However, under Alternative 4, the new Yolo Bypass East Levee setback would be set back farther east as compared to Alternative 2; therefore, under this alternative, nighttime lighting could be used within 100 feet of the residence located at 21788 County Road 124 in the southern portion of the project site. There are no structures or tall vegetation that would block views of the nighttime construction lighting, and the land is flat. Therefore, construction of slurry cutoff walls would result in nighttime lighting and glare, and could result in sleep disturbance to the occupants at this residence under Alternative 4.

For the same reasons described above under Alternative 2, nighttime lighting associated with construction of slurry cutoff walls adjacent to I-5 at the north end of the proposed Yolo Bypass East Levee setback, and adjacent to Old River Road at the southeastern end of the proposed Sacramento Bypass North Levee setback, would result in glare effects for motorists on these roadways under Alternatives 4 and 5.

Because the proposed Yolo Bypass East Levee setback would be shorter as compared to Alternative 2, a shorter period of construction would be required, and therefore the amount of time during which the construction-related nighttime light and glare would adversely affect views of the night sky would be reduced under Alternatives 4 and 5. However, skyglow effects from nighttime light and glare would still occur.

For all of the reasons listed above, these project components would have **significant** impacts. Mitigation Measures VIS-3a and VIS-3b, described below, have been identified to address these impacts.

Mitigation Measure VIS-3a: Coordinate Nighttime Lighting with Sacramento International Airport Operations and Restrict Night Lighting within and Near Airport Runway Approaches and Near CHP Academy Airport.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure VIS-3b: Provide Shielding from Nighttime Construction Activities or Offer to Temporarily Relocate Affected Residents.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measures VIS-3a and VIS-3b would reduce the significant impacts associated with creation of nighttime light and glare effects under Alternatives 4 and 5 to a **less-than-significant** level because all nighttime lighting will be shielded and directed downward, DWR will coordinate with SCAS and the CHP Academy Airport to provide notification and include safety measures during project design and construction, and an on-site safety meeting will be held prior to the start of nighttime construction. In addition, nighttime construction activities will either be screened from affected residences, or DWR will offer to temporarily relocate affected residents during nighttime operations.

Residual Significant Impacts

Impacts related to damage to scenic resources within State- or County-designated scenic highways (Impact VIS-1) would be less than significant. Therefore, no residual significant impacts would occur.

Impacts from new temporary sources of nighttime light and glare during project construction (Impact VIS-3) would be significant. However, implementation of Mitigation Measures VIS-3a and VIS-3b would reduce these impacts to a less-than-significant level. Therefore, no residual significant impacts would occur.

Impacts related to both temporary and permanent changes in scenic vistas and visual character (Impact VIS-2) from one to two residences in close proximity to construction activities, staging areas, borrow and pipeline relocation areas along the lower drainage canal, and to operation of the proposed east Yolo Bypass setback levee would be significant. Implementation of Mitigation Measure VIS-2a would reduce the short-term temporary construction-related impacts from changes in scenic vistas and visual character to a less-than-significant level. Implementation of Mitigation Measure VIS-2b would reduce the long-term permanent impacts from operation of the Sacramento International Airport Pipeline control structure to a less-than-significant level. However, no feasible mitigation measures are available to reduce the long-term permanent impacts from changes in scenic vistas and visual character at these residences from operation of the new setback levees to a less-than-significant level. No other feasible levee alternative route is available that would not itself cause this impact. Moreover, no feasible mitigation is available to reduce the project's impact on scenic vistas and visual character at the project site from operation of the new setback levees. Therefore, the residual impacts would be **significant and unavoidable**.

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4.3 Air Quality

4.3.1 Environmental Setting

Air pollutants can affect human and environmental health. A wide variety of natural and human activities can affect air quality. Air quality in a particular location is affected both by the amount of pollutants put into the air by local air pollution sources, and by the local climate, topography, and meteorology which determine how quickly the pollutants will be diluted and dispersed. Some air pollutants are involved in chemical reactions in the atmosphere and can have regional or wider effects. In addition, in some areas, pollutants are transported into an area from upwind pollution sources.

Topography and Meteorology

The project site is located in Yolo County which is part of the Sacramento Valley Air Basin (SVAB). The SVAB includes all of Butte, Colusa, Glenn, Tehama, Shasta, Yolo, Sacramento, Yuba, and Sutter Counties and parts of Placer, El Dorado, and Solano Counties.

The SVAB is bounded on the west and north by the Coast Ranges, on the east by the southern portion of the Cascade Range and the northern portion of the Sierra Nevada, and on the south by the San Joaquin Valley Air Basin. Hot, dry summers and mild, rainy winters characterize the climate of the SVAB. Summer high temperatures are typically in the 90s and winter low temperatures in the 30s, sometimes below freezing. The regional rainy season occurs mainly from late October to early May, in amounts that vary substantially from year-to-year and average approximately 20 inches per year. The rainy season is characterized by brief periods of rain interspersed with stagnant and sometimes foggy weather. 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 during periods of air stagnation. The highest frequency of air stagnation occurs in autumn and early winter when large high-pressure cells collect over the Sacramento Valley and cause calm wind conditions. These conditions reduce the influx of air into the SVAB and allow air pollutants emitted during the stagnation period to concentrate in a stable volume of air. When stagnation conditions combine with temperature inversions, the volume of stable air is reduced and the surface concentrations of the pollutants trapped at ground level are highest.

The ozone season (May through October) in the SVAB is characterized by stagnant morning air or light winds with San Francisco Bay and Delta breezes in the afternoon from the southwest. The afternoon and evening breezes transport air pollutants to the north and out of the SVAB. However, during about half of the days from July to September, a phenomenon called the “Schultz Eddy” causes the wind pattern to circle back to the south instead of allowing the prevailing wind patterns to move north and flush air pollution out of the SVAB. The eddy normally dissipates around noon when the Delta breeze arrives in the SVAB (Yolo-Solano Air Quality Management District [YSAQMD] 2007). The trapped air mass combined with plentiful sunshine create the conditions for photochemical reactions between reactive organic gases (ROG) and nitrogen oxides (NO_X), which result in ozone (smog) formation.

ROG are photochemically reactive hydrocarbons whose primary sources include mobile sources, consumer products, petroleum marketing (e.g., gasoline dispensing), coatings and solvents, and agricultural related activities. NO_X is a family of gaseous nitrogen compounds whose emissions result primarily from the combustion of fossil fuels under high temperature and pressure. On- and off-road motor vehicle fuel combustion is the major source of this air pollutant. In 2013, daily emissions of ROG and NO_X in YSAQMD were estimated at 49 and 51 tons, respectively, with on-road mobile sources making up 22 percent of ROG and 57 percent of NO_X emissions (YSAQMD 2016).

High concentrations of fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$) typically occur during late fall and winter (November through February) with stagnant inversion conditions. The stable air mass concentrates pollutants near the ground, and cooler temperatures and high humidity increase the secondary formation of fine particulates from the precursors of NO_X, sulfur dioxide (SO_2), volatile organic compounds (VOC), and ammonia. The cooler temperatures are also associated with increases in residential wood burning which is an important source of direct $PM_{2.5}$ emissions in the SVAB (SMAQMD 2013).

Ambient Pollutant Concentrations

Air pollutants are categorized based on the regulatory programs that control them. Pollutant categories are discussed below.

- Criteria Pollutants – these pollutants were established based on public health criteria (primary standards), and public welfare for non-health effects (secondary standards). Standards that apply to the criteria pollutants are the Federal National Ambient Air Quality Standards (NAAQS), and the State Ambient Air Quality Standards (SAAQS) which may be more, but not less, restrictive than the Federal standards. There are six criteria pollutants: CO, lead, nitrogen dioxide (NO_2), ozone, particulate matter which is subdivided into course (or respirable) particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}) and fine particulate matter ($PM_{2.5}$), and SO_2.

- Toxic Air Contaminants (TACs) – there are a variety of programs aimed at controlling TACs. The programs range from equipment or process control standards to ambient health risk-based standards. The Federal regulations address a list of 187 pollutants referred to as Hazardous Air Pollutants (HAPs). An extensive list of TACs are addressed by California Air Resources Board (ARB) health risk-based standards.

- Greenhouse Gases (GHG) – these pollutants are addressed in Section 4.7, “Climate Change.”

- Odors – these pollutants are generally regulated locally on a nuisance basis with regulations and analysis focused on common sources of annoying odor such as landfills and rendering facilities.

The regional air quality monitoring network operated by ARB and the local air districts provides data on ambient concentrations of air pollutants. These data are used to determine the compliance status of an area for the NAAQS and SAAQS, and to provide information useful in analyzing pollution trends and planning for improved air quality. The specific pollutants monitored at a location can change over time to focus monitoring efforts on pollutants of concern. Pollutants of concern are those with measured concentrations that exceed or approach the NAAQS, or SAAQS, and other pollutants that may create a public health concern, or have other potential effects on the local environment such as diminishing visibility.

The NAAQS and SAAQS change over time as health effects reviews show the need to reduce the allowable ambient pollutant concentrations. Areas where air quality does not meet the NAAQS or SAAQS are referred to as nonattainment areas (do not attain the standard). Areas where air quality did not meet the NAAQS historically, but where the air quality has improved to meet the NAAQS, are referred to as maintenance areas. Generally, the air control district(s) responsible for an area prepares maintenance plans that control emissions to maintain compliance with the NAAQS for 20 years following attainment of the NAAQS in maintenance areas. Typically, air pollutant monitoring in an area will be focused primarily on the pollutants for which attaining and maintaining the NAAQS or SAAQS are a concern.

Historically, concentrations of CO, PM_{10}, and ozone have exceeded the NAAQS, and the SAAQS in the SVAB. $PM_{2.5}$ was added to the NAAQS in 1997 because of the adverse health effects shown from inhalation of $PM_{2.5}$. The SVAB has $PM_{2.5}$ concentrations that have exceeded the NAAQS. The NAAQS for ozone, PM_{10}, and $PM_{2.5}$ have been changed (reduced) multiple times since 1971.

Table 4.3-1 shows the current attainment status for the SVAB. Pollutant concentrations in Yolo County and the project site are commonly measured below the standards; however, emissions from Yolo County can contribute to violations of the standards in the SVAB, and Yolo County is included in the Sacramento Federal Nonattainment Area for both ozone and $PM_{2.5}$. The NAAQS and SAAQS for NO_2, SO_2, and lead are being met, and data collected by the ARB indicate these pollutants will not be a concern for the foreseeable future. CO is a localized pollutant of concern primarily in areas of heavy traffic congestion. There have been no measured exceedances of the CO standards in the SVAB for many years and the 20-year maintenance planning period for CO will end in 2018. CO, NO_2, SO_2, and lead are not expected to be pollutants of concern for the project site although project emissions of VOC, NO_X, and SO_2 will need to be accounted for in addressing $PM_{2.5}$ because of potential secondary formation. The action alternatives are not expected to emit ammonia.

Table 4.3-1. Attainment Status for the Sacramento Valley Air Basin

Pollutant	NAAQS	SAAQS
1-hour Ozone	–	Nonattainment
8-hour Ozone	Severe nonattainment	Nonattainment
8-hour CO	Maintenance	Attainment
24-hour PM_{10}	Attainment (Yolo County)	Nonattainment
Annual PM_{10}	–	Nonattainment
24-hour $PM_{2.5}$	Moderate nonattainment	–

Notes: NAAQS = National Ambient Air Quality Standards; SAAQS = State Ambient Air Quality Standards; CO = carbon monoxide; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; $PM_{2.5}$ = fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less
Source: Yolo-Solano Air Quality Management District 2007

Table 4.3-2 contains a 3-year summary of criteria air pollutant concentration data for ozone, $PM_{2.5}$, and PM_{10}. There are two monitoring stations with data representative of the project site: one each in Woodland and West Sacramento. Data shown are the highest value from either monitoring station. There are no active monitoring stations that would provide appropriate data for the project site for CO, SO_2, or NO_2.

ARB is required to identify and control TACs. In 1985, ARB established a 20-station air toxics monitoring network within major urban areas throughout California to provide data to determine the annual average concentrations of TACs as input to the source identification process and to assess the effectiveness of controls (ARB 2016). The two TAC air monitoring stations nearest the project site are located in Citrus Heights and Roseville, approximately 18 to 20 miles northeast of the project site.

Table 4.3-2. Summary of Annual Ambient Air Quality Data for Criteria Pollutants at the Project Site (2013–2015)[1]

	2013	2014	2015
Ozone			
Maximum concentration (1-hour/8-hour, ppm)	0.080/0.067	0.082/0.071	0.086/0.071
Number of days State standard exceeded (1-hour/8-hour)	0/0	0/1	0/4
Number of days national standard exceeded (8-hour)[2]	0	1	3
SAAQS ozone standards (1-hour/8-hour, ppm)		0.09/0.070	
NAAQS ozone standard (8-hour – 2008/2015, ppm)[2]		0.075/0.070	
Fine Particulate Matter ($PM_{2.5}$)			
Maximum 24-hour concentration (national/California, $\mu g/m^3$)[3]	22.0/22.0	14.6/14.6	29.4/29.4
Annual mean concentration (national/California, $\mu g/m^3$)[3]	7.4/ -	5.9/ -	7.5/7.5
Number of days national 24-hour standard exceeded (measured/calculated)[4,5]	0/0	0/0	0/0
SAAQS $PM_{2.5}$ standard (annual, $\mu g/m^3$)		12	
NAAQS $PM_{2.5}$ standards (annual / 24-hour, $\mu g/m^3$)		12.0/35	
Course Particulate Matter (PM_{10})			
Maximum 24-hour concentration ($\mu g/m^3$) (national/California)[3]	62.4/66.5	46.4/49.0	70.8/69.4
Annual mean concentration ($\mu g/m^3$) (national/California)[3]	23.1/23.7	17.8/18.1	21.5/21.8
Number of days State 24-hour standard exceeded (measured/calculated)[4]	4/23.0	0/0	1/6.1
Number of days national 24-hour standard exceeded (measured/calculated)[4]	0/0	0/0	0/0
SAAQS PM_{10} standard (annual/24-hour, $\mu g/m^3$)		20/50	
NAAQS PM_{10} standard (24-hour, $\mu g/m^3$)		150	

Notes: $\mu g/m^3$ = micrograms per cubic meter; – = data not available; ppm = parts per million; SVAB = Sacramento Valley Air Basin; $PM_{2.5}$ = fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less

1 Measurements were recorded at the Woodland monitoring station, with the exception of 2015 PM_{10} data which were recorded at the West Sacramento monitoring station.

2 The 8-hour national ozone standard was revised down from 0.075 ppm to 0.070 ppm in October 2015. Statistics shown are based on the new 2015 standard. The 1-hour national ozone standard was revoked on June 15, 2005.

3 State and national statistics may differ for the following reasons: State statistics are based on California-approved samplers, whereas national statistics are based on samplers using Federal reference or equivalent methods. State and national statistics may therefore be based on different samplers. State statistics are based on local conditions while national statistics are based on standard conditions. State criteria for ensuring that data are sufficiently complete for calculating valid annual averages are more stringent than the national criteria.

4 Measured days are those days that an actual measurement was greater than the level of the State daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

5 The national $PM_{2.5}$ 24-hour standard was revised from 65 $\mu g/m^3$ to 35$\mu g/m^3$ in 2006. Statistics shown are based on the 35 $\mu g/m^3$ standard.

Source: California Air Resources Board 2016

Based on a data review for the Roseville monitoring station, the overall concentrations of TACs have declined substantially since the 1990s. Although the data from these stations do not represent ambient concentrations in the project site, the general trends are likely to be similar, with decreasing concentrations as a result of the control programs put in place Statewide, and regionally.

There are no significant stationary sources of TACs on or in the vicinity of the project site. The TACs that would be present on a regular basis in significant quantities on or near the project site would be potential emissions of TACs from agricultural activities, PM associated with diesel exhaust from trucks on local streets and highways, and construction equipment associated with this project and others in the region. Sensitive receptors in the project site are a relatively few nearby rural residential properties. The closest residential properties are more than 1,300 feet from the project construction areas.

Ambient odors are addressed by a heightened review process for facilities that are likely to cause a nuisance to the public and generate odor complaints. There is no general or established site ambient data collection for odors.

Toxic Air Contaminants

TACs are regulated under both Federal (HAPs) and State laws (TACs). Historically, the U.S. Environmental Protection Agency (EPA) defined national emission standards for hazardous air pollutants to protect public health and welfare. These substances include certain volatile organic chemicals, pesticides, herbicides, and radionuclides that present a tangible hazard, based on scientific studies of exposure to humans and other mammals. Under the 1990 Clean Air Act Amendments, 189 substances are regulated as HAPs.

Regulations promulgated at both the Federal and State levels for control of TACs/HAPs would not typically apply directly to the potential effects of the action alternatives because these standards apply either to stationary sources, or to mobile sources on a programmatic basis, and not a project basis. Some programmatic elements may apply to equipment that may be used in construction of the project alternatives, such as the Portable Equipment Registration Program, and fuel standards designed to manage emissions from fleets of construction equipment, and other mobile sources. These programs have been effective in reducing overall emissions of TACs from mobile source equipment by substantial amounts since promulgation, and are key elements of the plans of many local air districts in California for attaining and maintaining compliance with the NAAQS and SAAQS, in addition to reducing TAC concentrations in ambient air. Regulations that have reduced emissions of the types of equipment to be used in construction of the project alternatives have included the low-sulfur diesel fuel requirement, and tighter emissions standards for heavy-duty diesel trucks (2007) and off-road diesel equipment (2011) nationwide. The reductions in emissions resulting from the implementation of these regulations are incorporated into the determination of project-related air quality effects.

Health Effects of Air Pollutants

Health effects associated with various air pollutants are described below.

Ozone – Ozone is a colorless, odorless gas that exists primarily as a beneficial component of the ozone layer in the upper atmosphere (stratosphere) and as a pollutant in the lower atmosphere (troposphere). It is not emitted directly but is formed in the atmosphere over several hours from combinations of various precursors in the presence of sunlight. ROG and NO_X are considered to be the primary compounds, or precursors, contributing to the formation of ozone. Ozone is viewed as both a secondary pollutant and a regional pollutant because ozone can form far from where precursors are emitted.

Ozone is a principal cause of lung and eye irritation in the urban environment. Short-term exposure to ozone can injure or damage the lungs, decrease pulmonary function, and impair immune mechanisms. Chronic lung disease can occur as a result of longer-term exposure. Symptoms of ozone irritation include shortness of breath, chest pain when inhaling deeply, wheezing, and coughing. Children and persons with pre-existing respiratory disease (e.g., asthma, chronic bronchitis, and emphysema) are at greater risk.

Carbon Monoxide – CO is a colorless and odorless gas that, in the urban environment, is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. Overall, CO emissions are decreasing because the Federal Motor Vehicle Control Program has mandated increasingly lower emission levels for vehicles manufactured since 1973. CO concentrations are typically higher in winter because of the higher rates of combustion inefficiency in colder engines; therefore, California has required the use of oxygenated gasoline in winter to reduce CO emissions.

Relatively high CO concentrations are typically found near congested intersections and along heavily used roadways carrying slow-moving traffic. Even under the most severe meteorological and traffic conditions, high CO concentrations are limited to locations within a relatively short distance (300–600 feet) of heavily traveled roadways. Vehicle traffic emissions can cause localized CO effects, and severe vehicle congestion at major signalized intersections can generate elevated CO levels (“hotspots”) that can be hazardous to humans if they are present adjacent to intersections for an extended period of time.

Particulate Matter – PM is a complex mixture of extremely small particles and liquid droplets. PM is made up of acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. Natural sources of particulates include windblown dust. Some particles are emitted directly into the atmosphere. Others, referred to as secondary particles, result from gases that are transformed into particles through physical and chemical processes in the atmosphere.

The size of PM is directly linked to the potential for causing health problems. EPA is concerned about particles that are 10 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects, such as aggravating respiratory and cardiovascular disease and lung disease, and decreasing lung function. Individuals particularly sensitive to fine particle exposure include older adults, people with heart or lung disease, and children. EPA groups PM into two categories, PM_{10} and $PM_{2.5}$, as described below.

Inhalable coarse particles (PM_{10}), such as those found near roadways and dust-generating industries, are larger than 2.5 micrometers and smaller than 10 micrometers in diameter. Sources of coarse particles include crushing or grinding operations and dust from paved or unpaved roads. Control of PM_{10} is achieved primarily by controlling dust at construction and industrial sites, cleaning paved roads, and wetting or paving frequently used unpaved roads.

PM_{10} includes the subgroup of finer particles ($PM_{2.5}$), such as those found in smoke and haze, that have an aerodynamic diameter of 2.5 micrometers or smaller. These finer particles pose an increased health risk, because they can deposit deep in the lungs and contain substances that are particularly harmful to human health. Sources of fine particles include all types of combustion activities, such as motor vehicles, power plants, wood burning, and certain industrial processes. $PM_{2.5}$ is the major cause of reduced visibility (haze) in California.

Toxic Air Contaminants – The most serious TACs on a Statewide basis include diesel exhaust PM (diesel PM), benzene, and 1,3-butadiene, all of which are emitted by motor vehicles (YSAQMD 2007). It should be noted that ARB has also designated asbestos and naturally occurring asbestos as a TAC. The project site is not mapped as an area with expected naturally occurring asbestos. Ambient concentrations of diesel PM are estimated because an acceptable measurement method has not been developed. The health effects of TACs are evaluated based on chronic or acute effects. Chronic effects are assessed based on expected lifetime exposures. At the air district-level, regulatory controls on TACs are applied to stationary sources such as gasoline stations, but not mobile sources. Emissions control for mobile sources occur primarily through statewide or national control programs that require reduced emissions for newer vehicles, and changes to fuels.

4.3.2 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to air quality apply to the alternatives under consideration, as listed below (See Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Clean Air Act – Applies to the impact analysis and project construction.
- Clean Air Act Amendments and General Conformity Rule – Applies to the impact analysis and project construction.

State

The following State plans, policies, regulations, or laws related to air quality apply to the alternatives under consideration, as listed below (See Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- California Clean Air Act (CCAA) – Applies to the impact analysis and project construction.
- California Health and Safety Code – Applies to the impact analysis and project construction.
- State Air Toxics Program – Assembly Bill (AB) 1807 – Applies to the impact analysis and project construction.
- Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) – Applies to the impact analysis and project construction.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances laws related to air quality are relevant to the analysis of the alternatives under consideration, as listed below (See Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Yolo-Solano Air Quality Management District (YSAQMD) Handbook for Assessing and Mitigating Air Quality impacts (YSAQMD 2007) – Relevant to the impact analysis and project construction and operation.
- Yolo-Solano Air Quality Management District Rules and Regulations – Relevant to the impact analysis and project construction.
- Air Quality Plans (listed below) – Relevant to the impact analysis.

- Proposed $PM_{2.5}$ Implementation/Maintenance Plan and Redesignation Request for Sacramento $PM_{2.5}$ Nonattainment Area, October 2013. This plan is for Federal $PM_{2.5}$ standards.
- Sacramento Regional 8-hour Ozone Attainment and Reasonable further Progress Plan (2013 SIP Revisions), September 2013. This plan is for Federal ozone standards.
- Draft Triennial Assessment and Plan Update, March 2016. This plan is for CCAA ozone standards.

▪ Yolo County General Plan – Yolo County 2030 General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding air quality are relevant to project construction and/or the impact analysis of the project.

4.3.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

This subsection discusses potential air quality effects in relation to the air quality regulations and plans in place to maintain and improve the overall air quality of the project site and vicinity. The methods used to analyze temporary and short-term construction- and long-term operational emissions of pollutants are consistent with local air district (YSAQMD) recommendations and those from EPA. Air quality modeling data are presented included in Appendix D1, "Air Quality Modeling Results." Feasible mitigation measures are recommended, as appropriate, to reduce potentially significant adverse effects on air quality.

Large earthworks projects such as the Lower Elkhorn Basin Levee Setback (LEBLS) project have the potential to emit substantial amounts of air pollutants during construction. The particular pollutants of concern for any individual project will be decided by the pollutants emitted in large quantities and the sensitivity of the air basin where the emissions occur to added influxes of particular pollutants. The primary pollutants of concern for the project would be ROG, NO_X, and particulate matter (dust). Although CO is not a pollutant of concern in terms of potential emissions, the project site and vicinity was formerly an area of concern for CO.

Temporary and short-term construction-generated emissions of criteria air pollutants and ozone precursors were assessed in accordance with methods recommended by YSAQMD. Project construction emissions were quantified using the California Emissions Estimator Model (CalEEMod) Version 2016.3.1 (CAPCOA 2013), which includes project construction information such as construction schedule and phasing, expected duration of activities, equipment types, volume of material to be moved, and number of construction workers. Because it is not possible to predict the exact time of future construction conditions, this analysis assumes each component would be completed in the minimum amount of time, which would result in worst-case maximum daily emissions for each project component. If the project is constructed during later years than the years used for emissions estimates, it would result in lower emissions due to turnover in equipment and vehicle fleet and new emissions technology. Where project-specific information was not available, conservative assumptions and/or default assumptions contained in CalEEMod were used to quantify project construction emissions.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. Comments received from EPA indicated a detailed discussion of ambient air conditions (baseline or existing conditions), NAAQS, criteria pollutant nonattainment areas, and potential air quality impacts (including cumulative and indirect impacts) should be provided. These issues are addressed in the setting and impact analysis provided in this subsection, as well as in Chapter 5, "Cumulative Impacts."

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to air quality if they would do any of the following:

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

In addition, YSAQMD has established recommended significance thresholds for evaluating project-related air quality impacts under CEQA (YSAQMD 2007). If these thresholds are not exceeded, the project does not have a significant impact relative to the first four bullet items above for the criteria pollutants. The YSAQMD significance thresholds are shown in Table 4.3-3.

Table 4.3-3. Yolo-Solano Air Quality Management District Significance Thresholds for Criteria Pollutants of Concern

Pollutant	Threshold of Significance
ROG	10 tons/year
NO_X	10 tons/year
PM_{10}	80 pounds/day
CO	Violation of SAAQS for CO

Notes:
CO = carbon monoxide; NO_X = oxides of nitrogen; PM_{10} = respirable particulate matter with an aerodynamic diameter of 10 micrometers or less; ROG = reactive organic gases; YSAQMD = Yolo-Solano Air Quality Management District; SAAQS = State Ambient Air Quality Standard
Source: Yolo-Solano Air Quality Management District 2007

YSAQMD also has guidance and thresholds to evaluate the significance of TACs, odors, cumulative impacts, and Federal actions. The significance thresholds listed below would apply to the alternatives under consideration.

- For TACs, YSAQMD does not have thresholds that apply to mobile sources such as construction equipment.
- For odors, a project may reasonably be expected to have a significant adverse odor impact where it "generates odorous emissions in such quantities as to cause detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which may endanger the comfort, repose, health, or safety of any such person or the public, or which may cause, or have a natural tendency to cause, injury or damage to business or property."
- For cumulative impacts, any action alternative that would individually have a significant air quality impact over a significance threshold for ROG, NO_X, or PM_{10}, would be considered cumulatively significant as well. CO impacts are cumulatively significant when modeling shows that the combined emissions from any action alternative and the background concentration would exceed air quality standards.
- For Federal projects, the evaluation of criteria pollutants includes a comparison to Federal General Conformity thresholds to determine if a General Conformity analysis and determination will be required for a project prior to approving a Federal action. For General Conformity, the project emissions during construction or operation are compared to the EPA General Conformity *de minimis* thresholds, as stated in Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans."

Issues Not Discussed Further in this EIS/EIR

Long-Term Changes to Operations and Maintenance Activities and Emissions—Following the completion of project-related construction activities, periodic inspections and operations and maintenance (O&M) activities would continue to occur to check for and repair potential damage to the levee system. These inspection and O&M activities occur under existing conditions and would be similar with the project. Two to three existing pump stations would be consolidated into a single new and more efficient pump. Pumping capacity would not be increased. Therefore, because project O&M would not increase emissions, and would potentially decrease emissions, effects from project O&M activities are not further evaluated in this EIS/EIR.

Create Objectionable Odors Affecting a Substantial Number of People—YSAQMD lists common facilities that are known producers of odor. All are permanent facilities, not temporary construction and include highly odorous operations such as wastewater treatment plants, landfills, and rendering plants. The project does not include these types of operations and while some odors may be detectable from construction equipment and trucks, odors are not expected to reach levels that meet the YSAQMD threshold. In addition, the agricultural areas surrounding the project site are likely to experience odors due to smoke from controlled burns and wildfires, the application of agricultural chemicals, and dust from maintenance and cultivating activities. The project is not expected to be an odor source of concern based on YSAQMD screening criteria (YSAQMD 2007). For these reasons, odors are not further discussed in this EIS/EIR.

Expose Sensitive Receptors to Substantial Pollutant Concentrations—Toxic Air Pollutants and CO—Although construction activities associated with the action alternatives may emit TACs, construction is temporary in nature and would not expose residents to long-term emissions of these pollutants. In addition, construction activities would move as construction progresses linearly and are not expected to be located close to sensitive receptors (residents). The dose to which receptors are exposed is the primary factor used to determine health risk and is a function of concentration and duration of exposure. According to the Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments that determine the health risks associated with exposure of residential receptors to TAC emissions should be based on a 70-year exposure period (OEHHA 2003). Levee construction is expected to occur over an approximate 1- to 2-year period reducing local exposure substantially relative to levels of concern.

Although CO can be a pollutant of concern near congested intersections with high traffic volumes, the Yolo County and Sacramento areas have not shown a violation of the CO standard in many years and evaluation of potential CO impacts is normally associated with large development projects, or transportation system projects, not temporary construction projects, such as the LEBLS project.

For the reasons discussed above, TACs and CO are not discussed further in this EIS/EIR.

Impact Analysis

Table 4.3-4 provides a summary of air quality impacts and mitigation measures for all alternatives under consideration.

Table 4.3-4. Summary of Impacts and Mitigation Measures—Air Quality

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
AIR-1: Conflict with an Air Quality Plan, Contribute to Yolo-Solano Air Quality Management District Standards Exceedance, Generate a Considerable Increase of a Nonattainment Pollutant, and Contribute Substantially to Air Quality Violation	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	S	AIR-1a: Implement the Yolo-Solano Air Quality Management District's Best Management Practices for Construction Emission Control, or Measures that Perform as Well as Yolo-Solano Air Quality Management District Best Management Practices AIR-1b: Implement the Sacramento Metropolitan Air Quality Management District's Enhanced Fugitive PM Dust Control Practices AIR-1c: Use the Sacramento Metropolitan Air Quality Management District's Enhanced Exhaust Control Practices for Construction Equipment, and Pay Associated Fees AIR-1d: Use the Yolo-Solano Air Quality Management District's Off-site Mitigation Fee to Reduce NO_X and ROG Emissions, and Pay Associated Fees AIR-1e: Use Dispersion Modeling to Demonstrate PM_{10} Emissions Would Not Exceed the National Ambient Air Quality Standards or State Ambient Air Quality Standards	LTS
AIR-2: Potentially Expose Sensitive Receptors to Substantial Pollutant Concentrations (Dust)	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	AIR-1a: Implement the Yolo-Solano Air Quality Management District's Best Management Practices for Construction Emission Control, or Measures that Perform as Well as Yolo-Solano Air Quality Management District Best Management Practices AIR-1b: Implement the Sacramento Metropolitan Air Quality Management District's Enhanced Fugitive PM Dust Control Practices AIR-1e: Use Dispersion Modeling to Demonstrate PM_{10} Emissions Would Not Exceed the National Ambient Air Quality Standards or State Ambient Air Quality Standards	LTS

Table 4.3-4. Summary of Impacts and Mitigation Measures—Air Quality

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
AIR-3: Exceed General Conformity *de Minimis* Thresholds (Federal Action Requires Conformity Determination)	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	AIR-1a: Implement the Yolo-Solano Air Quality Management District's Best Management Practices for Construction Emission Control, or Measures that Perform as Well as Yolo-Solano Air Quality Management District Best Management Practices AIR-1b: Implement the Sacramento Metropolitan Air Quality Management District's Enhanced Fugitive PM Dust Control Practices AIR-1c: Use the Sacramento Metropolitan Air Quality Management District's Enhanced Exhaust Control Practices for Construction Equipment, and Pay Associated Fees AIR-1d: Use the Yolo-Solano Air Quality Management District's Off-site Mitigation Fee to Reduce NO_X and ROG Emissions, and Pay Associated Fees AIR-1e: Use Dispersion Modeling to Demonstrate PM_{10} Emissions Would Not exceed the National Ambient Air Quality Standards or State Ambient Air Quality Standards	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact Analysis

Impact AIR-1: ***Conflict with an Air Quality Plan, Contribute to Yolo-Solano Air Quality Management District Standards Exceedance, Generate a Considerable Increase in a Nonattainment Pollutant, and Contribute Substantially to Air Quality Violation.***

No Action Alternative

Under the No Action Alternative, USACE would not authorize DWR to construct setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, there would be no construction-related emissions. Therefore, there would be no impact.

Alternatives 2 through 5: All Action Alternatives

Construction emissions are considered temporary and short-term in nature, but have the potential to represent a significant effect with respect to air quality for large projects. Fugitive PM (dust) and exhaust NO_X emissions are among the pollutants of greatest concern with respect to the proposed construction activities, under all action alternatives. These emissions from construction activities can lead to adverse health effects and nuisance concerns, such as reduced visibility and soiling of exposed surfaces. Earth-moving operations along with general site grading operations are the primary sources of fugitive PM dust emissions from construction activities. Movement of vehicles on unpaved roads also can generate fugitive PM dust emissions. Construction fugitive PM dust emissions can vary greatly, depending on the level of activity, the specific operations taking place, the number and types of equipment operated, vehicle speeds, local soil conditions, weather conditions, and the amount of earth-disturbance (e.g., site grading, excavation, and cut-and-fill).

Emissions of ozone precursors (i.e., ROG and NO_X) are important on a regional air quality basis, and are primarily generated from mobile source fuel combustion (e.g., construction equipment, material haul trucks, and construction worker vehicles). Generation of these emissions vary as a function of hours of equipment operation per day; daily material haul truck trips for levee, waste, or construction materials; and worker commute trips. Typical daily construction activities for the project site would involve heavy-duty construction equipment working along various levee reaches; material haul trucks moving levee fill materials among work sites, staging areas, borrow sites, and disposal sites; and construction workers coming to and from the various work sites.

YSAQMD significance thresholds are considered the allowable amount of emissions each project could generate without impeding the region's air quality planning efforts to maintain and attain ambient air quality standards. Therefore, emissions that exceed these thresholds would be considered to conflict with or obstruct implementation of the applicable air quality plan. In addition, the significance thresholds represent an amount of daily, or annual emissions which, if exceeded, would be considered to contribute substantially to a potential air quality violation (i.e., exceedance of an ambient air quality standard).

The air quality impacts of all action alternatives would be similar in nature, but would vary in magnitude. Construction of the new levee setbacks and associated improvements would occur over a 1-, or 2-year construction period, depending on the implemented alternative. The construction emissions shown in Tables 4.3-5a and 4.3-5b represent the maximum annual emissions under each action alternative (mitigated and unmitigated), based on potential maximum daily emissions that could occur throughout the duration of each phase or activity. Under the long-haul scenario (Table 4.3-5a), maximum annual emissions would be greatest for Alternatives 4 and 5, because all construction would occur in 1 year; total project emissions would be greater under Alternatives 2 and 3, but these emissions would be spread over 2 years, resulting in lower annual emissions than Alternatives 4 and 5. Under the reuse scenario (Table 4.3-5b), Alternative 2 would have lower annual emissions than Alternative 4, but the total project emissions would be greater under Alternative 2, because construction would occur in 2 years.

Under all action alternatives, the project's maximum annual construction emissions would exceed the local air agency significance thresholds for NO_x and PM_{10}. ROG emissions would exceed the local air district's significance threshold under the long-haul scenario for Alternatives 4 and 5. Therefore, this would be a **significant** impact. Mitigation Measures AIR-1a, AIR-1b, AIR-1c, AIR-1d, and AIR-1e, described below, have been identified to address this impact. The project's mitigated construction-related emissions, under all action alternatives, are also shown in Tables 4.3-5a and 4.3-5b.

Mitigation Measure AIR-1a: Implement the Yolo-Solano Air Quality Management District's Best Management Practices for Construction Emission Control, or Measures that Perform as Well as Yolo-Solano Air Quality Management District's Best Management Practices.

To reduce PM emissions, DWR will require its contractor(s) to comply with the following best management practices for all project construction-related activities where feasible:

- water all active construction areas at least twice daily;
- maintain at least 2 feet of freeboard for haul trucks;
- cover all trucks hauling soil, sand, and other loose materials;
- apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas after cut-and-fill operations and reseeded areas;
- apply chemical soil stabilizers on inactive construction areas (disturbed lands within construction project areas that are unused for at least 4 consecutive days), or continue watering for periods up to 14 days prior to soil stabilization;
- plant vegetative ground cover in disturbed areas as soon as possible;
- cover inactive storage piles;

- sweep streets if visible soil material is carried out from the construction site; and treat access to a distance of 100 feet from the paved road with a 6- to 12-inch layer of wood chips, mulch, or gravel.

Timing: During all construction activities.

Responsibility: California Department of Water Resources and all Construction Contractor(s).

Mitigation Measure AIR-1b: Implement the Sacramento Metropolitan Air Quality Management District's Enhanced Fugitive PM Dust Control Practices.

To achieve higher levels of fugitive PM dust control, DWR will require its construction contractor(s) to implement the following Enhanced Fugitive PM Dust Control Practices recommended by SMAQMD where feasible.

Soil Disturbance Areas

- Water exposed soil with adequate frequency for continued moist soil; however, do not overwater to the extent that sediment flows off the site.
- Suspend excavation, grading, and/or demolition activity when wind speeds exceed 20 mph.
- Install wind breaks (e.g., solid fencing) on windward side(s) of construction areas.
- Plant vegetative ground cover (fast germinating native grass seed) in disturbed areas as soon as possible. Water appropriately until vegetation is established.

Unpaved Roads (Entrained Road Dust)

- Install wheel washers for all exiting trucks, or wash off all trucks and equipment leaving the site.
- Post a publicly visible sign with the telephone number and person to contact at DWR regarding dust complaints. This person will respond and take corrective action within 48 hours. The phone number of YSAQMD also will be visible to ensure compliance.

Timing: During all construction activities.

Responsibility: California Department of Water Resources and all Construction Contractor(s).

Mitigation Measure AIR-1c: Use the Sacramento Metropolitan Air Quality Management District's Enhanced Exhaust Control Practices for Construction Equipment.

To reduce air quality emissions, DWR will ensure that off-road construction equipment use SMAQMD's Enhanced Exhaust Control Practices, as described below.

- The construction contractor will submit to DWR and YSAQMD 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 model year, and projected hours of use for each piece of equipment. The construction contractor will provide the anticipated construction timeline including start date, and name and phone number of the project manager and on-site foreman. The SMAQMD Equipment List Form can be used to submit this information. The inventory will be updated and submitted monthly throughout the duration of project construction, except that an inventory will not be required for any 30-day period in which no construction activity occurs.

- The construction contractor will provide a plan for approval by DWR and YSAQMD demonstrating that the heavy-duty off-road vehicles (50 horsepower or more) to be used in the construction project, including owned, leased, and subcontractor vehicles, will achieve a project-wide fleet-average 20 percent NO_X reduction and 45 percent particulate reduction compared to the most recent California ARB fleet average. This plan will be submitted in conjunction with the equipment inventory. Acceptable options for reducing emissions may include use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available.

- SMAQMD's Construction Mitigation Calculator can be used to identify an equipment fleet that achieves this reduction. The construction contractor will ensure that emissions from all off-road diesel powered equipment used on the project area do not exceed 40 percent opacity for more than 3 minutes in any 1 hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) will be repaired immediately. Non-compliant equipment will be documented and a summary provided monthly to DWR and YSAQMD. A visual survey of all in-operation equipment will be made at least weekly. A monthly summary of the visual survey results will be submitted throughout the duration of project construction, 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.

Timing: During all construction activities.

Responsibility: California Department of Water Resources and all Construction Contractor(s).

Mitigation Measure AIR-1d: Use the Yolo-Solano Air Quality Management District's Off-site Mitigation Fee to Reduce NO_X and ROG Emissions, and Pay Associated Fees.

Pursuant to YSAQMD's significance thresholds, if the projected construction-related emissions exceed the NO_X or ROG significance threshold based on the equipment inventory, DWR will contribute to YSAQMD's off-site mitigation fee program sufficiently to offset the amount by which the project's NOx or ROG emissions exceed the threshold of 10 tons per year. The determination of the final mitigation fee will be conducted in coordination with YSAQMD before any ground-disturbance occurs for any phase of project construction. If NO_x emissions exceed the general conformity *de minimis* thresholds, DWR will contribute to YSAQMD's off-site mitigation fee program as required by the general conformity regulations. DWR will coordinate fee payment so that emissions offsets are committed prior to or concurrent with emissions for YSAQMD thresholds and as required by General Conformity regulations if *de minimis* thresholds are exceeded. If there are changes to construction activities (e.g., equipment lists, increased equipment usage or schedules), DWR will work with YSAQMD to ensure emission calculations and fees are adjusted appropriately.

The estimated cost of NO_X offsets based on current offset pricing are included in Appendix D1 and range from $5.5 million to $8.4 million, after implementation of Mitigation Measure AIR-1c under the long-haul scenario. Under the reuse scenario with lower levels of material hauling the estimated cost of NO_X offsets after implementation of Mitigation Measure AIR-1c range from $2.1 million to $3.8 million. The fees will be recalculated postconstruction to ensure that the correct payment(s) had been made, based on actual construction emissions.

Timing: Prior to construction activities.

Responsibility: California Department of Water Resources.

Mitigation Measure AIR-1e: Use Dispersion Modeling to Demonstrate PM_{10} Emissions Will Not Exceed the National Ambient Air Quality Standards or State Ambient Air Quality Standards.

If the projected construction-related emissions exceed the YSAQMD PM_{10} significance threshold based on the equipment inventory, DWR will use dispersion modeling to demonstrate PM_{10} concentrations outside of the project site will not exceed the NAAQS. DWR will implement PM_{10} controls to achieve NAAQS compliance based on modeling results. The modeling analysis will be completed and coordinated with YSAQMD before any ground-disturbance occurs for any phase of project construction.

Timing: Prior to construction activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measures AIR-1a, AIR-1b, AIR-1c, AIR-1d, and AIR-1e would reduce NO_x emissions and fugitive PM dust below the YSAQMD significance thresholds. Therefore, with implementation of these mitigation measures, the direct effect on regional air quality would be **less than significant**.

Table 4.3-5a. Lower Elkhorn Basin Levee Setback Project Construction Emissions (Long Haul Scenarios – Unmitigated/Mitigated Conditions)

Alternative	Pollutants (tons)[1]				
	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
Year 2018 Emissions (Unmitigated/Mitigated)					
Alternative 2 (7-Mile, Partial Degrade)	8.8/8.8	**253.3/249.2**	56.0/56.0	**1,072.4/295.2**	**162.3/44.4**
Alternative 3 (7-Mile, Full Degrade)	8.7/8.7	**249.0/244.9**	55.3/55.3	**1,063.6/293.4**	**160.8/44.0**
Alternative 4 (5-Mile, Partial Degrade)	**10.2/10.2**	**280.3/272.8**	71.4/71.4	**1,175.6/370.9**	**178.7/56.9**
Alternative 5 (5-Mile, Full Degrade)	10.3/10.3	**284.4/277.0**	72.1/72.1	**1,184.7/373.8**	**180.1/57.4**
Year 2019 Emissions (Unmitigated/Mitigated)					
Alternative 2 (7-Mile, Partial Degrade)	5.7/5.7	**169.8/168.1**	34.9/34.9	**846.5/263.2**	**130.5/41.8**
Alternative 3 (7-Mile, Full Degrade)	5.7 /5.7	**170.6/169.0**	35.0/35.0	**847.2/263.6**	**130.6/41.9**
YSAQMD Significance Threshold	10 tons/year	10 tons/year	--	80 pounds/day	--
General Conformity *de minimis* Threshold (tons/year)	25	25	100	--	100

Notes: NO_X = oxides of nitrogen; PM_{10} = particulate matter with aerodynamic diameter less than 10 microns; $PM_{2.5}$ = particulate matter with aerodynamic diameter less than 2.5 microns; ROG = reactive organic gases; SMAQMD = Sacramento Metropolitan Air Quality Management District; **bold** text indicates that significance threshold was exceeded

[1] Annual emissions, in units of tons per year, were conservatively estimated by multiplying the maximum daily emissions by the number of work days per phase or task. In reality, emissions would likely fluctuate and would not continue at the maximum level throughout each phase or task.

Source: Emissions modeled by GEI Consultants, Inc. in 2016 and 2017

Table 4.3-5b. Lower Elkhorn Basin Levee Setback Project Construction Emissions (Reuse Scenarios – Unmitigated/Mitigated Conditions)

Alternative	Pollutants (tons)[1]				
	ROG	NO_X	CO	PM_{10}	$PM_{2.5}$
Year 2018 Emissions (Unmitigated/Mitigated)					
Alternative 2 (7-Mile, Partial Degrade)	3.7/3.7	**92.3/88.2**	28.0/28.0	**1,150.3/377.5**	160.3/49.9
Alternative 4 (5-Mile, Partial Degrade)	4.9/4.9	**112.5/105.1**	42.2/42.2	**1,253.7/409.4**	176.3/55.2
Year 2019 Emissions (Unmitigated/Mitigated)					
Alternative 2 (7-Mile, Partial Degrade)	3.5/3.5	**103.6/102.0**	23.0/23.0	**882.9/281.2**	129.8 /41.3
YSAQMD Significance Threshold	10 tons/year	10 tons/year	--	80 pounds/day	--
General Conformity *de minimis* Threshold (tons/year)	25	25	100	--	100

Notes: NO_X = oxides of nitrogen; PM_{10} = particulate matter with aerodynamic diameter less than 10 microns; $PM_{2.5}$ = particulate matter with aerodynamic diameter less than 2.5 microns; ROG = reactive organic gases; **bold** text indicates that significance threshold was exceeded

[1] Annual emissions, in units of tons per year, were conservatively estimated by multiplying the maximum daily emissions by the number of work days per phase or task. In reality, emissions would likely fluctuate and would not continue at the maximum level throughout each phase or task.

Source: Emissions modeled by GEI Consultants, Inc. in 2016 and 2017

Impact AIR-2: Potentially Expose Sensitive Receptors to Substantial Pollutant Concentrations (Dust).

No Action Alternative

Under the No Action Alternative, USACE would not authorize DWR to construct setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, there would be no construction-related emissions. Therefore, there would be **no impact** as a direct result of the No Action Alternative**.**

Alternatives 2 through 5: All Action Alternatives

All action alternatives have the potential to cause elevated PM dust levels at receptors near the construction area. The impact of potentially elevated dust levels upon sensitive receptors is dependent upon the duration of exposure and the proximity of the receptor to the construction activity generating dust. Construction activities are expected to occur intermittently during two seasons under Alternatives 2 and 3 of approximate 8- to 9-month work periods (spread between two construction seasons). Alternatives 4 and 5 involve construction activities in one construction season. Following completion of levee improvements in each area, all construction activities in those designated areas would cease. PM dust emissions would vary, depending on what types of activities occur each day. PM dust emissions during phases that include significant material handling would be greater than during those that do not require as much material handling. Because these construction phases would occur at different locations within the project site, and at different times, it is anticipated that construction activities and subsequent PM dust emissions would vary substantially between specific locations. Sensitive receptors would be located at various distances from construction activities, depending on the levee reach and the construction phase. The distance between construction activities and sensitive receptors (residences) is approximately 1,300 feet, except for one residence that may remain very close to construction areas.

Maximum annual construction emissions for all action alternatives are expected to exceed the YSAQMD significance thresholds for PM. Under the long haul scenarios (Table 4.3-5a), maximum annual emissions would be greatest for Alternatives 4 and 5, because all construction would occur in 1 year. Total project emissions would be greater under Alternatives 2 and 3, but these emissions would be spread over 2 years, resulting in lower annual emissions than Alternatives 4 and 5. Under the reuse scenarios (Table 4.3-5b), Alternative 2 would have lower annual emissions than Alternative 4, but the total project emissions would be greater under Alternative 2, because construction would occur in 2 years. Because PM emissions would exceed the YSAQMD significance thresholds under all action alternatives, this would be a **potentially significant** impact. Mitigation Measures AIR-1a, AIR-1b, and AIR-1e, described below, have been identified to address this impact.

Mitigation Measure AIR-1a Implement the Yolo-Solano Air Quality Management District's Best Management Practices for Construction Emission Control, or Measures that Perform as Well as Yolo-Solano Air Quality Management District's Best Management Practices.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure AIR-1b: **Implement the Sacramento Metropolitan Air Quality Management District's Enhanced Fugitive PM Dust Control Practices.**

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure AIR-1e Use Dispersion Modeling to Demonstrate PM_{10} Emissions Will Not Exceed the National Ambient Air Quality Standards or State Ambient Air Quality Standards.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measures AIR-1a and AIR-1b would reduce fugitive PM dust below the YSAQMD significance threshold. Implementation of Mitigation Measure AIR-1e would demonstrate that ambient concentrations of PM_{10} will be below the NAAQS and SAAQS. Therefore, with implementation of these mitigation measures, the significant impact on sensitive receptors would be reduced to **less than significant**.

Impact AIR-3: ***Exceed General Conformity de Minimis Thresholds (Federal Action Requires Conformity Determination).***

No Action Alternative

Under the No Action Alternative, USACE would not authorize DWR to construct setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, there would be no construction-related emissions. Therefore, general conformity *de minimis* thresholds would not be exceeded, and there would be **no impact** as a direct result of the No Action Alternative**.**

Alternative 2 through 5: All Action Alternatives

As shown in Tables 4.3-5a and 4.3-5b, the maximum annual construction emissions for all action alternatives under the long haul and reuse scenarios are projected to exceed the applicable *de minimis* threshold for NO_x. Projects that generate annual emissions exceeding the *de minimis* thresholds are required to perform a General Conformity analysis. General Conformity is analyzed pollutant by pollutant.

NO_X is a regionally significant pollutant and local control measures cannot achieve the required reductions for this pollutant. Regardless of which action alternative is selected, the project would need to implement mitigation measures, including the purchase of offsets, to reduce NO_X emissions below YSAQMD's significance threshold for NO_X of 10 tons per year. If NO_x emissions exceed the general conformity *de minimis* thresholds, DWR would contribute to YSAQMD's off-site mitigation fee program as required by the General Conformity regulations. DWR would coordinate fee payment so that emissions offsets are committed prior to or concurrent with emissions for YSAQMD thresholds and as required by General Conformity regulations if *de minimis* thresholds are exceeded.

The analysis methods for demonstrating General Conformity must be coordinated in advance with USACE, the agency responsible for making the General Conformity determination. Therefore, the air quality effects, under all action alternatives for General Conformity are considered a **significant** impact. Mitigation Measures AIR-1a through AIR-1e, described below, have been identified to address this impact.

Mitigation Measure AIR-1a: Implement the Yolo-Solano Air Quality Management District's Best Management Practices for Construction Emission Control, or Measures that Perform as Well as Yolo-Solano Air Quality Management District's Best Management Practices.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure AIR-1b: Implement the Sacramento Metropolitan Air Quality Management District's Enhanced Fugitive PM Dust Control Practices.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure AIR-1c: Use the Sacramento Metropolitan Air Quality Management District's Enhanced Exhaust Control Practices for Construction Equipment.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure AIR-1d: Use the Yolo-Solano Air Quality Management District's Off-site Mitigation Fee to Reduce NOX and ROG Emissions, and Pay Associated Fees.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure AIR-1e: Use Dispersion Modeling to Demonstrate PM_{10} Emissions Will Not Exceed the National Ambient Air Quality Standards or State Ambient Air Quality Standards.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measures AIR-1a, AIR-1b, AIR-1c, AIR-1d, and AIR-1e would reduce NO_x emissions below the *de minimis* significance thresholds. Therefore, with implementation of these mitigation measures, significant air quality impacts would be reduced to **less than significant**.

Residual Significant Impacts

The impacts from conflict with an air quality plan, contribution to YSAQMD standards exceedance, generation of considerable increases of nonattainment pollutants, and contribution to a substantial air quality violation (Impact AIR-1); potential exposure of sensitive receptors to substantial pollutant concentrations (Impact AIR-2); and exceedance of General Conformity *de minimis* threshold, would be reduced to less-than-significant levels with implementation of Mitigation Measures AIR-1 through AIR-1e, because YSAQMD and SMAQMD best management practices would be implemented to control emissions, SMAQMD enhanced construction equipment would be used, emissions would be offset by paying mitigation fees, and dispersion modeling would be conducted (if needed) to demonstrate that no exceedances of NAAQS and SAAQS would occur. Therefore, no residual significant impacts would occur.

4.4 Biological Resources – Fish and Aquatic Organisms

4.4.1 Environmental Setting

The Yolo and Sacramento Bypasses provide important habitat for native anadromous and resident Central Valley fishes and other aquatic resources. Information presented in this subsection on existing conditions at and adjacent to the project site is based on a variety of sources, primarily scientific publications and management plans that address aquatic resources of the Yolo Bypass, as well as recent vegetation mapping conducted by DWR.

Yolo Bypass Floodplain Habitat

Floodplains are ecologically important components of riverine ecosystems that provide vital habitat and resources for aquatic animals. As flood waters inundate floodplains adjacent to river channels, they slow, spread, and warm. These conditions support high levels of primary and secondary production, compared to the river channels. Abundant food resources and shallow, low-velocity water conditions provide especially high-quality foraging habitats for larval and juvenile fish that feed heavily on invertebrates present in floodwaters.

Significant modifications have been made to the historic floodplain of California‘s Central Valley for water supply and flood damage reduction purposes. The resulting losses of rearing habitat, migration corridors, and food web production for fish have significantly hindered native fish species that rely on floodplain habitat during part or all of their life history (Reclamation and DWR 2012). Most former Central Valley floodplain wetlands are now only inundated during major floods when levees either fail or when high water spills into managed floodways. Because much of the historical floodplain in the Sacramento Valley has been lost to development, river channelization, and levee construction, the remnant floodplain habitat of the Yolo Bypass has exceptional biological value for many native aquatic and wildlife species. The Yolo Bypass is the Central Valley’s largest contiguous floodplain and represents one of the most frequent large-scale connections of river and floodplain habitats in the valley (Katz et al. 2013).

Though the historic flood basin has been substantially modified, the Yolo Bypass retains several important features of the historical system (Whipple et al. 2012). The Bypass provides a relatively broad and seasonal overflow area that can convey up to 80 percent of total Sacramento River basin flow during a large flood (Sommer et al. 2014). Historically, this overflow occurred through natural levees between the river and flood basin, but under current conditions, flows enter the Bypass via Freemont Weir and Sacramento Weir. The Yolo Bypass typically floods in about 70 percent of years; it has been inundated as early as October and as late as June, with a typical peak period of inundation during January through March (Natural Heritage Institute et al. 2002). The Bypass also continues to provide a drainage basin for tributaries such as Cache Creek and Putah Creek, and substantial short-term flooding can occur even when Sacramento River flows do not enter the Bypass. Similar to historical basin flood patterns, floodwaters typically spread out across the Yolo Bypass, creating a large area of shallow water habitat that eventually drains to the south Delta (Whipple et al. 2012).

The Yolo Bypass has been shown to provide high-quality fish rearing habitat, resulting in rapid growth for juvenile salmon during natural flood events (Sommer et al. 2001). When inundated, the Bypass provides up to 60,000 acres of vital shallow water habitat for native fish, a wetted area approximately ten times larger than the comparable reach of the Sacramento River (Sommer et al. 2001). In addition, the river channel lacks a broad, low-velocity shoal, typically preferred by young salmon, because flows are confined to deep, narrow rip-rapped channels. In contrast, the Yolo Bypass has extensive shoals and substantial habitat complexity. Floodplain habitat complexity can provide diversity in water temperature, refugia from swift water, and cover and structure for predator avoidance, all of which enhance juvenile fish survival. Connectivity of the floodplain habitat to migratory routes is also critical for survival of juvenile fishes, as well as adults.

Studies have revealed the importance of Yolo Bypass floodplain inundation for native fish. Observed benefits of the Yolo Bypass to aquatic species include: (1) increased spawning habitat, (2) increased fish production, (3) increased rearing habitat, (4) enhanced food web within the floodplain, and (5) food web support to the downstream estuary (Sommer et al. 1997; Sommer et al. 2001). Studies in the Yolo Bypass also indicate that managed inundation of rice fields may provide valuable nursery habitat; juvenile salmon reared in rice fields purposely flooded in winter exhibited rapid growth and high survival rates (Katz et al. 2013). This research also indicated that rates of avian predation on juvenile salmon can be high in flooded rice fields, depending on habitat conditions. For example, high predation rates were observed in 2013, when very little aquatic habitat other than the experimentally inundated rice fields was available in the region and water depth in the fields was relatively shallow. These two factors appear to have resulted in a high concentration of piscivorous birds foraging in the experimental fields. Avian predation could, however, also be high in unmanaged floodplain habitat, when foraging conditions are conducive.

An important attribute of floodplain habitat is an enhanced food web. Sommer et al. (2001) found that drift insects were 10 to 100 times more abundant in the Yolo Bypass floodplain than the adjacent Sacramento River. This higher drift insect abundance was reflected in the diets of juvenile salmon; Yolo Bypass salmon had significantly more prey in their stomach than salmon collected in the Sacramento River. Increased feeding success may be partly offset by significantly higher water temperatures on the broad, shallow floodplain habitat, resulting in increased metabolic costs for young fish. However, the floodplain salmon had substantially better feeding success than fish in the Sacramento River, even when data were corrected for increased metabolic costs of warmer floodplain habitat (Sommer et al. 2001). The mean salmon size increased significantly faster in the seasonally inundated Yolo Bypass floodplain than the Sacramento River, suggesting better growth rates.

Floodplain inundation may also provide benefits to organisms downstream in the brackish portion of the Delta estuary. At the base of the estuarine food web, phytoplankton are responsible for most of the primary production in the estuary. However, there has been a major long-term decline in phytoplankton biomass in the estuary as a result of multiple factors, including introduction of new benthic grazers (i.e., Asian clam), water exports and low outflow, and climate change (Sommer et al. 2001). This has, in turn adversely affected organisms dependent on phytoplankton. Modeling studies by Jassby and Cloern (2000) suggest that phytoplankton produced in the Yolo Bypass may be an important source of organic carbon to the estuary, at least during flood events. In addition, the Yolo Bypass is a major pathway for organic matter to the estuary in wet years.

Despite the multiple benefits that are provided when the Yolo Bypass is inundated, the seasonal nature of this floodplain habitat presents a substantial disadvantage to migratory species whose spawning habitat is upstream of the Bypass. Though modest flows appear sufficient to draw migratory fish into the floodplain, upstream passage to the Sacramento River is only available during brief windows of high flows. Results of a recent study suggest that Yolo Bypass is a migration “sink” for approximately 25 percent of the adult fall-run Chinook salmon (*Onchorhynchus tshawytscha*) that enter the Bypass during their spawning migration (DWR 2015). As a result, the Yolo Bypass represents a serious passage barrier to at least some migratory fishes (NMFS 2009).

Habitat on and Adjacent to the Project Site

Currently, aquatic habitat on the project site is limited to canals and ditches landside and waterside of the Yolo Bypass East Levee and Sacramento Bypass North Levee. The landside features include two main “cross canals” that transport water from the Sacramento River to a network of agricultural ditches on and east of the project site. The cross canals act as the main water delivery and drainage channels that pump irrigation water from the Sacramento River and pump return water into the Yolo Bypass. The smaller agricultural ditches provide irrigation water to and transport drainage away from fields and orchards on the project site.

Although the project site east of Tule Canal provides very limited aquatic habitat of little value to native fish and other aquatic organisms, the Yolo and Sacramento Bypasses provide high-quality seasonally inundated floodplain habitat. Tule Canal is an important perennial canal in the Yolo Bypass that extends along the waterside toe of the Yolo Bypass East Levee, immediately west of the entire length of the project site. This canal becomes the Toe Drain south of I-80 and serves as the primary perennial feature draining water from the Yolo Bypass to waterways farther south in the Delta. Even in dry years, this channel remains inundated as a result of tidal action along its southern half and from agricultural drainage along its northern half (Sommer et al. 2014).

Riparian vegetation is present along Tule Canal, primarily on the west side, but some small riparian patches are also present on the east side of the canal, along the project site’s western boundary. Canals and associated riparian vegetation are also present along the waterside toes of both Sacramento Bypass levees. Important attributes of aquatic and riparian habitat that is present in the Bypasses include bank substrate type and size, aquatic vegetation, instream woody material (IWM), and shaded riverine aquatic (SRA) cover (USACE 2012). Aquatic vegetation and IWM provide hiding cover and an invertebrate food production base for many aquatic species. IWM also provides essential shading and velocity refuge for fishes. SRA habitat improves aquatic habitat quality by providing hiding cover and increasing food availability for fish species. Juvenile salmonids use overhanging vegetation and the shade it provides as hiding cover from terrestrial and sight-feeding aquatic predators; SRA cover also may reduce water temperature and provide thermal refugia for juvenile salmonids. Benefits of overhanging vegetation to native fish species also include input of leaf litter, which provides nutrients that support all trophic levels, and terrestrial insects that are food for many fish species.

The Yolo Bypass, and in some cases the Sacramento Bypass, is designated critical habitat for several Federally listed Threatened or Endangered species. Critical habitat includes certain physical or biological features that are considered by NMFS or U.S. Fish and Wildlife Service (USFWS) as essential to the conservation of the species and that may require special management considerations or protection. The Bypasses are also considered Essential Fish Habitat (EFH) for Chinook salmon, which includes waters and substrate necessary for spawning, breeding, feeding, or growth to maturity within currently and historically accessible habitat.

Yolo Bypass Fish Species

Fish use of the Yolo and Sacramento Bypasses is influenced by variations in permanent habitat conditions and seasonal inundation of the floodplains, as well as the habitat requirements, life history, daily and seasonal movements, and behavior of each fish species and population. Altered flow regimes, flood control, and floodwater conveyance activities along much of the Yolo Bypass have affected available habitat and ecological processes, but sampling to date has shown that the floodplain is used by species that are present seasonally when the floodplain is inundated and species that are year-round residents in perennial water sources, such as Tule Canal (Sommer et al. 2003). In winter and spring of some years, agricultural fields and wetland habitats throughout the Yolo Bypass flood during high flows and are used by several native species for spawning and/or rearing.

Similar to other Delta habitats, there are more introduced species than native species in the Yolo Bypass floodplain (Table 4.4-1) (Sommer et al. 2003). Introduced species are one of the major environmental issues in the Delta, where they frequently dominate the fauna on a year-round basis (Bennett and Moyle 1996) and comprise approximately 90 percent of the biomass in the Delta. However, because the Yolo Bypass floodplain is seasonally dewatered for agricultural production during late spring through autumn, introduced fish species can only establish year-round dominance in the few areas of perennial aquatic

Table 4.4-1. Fish Species Known to Occur in the Yolo Bypass

Native Fish Species	
Green sturgeon (*Acipenser medirostris*)	Hitch (*Lavinia exilicauda*)
White sturgeon (*Acipenser transmontanus*)	Pacific staghorn sculpin (*Leptocottus armatus*)
Sacramento sucker (*Catostomus occidentalis*)	Central Valley steelhead (*Oncorhynchus mykiss*)
Prickly sculpin (*Cottus asper*)	Chinook salmon (*Oncorhynchus tshawytscha*)
Pacific lamprey (*Entosphenus tridentatus*)	Sacramento blackfish (*Orthodon microlepidotus*)
Threespine stickleback (*Gasterosteus aculaetus*)	Sacramento splittail (*Pogonichthys macrolepidotus*)
Delta smelt (*Hypomesus transpacificus*)	Sacramento pikeminnow (*Ptychocheilus grandis*)
Tule perch (*Hysterocarpus traski*)	Longfin smelt (*Spirinchus thaleichthys*)
River lamprey (*Lampetra ayresi*)	
Nonnative Fish Species	
Yellowfin goby (*Acanthogobius flavimanus*)	Bluegill sunfish (*Lepomis macrochirus*)
American shad (*Alosa sapidissima*)	Redear sunfish (*Lepomis microlophus*)
White catfish (*Ameiurus catus*)	Inland silverside (*Menidia beryllina*)
Black bullhead (*Ameiurus melas*)	Redeye bass (*Micropterus coosae*)
Brown bullhead (*Ameiurus nebulosus*)	Smallmouth bass (*Micropterus dolomieu*)
Goldfish (*Carassius auratus*)	Spotted bass (*Micropterus punctulatus*)
Common carp (*Cyprinus carpio*)	Largemouth bass (*Micropterus salmoides*)
Threadfin shad (*Dorosoma petenense*)	Striped bass (*Morone saxatilis*)
Mosquitofish (*Gambusia affinis*)	Golden shiner (*Notemigonus crysoleucas*)
Wakasagi (*Hypomesus nipponensis*)	Bigscale logperch (*Percina macrolepida*)
Yellow bullhead (*Ictalurus natalis*)	Fathead minnow (*Pimephales promelas*)
Channel catfish (*Ictalurus punctatus*)	Black crappie (*Pomoxis nigromaculatus*)
Green sunfish (*Lepomis cyanellus*)	White crappie (*Pomoxis annularis*)
Warmouth (*Lepomis gulosus*)	

Sources: U.S. Bureau of Reclamation and California Department of Water Resources 2012; Sommer et al. 2003; Sommer et al. 2014 habitat (Sommer et al. 2003). In addition, many of the native fish are adapted to spawn and rear during the winter flood pulse in winter and early spring (Moyle 2002), while introduced fish typically spawn in late spring through summer, when most of the floodplain is unavailable.

Special-status Species

Several special-status species are among those native species known to use habitat in the Yolo Bypass. Special-status fish species relevant to the project include those that are:

- listed as Endangered or Threatened under the Federal Endangered Species Act (ESA) or the California Endangered Species Act (CESA),
- candidate species for listing under the ESA or CESA,
- designated by NMFS or USFWS as a Federal species of concern, or
- designated as a California Department of Fish and Wildlife (CDFW) Species of Special Concern.

Special-status fishes with the potential to occur in the Yolo Bypass, adjacent to the project site, were determined based on results of studies conducted in the Bypass and other available information describing each species distribution and habitat use. Because the project site is located adjacent to the Sacramento River and the Yolo and Sacramento Bypasses, it is along the main migratory route between upstream spawning habitat and downstream rearing habitat for several special-status anadromous fish species and life stages that occur in the vicinity of the project site at different times of the year. The Yolo Bypass also provides habitat for several resident and semi-anadromous special-status fishes. Table 4.4-2 lists special-status fish known to occur in the Yolo Bypass and with potential to occur on or adjacent to the project site; each species and life stage is discussed in more detail following the table.

Table 4.4-2. Special-status Fish with Potential to Occur on or Adjacent to the Project Site

Scientific Name Common Name	Status[1] (Federal/State)	Description
Acipenser medirostris green sturgeon	FT, FX/SSC	Anadromous; expected to occur, primarily as adults migrating upstream; larvae and juveniles rearing and migrating downstream could also occur.
Acipenser transmontanus white sturgeon	–/SSC	Anadromous; expected to occur, primarily as adults migrating to upstream; larvae moving downstream could also occur.
Entosphenus tridentatus Pacific lamprey	–/SSC	Anadromous; adults and rearing juveniles may occur seasonally.
Hypomesus transpacificus delta smelt	FT, FX/SE	Semi-anadromous; adults and juveniles may occur seasonally but typically occurs downstream of Isleton.
Lampetra ayresi river lamprey	–/SSC	Anadromous; distribution is not well known, but individuals have been documented in the Yolo Bypass and may occur adjacent to the project site.
Lavinia exilicauda Sacramento hitch	–/SSC	Resident; expected to occur seasonally.
Oncorhynchus mykiss Central Valley steelhead	FT, FX/–	Anadromous; expected to occur seasonally as adults migrating upstream and as rearing juveniles and smolts.
Oncorhynchus tshawytscha Central Valley spring-run Chinook salmon	FT, FX/ST	Anadromous; expected to occur seasonally as adults migrating upstream and as migrating and rearing juveniles.

Table 4.4-2. Special-status Fish with Potential to Occur on or Adjacent to the Project Site

Scientific Name Common Name	Status[1] (Federal/State)	Description
Oncorhynchus tshawytscha Sacramento River winter-run Chinook salmon	FE, FX/SE	Anadromous; Expected to occur seasonally as adults migrating upstream and as migrating and rearing juveniles.
Oncorhynchus tshawytscha Central Valley fall-/late fall-run Chinook salmon	FSC/SSC	Anadromous; fall-run are expected to occur seasonally, as adults migrating upstream or as juveniles and smolts rearing and migrating downstream; late fall-run may occur seasonally, as adults migrating upstream and as smolt migrating downstream.
Pogonichthys macrolepidotus Sacramento splittail	–/SSC	Resident/semi-anadromous; expected to spawn and rear.
Spirinchus thaleichthys longfin smelt	FC/ST, SSC	Anadromous; adults and juveniles may occur seasonally but typically occurs downstream of Rio Vista.

[1] Status:

Federal
- FE = Endangered under the Endangered Species Act (ESA)
- FT = Threatened under the ESA
- FC = Candidate species for listing under the ESA
- FSC = Federal sensitive, or species of concern
- FX = designated critical habitat under the ESA
- – = no status

State
- SE = Endangered under California ESA (CESA)
- ST = Threatened under CESA
- SSC = CDFW Species of Special Concern
- – = no status

Sources: California Department of Fish and Wildlife 2016; Moyle 2002; National Marine Fisheries Service 2009; Sommer et al. 2001

Green Sturgeon

The southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*) is Federally listed as Threatened and is a CDFW Species of Special Concern. Critical habitat designated for this DPS includes the Yolo Bypass. Green sturgeon are expected to occur in the Yolo Bypass, primarily as adults migrating to upstream spawning sites, but larval and juvenile green sturgeon rearing and migrating downstream may also occur. Adult green sturgeon migrate upstream through the Toe Drain and Tule Canal in all water years (Natural Heritage Institute et al. 2002). During high-water conditions that result in the flooding of the Yolo Bypass, adult green sturgeon may use the floodplain to move upstream. However, unless water is flowing over Fremont Weir, they cannot pass to the Sacramento River. Even during moderate flow over the weir, sturgeon may not be able to pass, because the weir functions as a low head dam; although sturgeon are able to jump, they do not do so to clear obstructions such as low head dams. Consequently, the existing fish passage structure at Fremont Weir is inadequate to allow normal passage of adult green sturgeon at most operational levels of the Sacramento River and has resulted in stranding and loss of individuals (NMFS 2009).

Though anadromous, green sturgeon are the most marine-oriented of the North American sturgeon. Little is known about movements, habitat use, and feeding habits of this DPS. They have been salvaged at Federal and State fish collection facilities in every month, indicating that they are present in the Delta year-round. Specific spawning behaviors, sites, and habitat requirements remain unknown, although preferred spawning habitat is thought to include deep, fast water. Adults become sexually mature in 13–20 years and then spawn every 2–5 years (Adams et al. 2007). Most spawning is thought to occur in the Sacramento River, apparently from April through July (Brown 2007). Juveniles spend 1–4 years in freshwater and estuarine waters before dispersing into salt water (NMFS 2012). Some post-spawn adults remain in the Sacramento River, near spawning habitat, for several months, while others migrate downstream soon after spawning. Those that remain in the Sacramento River outmigrate in fall, although they may move into and out of the river quickly during summer (Heublein et al. 2009).

White Sturgeon

White sturgeon (*Acipenser transmontanus*) is a CDFW Species of Special Concern. Individuals are expected to occur in the Yolo Bypass, primarily as adults migrating to upstream spawning sites. Larvae moving downstream could be carried into the Bypass if present in the Sacramento River when flows overtop Fremont Weir. White sturgeon can be present in the Yolo Bypass throughout much of the year, and appear able to exit the Bypass successfully under dry conditions (DWR 2015). However, individuals become stranded when there is no hydraulic connectivity to the river (Reclamation and DWR 2012).

White sturgeon are anadromous, spending most of their lives in estuaries and returning to fresh water to spawn. Within California, self-sustaining spawning populations are only known to occur in the Sacramento River Basin, primarily in the Sacramento and Feather Rivers (Beamesderfer et al. 2004). Upstream migration begins in late winter, and spawning occurs over deep gravel riffles or in deep pools with swift currents and rock bottoms between late February and early June. Once the eggs have been deposited, the adults move back downstream to the estuary. After hatching, larvae are quickly transported by river currents downstream to estuarine rearing habitat, primarily in spring and early summer (Moyle 2002).

Pacific Lamprey

Pacific lamprey (*Entosphenus tridentata*) is a CDFW species of special concern. The species is an anadromous fish with a very long freshwater rearing period. Recent data and anecdotal accounts indicate that distribution of the Pacific lamprey has been reduced in many river systems, including the Sacramento-San Joaquin, primarily due to migratory barriers (Moyle et al. 2009). Adult Pacific lampreys at varying levels of sexual maturity and ammocoetes are likely present in the Sacramento-San Joaquin River Basin throughout the year. Adults migrating to upstream holding and spawning area could occur seasonally in the Yolo Bypass.

Adults spend 6 months to 3.5 years in the marine environment and typically return to freshwater in spring and summer, where they usually hold in low-velocity areas under large boulders and bedrock crevices until making a secondary migration to spawning areas in later winter or early spring of the following year. Spawning typically occurs March through July, in pool and run tailouts and low-gradient riffles of gravel-bottom rivers and streams and usually near suitable habitat for their ammocoetes larvae. Adults die after spawning. After ammocoetes emerge, they drift downstream to areas of low-stream velocity and burrow into sand or silt substrate, typically in depositional areas with soft substrate near stream margins associated with pools, alcoves, and glides (Brumo et al. 2009). They are mostly sedentary and remain burrowed in the stream substrate for 3–10 years, filter feeding on algae, diatoms, and detritus. Ammocoetes move downstream during high-flow events, or if disturbed, and metamorphose into the subadult form (macropthalmia), generally from July through November. Outmigration to the ocean occurs during or shortly after transformation and generally peaks with rising stream and river flows in late winter or early spring (Brostrom et al. 2010). Pacific lampreys are thought to remain in the ocean for approximately 18–40 months before returning to freshwater as sexually immature adults, typically between late winter and early summer, then migrating to natal streams to spawn.

Delta Smelt

Delta smelt (*Hypomesus transpacificus*) is Federally listed as Threatened and State-listed as endangered. Designated critical habitat includes the southern Yolo Bypass, up to approximately 1 mile south of the Sacramento Bypass. Delta smelt are endemic to the Sacramento-San Joaquin estuary and are found seasonally in Suisun Bay and Suisun Marsh (Moyle 2002). Distribution varies with river outflow, extending from the Lower Sacramento River into Suisun Bay during high outflow and concentrating in the upper Delta and Lower Sacramento River during low outflow. The Yolo Bypass is upstream of the typical delta smelt distribution, which generally remains downstream of Isleton, but the species is known to occur in the Bypass and could occasionally range as far upstream as the project site.

Delta smelt is semi-anadromous, and at all life stages, individuals are found in greatest abundance in the water column, and usually not in close association with the shoreline. Most delta smelt live for 1 year. The species is typically found in shallow water (<10 feet) where salinity ranges from 2 to 7 parts per thousand (ppt), but they have been observed at salinities between 0 and 18.4 ppt (Moyle 2002). During their spawning migration, adults move into the freshwater channels and sloughs of the Delta between December and January. Spawning occurs between January and July, with peak spawning from April through mid-May (Moyle 2002). Laboratory experiments have found eggs to be adhesive and demersal (i.e., sinking to or deposited on the bottom of a body of water); they are usually attached to substrate, likely composed of gravel, sand, or other submerged material. Newly hatched larvae are semi-buoyant, which allows them to stay near the bottom; as their fins and swim bladder develop, they move higher into the water column and are washed downstream to the open waters of the estuary (Moyle 2002). The triggers for and duration of delta smelt larval movement from spawning areas to rearing areas is not known. Most young-of-the-year rear in the low-salinity zone from late spring through fall and early winter, but some remain upstream of this zone, particularly in the Cache Slough complex, including Liberty Island and the Sacramento Deepwater Ship Channel (Sommer et al. 2011; Sommer and Mejia 2013).

River Lamprey

River lamprey (*Lampetra ayresi*) is a CDFW Species of Special Concern thought to occur throughout Pacific Coast streams. Little is known about their distribution and life history within California, but they seem to be primarily associated with the lower portions of certain large river systems, and most records for the State are from the Lower Sacramento-San Joaquin River system (Moyle 2002). The species has been documented in the Yolo Bypass (Sommer et al. 2001).

Like Pacific lamprey, river lamprey is anadromous, with a long freshwater rearing period. Adults return to freshwater in fall and winter, and spawning usually occurs in gravelly riffles in small tributary streams from February through March, after which the adults typically die. Ammocoetes remain in silt and sand substrates, where they filter feed on algae and detritus for approximately 3–5 years before migrating to the ocean in late spring. Good water quality and temperatures not exceeding 77 degrees Fahrenheit (°F) are believed necessary for their survival (Moyle 2002). Their metamorphosis into adults begins in July (Beamish 1980) and is not complete for about 9–10 months, until around April of the following spring. During this time, they are believed to live in deep waters of the river channel. Just prior to the completion of metamorphosis, the juvenile lampreys (macropthalmia) congregate immediately upstream of salt water and enter the estuary or ocean from May to July (Beamish and Youson 1987). Adults spend 3–4 months in salt water, remaining close to shore.

Sacramento Hitch

Sacramento hitch (*Lavinia exilicauda exilicauda*) is a CDFW Species of Special Concern. Hitch were once found throughout the Sacramento and San Joaquin Valleys in low elevation streams and rivers, as well as in the Delta, but today they are absent from the San Joaquin River and the lower reaches of its tributaries. In the Sacramento River, hitch appear to be spread in scattered populations across much of their native range, up to and including Shasta Reservoir (Moyle 2002); they are known to occur in the Yolo Bypass (Sommer et al. 2001).

Sacramento hitch inhabit warm, lowland, waters including clear streams, turbid sloughs, lakes, and reservoirs. In streams they are generally found in pools or runs among aquatic vegetation, although small individuals will also use riffles. Sacramento hitch prefer shallow (< 4 feet deep) stream habitats with smaller gravel to mud substrates. Hitch have high temperature tolerances and can tolerate low salinities, up to 9 ppt (Leidy 2007; Moyle 2002). Spawning takes place over gravel riffles, and can also occur on vegetation. After hatching, larvae become free-swimming in several days. Young-of-year hitch spend the next 2 months shoaling in shallow water or staying close to beds of aquatic plants, especially among emergent tules, before moving out into more open water. When floodplains are available, hitch will use them for rearing (Moyle et al. 2007).

Central Valley Steelhead

The Central Valley steelhead (*Oncorhynchus mykiss*) DPS is Federally listed as Threatened. Designated critical habitat includes all river reaches accessible to steelhead in the Sacramento and San Joaquin Rivers and their tributaries, including the Yolo and Sacramento Bypasses. Wild steelhead are now mostly confined to the upper Sacramento River downstream of Keswick Dam; upper Sacramento River tributaries such as Deer, Mill, and Antelope Creeks; and the Yuba River downstream of Englebright Dam. Adults are known to use the Yolo Bypass during upstream migration, though Fremont Weir presents a passage barrier under low water conditions. Steelhead smolts have been found in the Yolo Bypass during the period of winter and spring inundation (Sommer et al. 2001).

Steelhead have a highly variable life history throughout their range, but are broadly categorized into winter and summer reproductive ecotypes. Winter steelhead is the most widespread reproductive ecotype and the only type currently present in Central Valley streams. These steelhead become sexually mature in the ocean, typically leave the ocean and begin migration to spawning areas in August through April, and spawn later in winter and spring (January through April). Spawning occurs in waterways where cool, well-oxygenated water is available year round. Initially, juvenile steelhead are found in or near their natal spawning streams, but as they grow and mature, juveniles may move downstream into larger stream segments. Most juvenile Central Valley steelhead spend 2 years in freshwater (Busby et al. 1996). Juvenile migration to the ocean generally occurs from December–August, peaking in January to May (McEwan 2001); however, many juveniles may emigrate as young-of-the-year. Individual steelhead may spawn more than once, returning to the ocean between each spawning migration (NMFS 2014).

Central Valley Spring-run Chinook Salmon

The Central Valley spring-run Chinook salmon ESU is Federally and State-listed as Threatened. Designated critical habitat includes the San Francisco Bay-Delta estuary, mainstem Sacramento River upstream to Keswick Dam, and most of the Sacramento Valley’s perennial tributaries with established spring salmon runs; Tule Canal/Toe Drain and the Sacramento Bypass are included in the critical habitat designation. Historically, this ESU was the most abundant run of Central Valley Chinook salmon, but current surveys indicate that consistent runs of naturally produced fish are found only in Butte, Mill, and Deer Creeks; non-sustaining populations occur in Cottonwood, Battle, Antelope, and Big Chico Creeks. Adults of this ESU are expected to use the Yolo Bypass during upstream migration, and rearing juveniles may occur when the floodplain is inundated. If flows are not adequate to allow passage beyond

Fremont Weir to the Sacramento River, affected Chinook salmon will never spawn, because they do not descend to the estuary or ocean and return to spawn in another year.

Adult Central Valley spring-run Chinook salmon enter the mainstem Sacramento River in March–September, with the peak upstream migration occurring in May–June (Yoshiyama et al. 1998). They are sexually immature during upstream migration, and adults hold in deep, cold pools near spawning habitat until sexually mature. These salmon spawn in the upper reaches of the mainstem Sacramento River and tributary streams (NMFS 2014). Spawning typically begins in late August and may continue through October. Newly emerged fry remain in shallow, low-velocity edge water. Juveniles move into deeper water with higher current velocities as they grow, but they continue to use velocity refugia, such as complex channel margin habitat and backwater channels. Individuals appear to emigrate at two different life stages: fry and yearlings. Fry emigrate between February and June, while yearlings emigrate October to March, peaking in November. Juveniles may leave their natal streams as fry soon after emergence or rear for several months to a year before migrating as smolts or yearlings (Yoshiyama et al. 1998). Rearing occurs in natal streams, the mainstem of the Sacramento River, inundated floodplains, and the Delta. Downstream migration of yearlings typically coincides with the onset of the winter storm season, and migration may continue through March.

Sacramento River Winter-run Chinook Salmon

The Sacramento River winter-run Chinook salmon ESU is Federally and State-listed as Endangered. Designated critical habitat includes the Sacramento-San Joaquin Delta and mainstem of the Sacramento River; it does not include the Yolo or Sacramento Bypass. Adults of this ESU are expected to use the Yolo Bypass during upstream migration, and rearing juveniles may occur when the floodplain is inundated.

After spending 1–3 years in the Pacific Ocean, adults of this run leave the ocean to migrate through the Delta and into the Sacramento River system, beginning in November, and migrate upstream past Red Bluff Diversion Dam (RBDD) from December through July. The primary spawning habitat is above RBDD; though spawning has also been observed downstream of RBDD (NMFS 2001), spawning success below the dam may be limited by warm water temperatures (Yoshiyama et al. 1998). Winter-run Chinook salmon spawn from mid-April through August. Juveniles rear and emigrate from July through March. Peak abundance of juveniles moving downstream occurs at Red Bluff in September and October. Juveniles have been observed in the Delta between October and December, especially during high Sacramento River discharge caused by fall and early-winter storms, and may migrate through the Delta and San Francisco Bay to the ocean during November–May (Yoshiyama et al. 1998).

Central Valley Fall/Late Fall-run Chinook Salmon

The Central Valley fall–/late fall–run Chinook salmon (*Onchorhynchus tshawytscha*) ESU is a NMFS Species of Concern and CDFW Species of Special Concern. Adults of this ESU use the Yolo Bypass during upstream migration, and rearing juveniles may occur when the floodplain is inundated.

Adult Central Valley fall-run Chinook salmon migrate into the Sacramento River and its tributaries in June–December in mature condition and spawn in late September–December, soon after arriving at their spawning grounds. The spawning peak occurs in October and November. Emergence occurs in December–March, and juveniles migrate downstream through the Delta and out to the ocean soon after emerging, rearing in fresh water for only a few months. Smolt outmigration typically occurs in March–July (Yoshiyama et al. 1998). Central Valley late fall-run Chinook salmon migrate upstream before they are sexually mature and hold near the spawning grounds for 1–3 months before spawning. Upstream migration takes place in October–April and spawning occurs in late January–April, with peak spawning in February and March. Fry emerge in April–June, and juveniles rear in their natal stream during summer and remain throughout the year in some streams. Smolt outmigration can occur from November–May (Yoshiyama et al. 1998). Important habitat during juvenile rearing includes flooded bars, side channels, and overbank areas with relatively low water velocities, cover structures, space, and food. As juveniles grow, they typically move into deeper water with higher current velocities, but still use velocity refugia to minimize energy expenditures.

Sacramento Splittail

Sacramento splittail (*Pogonichthys macrolepidotus*) is a CDFW Species of Special Concern that is confined largely to the Delta, Suisun Bay, Suisun Marsh, and Napa Marsh. Yolo Bypass is known to support a major splittail spawning and nursery area (Sommer et al. 2011).

Splittail are capable of tolerating high salinities (<20 ppt) and low levels of dissolved oxygen (<1.0 milligrams/liter), but outside of the spawning season, the species is rarely found more than 5–10 miles above the upstream boundaries of the Delta (Moyle et al. 1989). Spawning runs, however, are more extensive (Sommer et al. 2011). Adults move upstream from late November to late January, foraging in flooded areas along the main rivers, bypasses, and tidal freshwater marsh areas before the onset of spawning. Feeding in flooded riparian areas before spawning may contribute to spawning success and adult survival after spawning (Moyle et al. 2004). Sacramento splittail migration appears closely tied to river outflow. In wet years with increased river flow, adults will move long distances upstream to spawn, allowing juvenile rearing in upstream habitats. The upstream migration is smaller during dry years, although larvae and juveniles are often found upstream of Sacramento to Colusa or Ord Bend on the Sacramento River (Moyle et al. 2004). Sacramento splittail are thought to be fractional spawners, with individuals spawning over a protracted period, often for as long as several months. Spawning typically occurs on inundated floodplains in February–June, with peak spawning in March and April. The eggs adhere to vegetation until hatching (Moyle 2002). Larval splittail are commonly found in shallow, weedy areas where spawning occurs and eventually move into deeper open-water habitats as they grow and become juveniles. Although juvenile Sacramento splittail are known to rear in upstream areas for a year or more, most move to shallow, productive bay and estuarine waters after only a few weeks (from April to August), often in response to flow pulses (Moyle et al. 2004).

Longfin Smelt

Longfin smelt (*Spirinchus thaleichthys*) is State-listed as Threatened. Though these smelt may range farther upstream, they are generally limited to waters downstream of Rio Vista. The Yolo Bypass is upstream of the typical longfin smelt distribution, which generally remains downstream of Rio Vista, but the species has been documented in the Bypass and could occasionally range as far upstream as the project site.

Adult longfin smelt generally migrate upstream to the Delta and spawn in freshwater areas as temperatures drop in fall. Longfin smelt typically spawn at 2 years old, but some females may spawn in their third year of life. The majority of spawning occurs in February–April. Spawning occurs over a variety of substrates, including sand, gravel, rocks, and plants. Larvae and early juveniles are subsequently found in upstream areas from January until early spring, when they migrate downstream (Moyle 2002). Larval abundance in the estuary peaks in January–March. Larvae are swept downstream into nursery areas in the western Delta and Suisun and San Pablo Bays.

4.4.2 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to fish and aquatic organisms apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Federal Endangered Species Act – Applies to project design, construction, and the impact analysis.
- Magnuson-Stevens Fishery Conservation and Management Act – Applies to project construction and the impact analysis.
- Section 404 of the Clean Water Act – Applies to project construction and the impact analysis.
- Section 401 of the Clean Water Act – Applies to project construction and the impact analysis.

State

The following State plans, policies, regulations, or laws related to fish and aquatic organisms apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- California Endangered Species Act – Applies to project design, construction, and the impact analysis.
- California Fish and Game Code—Streambed Alteration – Applies to project construction and the impact analysis.
- Porter-Cologne Water Quality Control Act – Applies to project construction and the impact analysis.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to fish and aquatic organisms are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County 2030 General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan (Yolo County 2009) regarding fish and aquatic organisms are relevant to project design, construction, and/or the impact analysis of the project (See Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

4.4.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

Methodology

This analysis of environmental consequences (impacts) to fish and other aquatic organisms that could result from the project focuses on evaluating the potential for the project to adversely affect special-status fish and their habitats. The evaluation considers temporary and permanent habitat loss and disturbance that would occur, potential for injury or death of individual fish during construction and as a result of stranding, and adverse effects on water quality during and after construction. Information on activities and habitat conditions that could adversely affect special-status fish is based on scientific publications, agency documents, and other relevant sources. Impact conclusions consider the magnitude of the effect, such as habitat quality, impact extent, impact duration, and impact intensity (e.g., level of harm, injury/loss, or degradation suffered by the resource). An impact of substantial magnitude is considered a significant impact.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. EPA's comments on the NOI indicated the EIS/EIR should identify all threatened and endangered species and critical habitat that could occur in the project site and vicinity, identify and quantify which species and habitats could be affected, and include mitigation for impacts to these species, with emphasis on protection and recovery of the species. The comments also indicated the project could allow operational changes to the Sacramento River Flood Control Project that could have beneficial impacts and that these operational changes and their impacts should be discussed. As requested, impacts on relevant species and critical habitat designations are evaluated below and mitigation measures are identified where appropriate. This includes identification of potential beneficial impacts that could result from expansion of the floodplain.

Input was directly sought from fish and wildlife regulatory agencies: NMFS, USFWS, and CDFW. Comments from agency staff primarily focused on opportunities for habitat enhancement and restoration, but several concerns regarding adverse effects were also identified, including potential for concentrated agricultural runoff from the levee setback area to attract large-bodied fishes and potential to affect fish passage and increase fish stranding risks. As requested, these potential beneficial and adverse effects are evaluated below.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity), as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to biological resources – fish and aquatic organisms if they would do any of the following:

- have a substantial adverse effect, either directly or through habitat modifications, on any fish species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by NMFS, USFWS, or CDFW;
- adversely modify designated critical habitat for any Federally listed species;
- interfere substantially with the movement of any native resident or migratory fish species;
- substantially diminish habitat for any fish life stage, or result in displacement of spawning fish such that year-class strength is substantially reduced, or involve production and discharge of materials that pose a hazard to fish species; or
- conflict with any local policies or ordinances protecting biological resources, such as provisions of an adopted Habitat Conservation Plan (HCP), Natural Communities Conservation Plan (NCCP), or other approved local, regional, or State habitat conservation plan.

Impacts related to riparian habitats and wetlands are discussed in Sections 4.5, "Biological Resources – Vegetation and Wildlife," and 4.6, "Biological Resources – Wetlands and Other Waters of the United States."

Issues Not Discussed Further in this EIS/EIR

Conflict with Provisions of an Adopted HCP or NCCP—The project site is within the planning area for the Yolo HCP/NCCP, which provides a framework to improve conservation of natural resources, including endangered species habitat, while streamlining the permitting process for planned development, infrastructure, and maintenance activities. The Second Administrative Draft of the HCP/NCCP (Yolo County HCP/NCCP Joint Powers Authority 2015) was issued in March 2015. However, the HCP/NCCP has not yet been adopted by participants or approved by the regulatory agencies. In addition, the HCP/NCCP does not cover listed fish species or populations. Therefore, consistency of the project with this conservation plan is not required to be analyzed under CEQA or NEPA; therefore, such analysis is not included in this EIS/EIR.

Introduction of Aquatic Invasive Species—Operation of barges and other in-water equipment originating from areas outside the project site can introduce and spread invasive aquatic animals and plants. However, no barges or other equipment that could harbor invasive aquatic animals and plants would be used during project construction. Therefore, potential for such impacts from the project is negligible to nonexistent and not analyzed further in this EIS/EIR.

Impact Analysis

Table 4.4-3 provides a summary of biological resources – fish and aquatic organism impacts and mitigation measures for all alternatives under consideration.

Table 4.4-3. Summary of Impacts and Mitigation Measures—Biological Resources – Fish and Aquatic Organisms

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
FISH-1: Temporary Disturbance of Fish, Habitat Degradation, and Adverse Effects on Fish Health during Construction Activities	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	GEO-2: Acquire Appropriate Regulatory Permits, and Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices, and Comply with Yolo County Improvement Standards for Grading and Erosion Control when Relocating County Road 124 and any Associated Drainage Facilities HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities WQ-1: Limit Ground-disturbance to Construction Areas and Avoid and Limit Disturbance to Stream Banks and Habitats when Feasible WQ-2: Install, Monitor, and Maintain Erosion Control Measures to Minimize Soil or Sediment from Entering Waterways or Wetlands	LTS
FISH-2: Loss or Degradation of Riparian and Shaded Riverine Aquatic Cover Associated with Levee Construction and Degradation	Alternative 1: No Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	B	None	B
FISH-3: Degradation and Contamination of Aquatic Habitat and Adverse Effects on Fish Health and Survival Associated with Exposure of Disturbed Soils and Contaminated Materials	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	GEO-2: Acquire Appropriate Regulatory Permits, and Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices, and Comply with Yolo County Improvement Standards for Grading and Erosion Control when Relocating County Road 124 and any Associated Drainage Facilities HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities	LTS

Table 4.4-3. Summary of Impacts and Mitigation Measures—Biological Resources – Fish and Aquatic Organisms

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
			HAZ-2c: Implement Remediation of Old Bryte Landfill	
FISH-4: Fish Stranding in Expanded Setback Levee Areas Associated with Enhanced Floodplain Inundation	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
FISH-5: Increases in Aquatic Habitat Associated with Expanded Floodplain Area	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	B	None	B
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact FISH-1: Temporary Disturbance of Fish, Habitat Degradation, and Adverse Effects on Fish Health during Construction Activities.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, there would be no disturbance of fish, habitat degradation, or effects on fish health during construction activities. Therefore, there would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

The project site for all action alternatives is almost entirely restricted to areas landside of the Yolo Bypass East Levee and Sacramento Bypass North Levee. Consequently, aquatic habitat present on the project site is primarily limited to canals and agricultural ditches that do not provide suitable habitat for special-status fish. Project components that would be implemented landside of the existing levees, such as setback levees, seepage berm, cutoff walls, and relief wells, would not affect habitat used by special-status fish. Construction activities that would occur in or adjacent to suitable habitat for special-status fish include degrading the existing Yolo Bypass East Levee and Sacramento Bypass North Levee and implementing ecosystem project elements in levee degrade areas and potentially in canals along the waterside levee toes (e.g., Tule Canal). If activities occur within these canals, such activities would focus on habitat improvements, including enhancing hydrologic connectivity with canals in the setback area and, if necessary, reducing potential for fish stranding. Armoring the Sacramento Bypass Training Levee and remnants of the Yolo Bypass East Levee would also occur adjacent to fish habitat.

These construction activities would result in temporary noise and physical disturbance adjacent to fish habitat. If habitat improvements include work within fish habitat, individual fish could be injured or killed by equipment or loose material or become stranded in dewatered areas, but potential for such impacts would be lessened by implementing habitat improvements outside of the flood season, when water levels are low, no spawning is taking place, and the number of special-status fish present in the bypass areas is relatively low. Construction activities also could have adverse effects on water quality that may affect fish health. Noise and other disturbances would be limited to the immediate construction area, affecting small numbers of individuals. Erosion and resulting increases in turbidity and suspended sediment associated with ground-disturbing activities could extend beyond the immediate construction area and result in short- to long-term effects on health and survival of fish and aquatic resources. Release of contaminants into aquatic habitat could have similar adverse effects.

Armoring the Sacramento Bypass Training Levee and degrading the Yolo Bypass East Levee and armoring its levee remnants would create short-term noise and other disturbance adjacent to Tule Canal and the canal along the waterside toe of the Training Levee. If special-status fish are present in the canals, noise and disturbance from construction activities could displace adult and juvenile fish from cover, potentially increasing their susceptibility to mortality by predation, or disrupt essential behaviors such as foraging and migration. Direct mortality or injury of individuals present during levee degradation and armoring is very unlikely to occur, because no in-water construction would be required for these construction activities and noise levels from activities along the adjacent levees are unlikely to be high enough to cause such effects. In addition, the number individuals affected would be reduced by conducting construction activities along the levees outside of the flood season, when the number of special-status fish present in the Bypasses is relatively low. Therefore, if special-status fish are present during armoring or levee degradation activities, the number of individuals that could be affected is anticipated to be very small.

Related to long-term impacts, armoring the Sacramento Bypass Training Levee and Yolo Bypass East Levee remnants is necessary to reduce future erosion and, for the levee remnants, allows them to continue to function as habitat and create adjacent habitat without armoring on a long-term basis. Although armored habitat is much less valuable than natural habitats for fish, and can increase non-native fish predation on native species, the overall benefits to fish and aquatic resources from the increased floodplain habitats and riparian habitat enhancements are beneficial and the relatively small area requiring long-term armoring is considered to be a less-than-significant impact.

Ground-disturbing project activities in or adjacent to Tule Canal and canals along the waterside toe of the Training Levee and Sacramento Bypass North Levee could result in increased turbidity and sedimentation of aquatic habitats within the canals if soil falls into the canals or is carried to the canals by surface runoff. Increases in turbidity and sedimentation would not necessarily be limited to the immediate area and could affect downstream portions of Tule Canal. Increased turbidity could temporarily disrupt essential fish behaviors, and high levels of suspended sediments could displace fish from high-quality habitat. Increased sediment loading could degrade food-producing habitat downstream as well, by interfering with photosynthesis of aquatic flora and displacing aquatic fauna. Many fish are sight feeders, and turbid waters reduce the ability of these fish to locate and feed on prey. Potential also exists for contaminants such as fuels, oils, and other petroleum products used in construction activities to be introduced into the canals in the event of a spill or if carried by surface runoff. Contaminants may be toxic to fish or may alter oxygen diffusion rates and cause acute and chronic toxicity to aquatic organisms, thereby reducing growth and survival. Potential for sediment and contaminants to be carried to canals in the Bypasses via surface runoff is relatively low, because construction would occur during the dry season. However, there is potential for accidental spill of soils and contaminants if proper avoidance and containment measures are not in place.

All of the action alternatives would include construction of the same types of features, but the extent of ground-disturbance adjacent to Tule Canal would vary, depending on how much of the levee would be degraded. As a result, the extent of construction activities that could result in the types of impacts described above would also differ. Levee degradation adjacent to Tule Canal would be greatest under Alternative 3 (5.9 miles) and least under Alternative 4 (2.7 miles); Alternatives 2 would disturb 4.9 miles along Tule Canal, and Alternative 5 would disturb 3.3 miles. Disturbance adjacent to Tule Canal would also result from implementing ecosystem project elements and could vary among alternatives, but these elements have not been developed sufficiently to evaluate potential differences between the alternatives.

Disturbance from levee degradation and armoring adjacent to habitat for special-status fish in Tule Canal and canals along the Training Levee and Sacramento Bypass North Levee would be relatively minor. Additional impacts on special-status fish and their habitat could occur if in-water ecosystem project elements are implemented, but such activities would be focused on improving floodplain connectivity and avoiding fish stranding. The number of fish affected may be higher under Alternatives 2 and 3, because the extent of disturbance in and adjacent to Tule Canal would be higher. However, all of the action alternatives are anticipated to affect a relatively small number of fish, because project construction would occur when the number of fish present in and adjacent to the project site would be low. In addition, construction would occur outside of the spawning season for Sacramento splittail, the only special-status species likely to spawn in the Bypasses, and no spawning individuals would be displaced by construction activities. All action alternatives could also result in increased turbidity and sedimentation and contamination of fish habitat in Tule Canal. Potential for such effects may be greater under Alternatives 2 and 3, because construction activities would extend farther north along the canal. These adverse effects to water quality could extend to downstream portions of Tule Canal and affect the health and survival of a substantially higher number of fish than may be present in and adjacent to the project site. Therefore, this impact would be **potentially significant**. Mitigation Measures GEO-2, HAZ-1, WQ-1, and WQ-2, described below, have been developed to address this impact.

Mitigation Measure GEO-2: Acquire Appropriate Regulatory Permits, and Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices.

Please refer to Impact GEO-2 in Section 4.11, "Geology, Soils, and Paleontological Resources," for the full text of this mitigation measure.

Mitigation Measure HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.

Please refer to Impact HAZ-1 in Section 4.13, "Hazards and Hazardous Materials," for the full text of this mitigation measure.

Mitigation Measure WQ-1: Limit Ground-disturbance to Construction Areas and Avoid and Limit Disturbance to Stream Banks and Habitats when Feasible.

Please refer to Impact WQ-1 in Section 4.22, "Water Quality," for the full text of this mitigation measure.

Mitigation Measure WQ-2: Install, Monitor, and Maintain Erosion Control Measures to Minimize Soil or Sediment from Entering Waterways or Wetlands.

Please refer to Impact WQ-1 in Section 4.22, "Water Quality," for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measures GEO-2, HAZ-1, WQ-1, and WQ-2 would reduce the potential effects associated with the potential for erosion, increased sedimentation and turbidity, and release of contaminants to surface water during and following construction of all action alternatives to a **less-than-significant** level because Best Management Practices (BMPs) and requirements of a Storm Water Pollution Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasures Plan will include installing and maintaining erosion control measures, minimizing potential for contamination and increased sedimentation, and minimizing effects of accidental contamination.

Impact FISH-2: Loss or Degradation of Riparian and Shaded Riverine Aquatic Cover Associated with Levee Construction and Degradation.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, “No Action/No Project Alternative,” under “Consequences of No Action.”

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, no construction-related effects would occur under this alternative, but existing O&M practices would continue. Though the mechanism may largely be passive, these practices would likely include elimination over time of vegetation waterside of the Yolo Bypass East Levee and Sacramento Bypass North Levee that provides SRA cover and a source for IWM. However, relatively little vegetation is present along these levees, compared to the west side of Tule Canal and elsewhere in the Sacramento Bypass. Because the ecosystem project elements would not be implemented under the No Action Alternative, the riparian habitat enhancements included in all of the action alternatives would not be implemented. Other riparian and SRA cover enhancements could result from implementing actions to restore floodplain rearing habitat in the Yolo Bypass, as required by the USFWS and NMFS Biological Opinions for Central Valley Project and State Water Project long-term operations (BiOps) (see Chapter 5, “Cumulative Impacts”). Therefore, the No Action Alternative would have a **less-than-significant** impact to habitat used by special-status fish at the project site.

Alternatives 2 through 5: All Action Alternatives

SRA cover and riparian vegetation on the project sites for all action alternatives is currently limited to areas adjacent to suitable perennial and seasonal habitat for special-status fish habitat in the Yolo and Sacramento Bypasses. Perennial canals, such as Tule Canal, support aquatic habitat immediately adjacent to the project site. In addition, the Bypasses provide seasonal floodplain habitat that can extend up to the project site boundary when the floodplain is inundated. None of alternatives would modify these waterside canals or the greater floodplain area. However, habitat along the canals, near the waterside toe of the Yolo Bypass East Levee and Sacramento Bypass North Levee, could be removed by degrading portions of the existing levees. This could result in removal of shoreline riparian vegetation that provides SRA cover and could be important as a source of food, moderator of water temperatures, and source of IWM that provides refugia from predators, variation in water velocities, and habitat for aquatic invertebrates.

Removal of riparian vegetation would be avoided to the greatest extent possible, and the existing levees are generally anticipated to be degraded to elevations above where most riparian vegetation occurs. Very little, if any, SRA cover would be removed during levee degradation because the general degrade elevation is above the canal shorelines. In some targeted locations, however, additional material may be excavated as part of the ecosystem project elements to enhance hydrologic connection between the current Yolo Bypass area and the future levee setback area and, if necessary, to reduce potential for fish stranding. A primary goal of this excavation would be to maximize opportunities to enhance fish habitat.

Therefore, removal of SRA cover and riparian vegetation in these areas would be minimized and would only occur when it is determined that a greater ecological benefit to fish and their habitat would result. Unavoidable loss of SRA cover and riparian vegetation would be very small relative to the amount of these habitats that would remain along Tule Canal and Sacramento Bypass. In addition, habitat loss would be offset by planting riparian vegetation along the proposed Tule Canal habitat corridor and elsewhere adjacent to aquatic habitat that would be incorporated into the expanded Bypass areas. Implementing future O&M activities is not anticipated to require modification of aquatic or riparian habitat used by special-status fish, because no such habitat would be present along the setback levee when it is constructed, and implementing O&M activities should prevent riparian vegetation from becoming established within the maintenance zone.

The amount of SRA cover and riparian vegetation removal would likely be greatest under Alternative 3, because the entire existing Yolo Bypass East Levee between I-5 and the Sacramento Bypass would be degraded. SRA habitat removal would be least under Alternatives 4 and 5, because none of the levee would be degraded in the northern portion of the project site. Based on the preliminary levee degradation footprints, riparian loss along the east side of Tule Canal would be less than 1.5 acres under Alternatives 2 and 3, and less than 0.5 acre under Alternatives 4 and 5. No riparian vegetation is expected to be removed along the Sacramento Bypass North Levee or the Training Levee.

Implementing any of the action alternatives would increase seasonal floodplain habitat, making perennial aquatic habitat and associated riparian cover in the setback area accessible to special-status fish when the Bypass areas are expanded. As a result of this floodplain expansion and the riparian planting component of the ecosystem project elements, all action alternatives would result in an overall net increase in the amount of riparian habitat and seasonally available SRA cover. The amount of riparian habitat that would be created from planting and floodplain expansion is anticipated to be relatively similar among action alternatives. In addition, none of the action alternatives would adversely modify EFH for Chinook salmon or designated critical habitat for green sturgeon, steelhead, or spring-run Chinook salmon. Therefore, all of the action alternatives would have a **beneficial** impact on riparian habitat and SRA cover for special-status fish.

Mitigation Measure: No compensatory mitigation is required.

Impact FISH-3: Degradation and Contamination of Aquatic Habitat and Adverse Effects on Fish Health and Survival Associated with Exposure of Disturbed Soils and Contaminated Material.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. No construction-related effects would occur under this alternative, but existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, “No Action/No Project Alternative,” under “Consequences of No Action.”

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site with the exception of remediation of the Old Bryte Landfill, there would be no construction and exposure of the expanded floodplain to inundation under this alternative, there would be no degradation or contamination of habitat or effects on fish health from exposure of disturbed soils or contaminated materials in the setback area. Therefore, there would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

Soils disturbed during project activities landside of the levees could be suspended by floodwaters when the expanded floodplain inundates for the first time. Increased turbidity could occur in the setback area, and turbidity and sedimentation could increase downstream of the project site as floodwaters recede. As described above under Impact FISH-1, increased turbidity could temporarily disrupt essential fish behaviors, and high levels of suspended sediments could displace fish from high-quality habitat and degrade food-producing habitat. Turbid waters reduce the ability of these fish to locate and feed on prey, and some fish, particularly juveniles, could become disoriented and leave areas where their main food sources are located. If contaminants from construction activities, including contaminated material from the former Old Bryte Landfill, are present in exposed soil, contaminants could be released into the water when the setback area is inundated during flood events.

All of the action alternatives could result in increased turbidity, sedimentation, and contamination of floodwaters in and downstream of the setback area. Because the size of the setback area would vary among alternatives, the extent of special-status fish habitat that could be affected in the expanded floodplain would also vary. Alternative 2 could affect approximately 1,000 acres of expanded floodplain, Alternative 3 could affect 1,300 acres, Alternative 4 could affect 900 acres, and Alternative 5 could affect 600 acres. However, all alternative project sites include the former Old Bryte Landfill.

Habitat degradation through sedimentation, increased turbidity, or contamination could occur over a large area when the setback area floods for the first time; this could substantially adversely affect fish habitat, including EFH for Chinook salmon and designated critical habitat for green sturgeon, delta smelt, steelhead, and spring-run Chinook salmon. If these adverse effects are severe enough, they could affect the health and survival of individual fish and other aquatic organisms and overall populations present in the Yolo and Sacramento Bypasses when flooding occurs. Furthermore, the Old Bryte Landfill is currently present within the expanded floodplain associated with each action alternative. Although the No Action Alternative (the NEPA baseline for comparison) includes remediation of the landfill (as described in Chapter 3, “Alternatives”), the existing condition used as the CEQA baseline does not include the landfill remediation. Although no borrow material would be taken from the landfill material, the presence of the landfill could result in contamination of fish habitat (for consideration in the CEQA analysis only). The impact associated with exposure to disturbed soils would be **potentially significant** for both CEQA and NEPA. Mitigation Measures GEO-2, HAZ-1, and HAZ-2c, described below, have been developed to address this impact.

> **Mitigation Measure GEO-2: Acquire Appropriate Regulatory Permits, and Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices.**
>
> Please refer to Impact GEO-2 in Section 4.11, “Geology, Soils, and Paleontological Resources,” for the full text of this mitigation measure.

Mitigation Measure HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.

Please refer to Impact HAZ-1 in Section 4.13, "Hazards and Hazardous Materials," for the full text of this mitigation measure.

Mitigation Measure HAZ-2c: Implement Remediation of Old Bryte Landfill (CEQA Only).

Please refer to Impact HAZ-2c in Section 4.13, "Hazards and Hazardous Materials," for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measures GEO-2 and HAZ-1 would reduce the potential effects associated with the potential for erosion, increased sedimentation and turbidity, and release of contaminants to surface water during and following construction of all action alternatives to a **less-than-significant** level because BMPs and requirements of a SWPPP and Spill Prevention Control and Countermeasures Plan will include installing and maintaining erosion control measures, minimizing potential for contamination and increased sedimentation, and minimizing effects of accidental contamination. Implementation of Mitigation Measure HAZ-2c by SAFCA would ensure complete remediation of the Old Bryte Landfill prior to project construction.

Impact FISH-4: Fish Stranding in Expanded Setback Levee Areas Associated with Enhanced Floodplain Inundation

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. No construction-related effects would occur under this alternative, but existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, no new potential fish stranding hazards in the levee setback area would be exposed to inundation. Actions to improve fish passage in the Yolo Bypass, as required by the USFWS and NMFS BiOps, are being aggressively pursued (see Chapter 5, "Cumulative Impacts"). Such actions would reduce the number of special-status fish that become stranded in the Yolo Bypass, but no additional floodplain habitat with potential stranding risk would be created in the project site under the No Action Alternative. Therefore, the No Action Alternative would have no impact on fish survival.

Alternatives 2 through 5: All Action Alternatives

Degrading the existing levees would expose the area between the levees and the proposed setback levee to seasonal flooding. As water levels lower, topographic low points could remain inundated but become isolated from receding floodwaters and result in fish stranding. Although borrow would be excavated from the setback area to construct the setback levee, and some existing canals and ditches may persist in the setback area, a key component of the project is continued agricultural production. As a result, the setback area would be designed and graded appropriately to facilitate future agricultural use, including proper drainage following floodplain inundation to minimize potential for fish stranding. Under current conditions, the Yolo and Sacramento Bypass floodplain is relatively well-drained as a result of land-grading for agriculture. Other than agricultural berms, no major topographic features impede the drainage of flood flows (Natural Heritage Institute et al. 2002), and the Toe Drain provides a perennial conduit for drainage to pass to waterways farther south in the Delta. The project would integrate with this larger Bypass drainage system, avoiding topographic features that could increase risk of fish stranding. In addition, the setback area drainage system would be designed to minimize attraction of fishes into dead-end drainage and irrigation infrastructure that could interfere with fish movements, impede passage, or increase stranding potential. To further minimize potential for fish stranding, portions of Tule Canal and the canal along the waterside toe of the Sacramento Bypass North Levee also could be altered if their existing conditions represent a fish-stranding hazard. Although the size of the setback area would differ among alternatives, these design objectives to minimize interference with fish movement and potential for fish stranding would apply to all of the action alternatives and potential for adverse effects is not expected to greatly differ among alternatives. Therefore, degrading the existing levee under all action alternatives would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Impact FISH-5: Increases in Aquatic Habitat Associated with Expanded Floodplain Area.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. No construction-related effects would occur under this alternative, but O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

Actions to restore floodplain rearing habitat in the Yolo Bypass, as required by the USFWS and NMFS BiOps, are being aggressively pursued (see Chapter 5, "Cumulative Impacts"). These include objectives to provide significantly increased acreage of seasonal floodplain rearing habitat. However, these improvements would not occur on the project site in this alternative; there would be **no impact** related to increased aquatic habitat on the project site.

Alternatives 2 through 5: All Action Alternatives

As described above under "Environmental Setting," floodplains provide vital habitat and resources for aquatic animals, including high-quality foraging habitats for larval and juvenile fish and spawning habitat for Sacramento splittail. Implementing any of the action alternatives would expand the Yolo and Sacramento Bypass floodplain and increase seasonal aquatic habitat for special-status fish. Benefits of this floodplain expansion for larval and juvenile salmonids could be maximized if habitat complexity is provided, such as diversity in water temperature, refugia from swift water, and cover and structure for predator avoidance. The extent to which such components would be incorporated into the project is not known at this time, but expanding the floodplain and increasing the amount of aquatic habitat is likely to result in some degree of beneficial effects compared to the existing conditions, regardless of the resulting habitat complexity. Because the length of the setback levee would vary among alternatives, the extent of floodplain expansion would also vary: Alternative 2 would result in approximately 1,000 acres of additional floodplain, Alternative 3 would result in 1,300 acres, Alternative 4 would result in 900 acres, and Alternative 5 would result in 600 acres. Because of the considerable extent of floodplain expansion under all of the alternatives, each would result in a substantial increase in seasonal aquatic habitat for special-status fish. The extent of these benefits, however, would relate directly to the amount of floodplain expansion, with greater benefit resulting from the greater floodplain expansion (i.e., as under Alternatives 2 and 3). Aquatic habitat benefits would also integrate well with other ongoing and future projects to restore floodplain rearing habitat and improve fish passage in the Yolo Bypass, as required by the USFWS and NMFS BiOps, Therefore, all of the action alternatives would have a **beneficial** impact.

Mitigation Measure: No compensatory mitigation is required.

Residual Significant Impacts

Impacts to fish and aquatic organisms related to loss or degradation of riparian and SRA cover, stranding in expanded setback levee areas, and increases in aquatic habitat would be less than significant or beneficial. With implementation of Mitigation Measures GEO-2, HAZ-1, and HAZ-2c, impacts related to habitat degradation and adverse effects on fish health and survival during construction activities and associated with exposure of disturbed soils and contaminations material would be reduced to less-than-significant levels. Therefore, no residual significant impacts would occur.

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4.5 Biological Resources – Vegetation and Wildlife

4.5.1 Environmental Setting

Methodology and Surveys

The biological study area (referred to as "study area") consists of the project site, including borrow areas and haul routes, and a 200-foot-wide buffer surrounding the site. The environmental setting is based on observations made during field surveys, review of aerial photographs, and information obtained from a variety of sources that address biological resources in the study area and the larger region. Several online biological data resources were queried, including the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB), the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation tool, and the California Native Plant Society (CNPS) Inventory of Rare and Endangered Vascular Plants of California. Numerous additional sources of information on individual plant and wildlife species were also reviewed.

DWR environmental scientists conducted biological resource field surveys within the study area on March 8; April 4 and 6; June 23; July 27; August 1, 2, 11, 12, 15, 17, and 26; and September 1,9, 20, and 27, 2016 (DWR 2016e, f, g). The purpose of these surveys was to characterize general biological resources, map vegetation and land cover within the study area, and assess the potential for the study area to support special-status species and other sensitive biological resources. Locations of elderberry (*Sambucus nigra* subsp. *caerulea*) shrubs in and near the study area were mapped, and aquatic habitat in and near the study area was evaluated for the potential to support giant garter snake (*Thamnophis gigas*). No protocol-level plant or wildlife surveys were conducted. Vegetation and land cover were mapped onto aerial photographs during the field surveys. The polygons were later digitized into a GIS overlay and used to create maps depicting the location and extent of each cover type present in the study area.

Environmental Setting Description

Land Cover and Vegetation

The study area lies within the northeastern Sacramento Valley geographic subdivision of the Great Central Valley of the California Floristic Province (Baldwin et al. 2012). This area has a typical Mediterranean climate with hot, dry summers and cool, wet winters, with an average annual rainfall of 17.1 inches typically occurring from October through April (Western Regional Climate Center [WRCC] 2016) and a mean annual temperature of 61.0 degrees Fahrenheit (˚F). The elevation is approximately 35 feet above mean sea level and the topography is naturally flat valley bottom.

The western boundary of the study area is formed by the Tule Canal, which is a perennial riparian channel on the eastern edge of the Yolo Bypass. The Sacramento Bypass is located along the west bank of the Sacramento River, approximately 2 miles upstream from the confluence with the American River, and its North Levee forms the southern boundary of the study area. East of the central portion of the study area is the Katchituli Oxbow Restoration Mitigation Site, which is an approximately 100-acre environmental restoration site that includes native riparian forest, elderberry savannah, and valley oak (*Quercus lobata*) woodland. Section 4.15, "Land Use and Planning, and Agricultural and Forestry Resources," includes a more detailed discussion about land use types in the study area.

The study area is comprised primarily of agricultural land and supports lesser amounts of other vegetation and land cover types (DWR 2016e, f). Table 4.5-1 lists the acreage of each vegetation and land cover type in the study area; Figure 4.5-1 depicts the land cover and vegetation within the study area.

Table 4.5.1 Acreage of Vegetation and Land Cover Types in the Biological Resources Study Area

Vegetation/Land Cover Type	Approximate Acreage
Agriculture	1,984
Annual Grassland	211
Aquatic	174
Developed	73
Riparian	147
Riparian Scrub	30

Source: Data collected by the California Department of Water Resources in 2016 and compiled by GEI Consultants Inc. in 2016

Agriculture. Agriculture is the predominant vegetation type in the study area. It consists primarily of row crops, including tomato (*Solanum* spp.), sunflower (*Helianthus* spp.), and safflower (*Carthamus* spp.). Approximately 110 acres of the study area are cultivated in alfalfa (*Medicago sativa).* A young walnut orchard is also present in the southeastern portion of the study area, and a small portion of a rice field is present in the southwestern portion of the study area. These agricultural areas, and the associated agricultural irrigation ditches, undergo regular anthropogenic manipulation such as harvesting and discing. Scattered native trees including valley oak, Fremont cottonwood (*Populus fremontii*), Goodding's black willow (*Salix gooddingii*), and black walnut (*Juglans nigra* and hybrids) are also present along the edges of the agricultural areas.

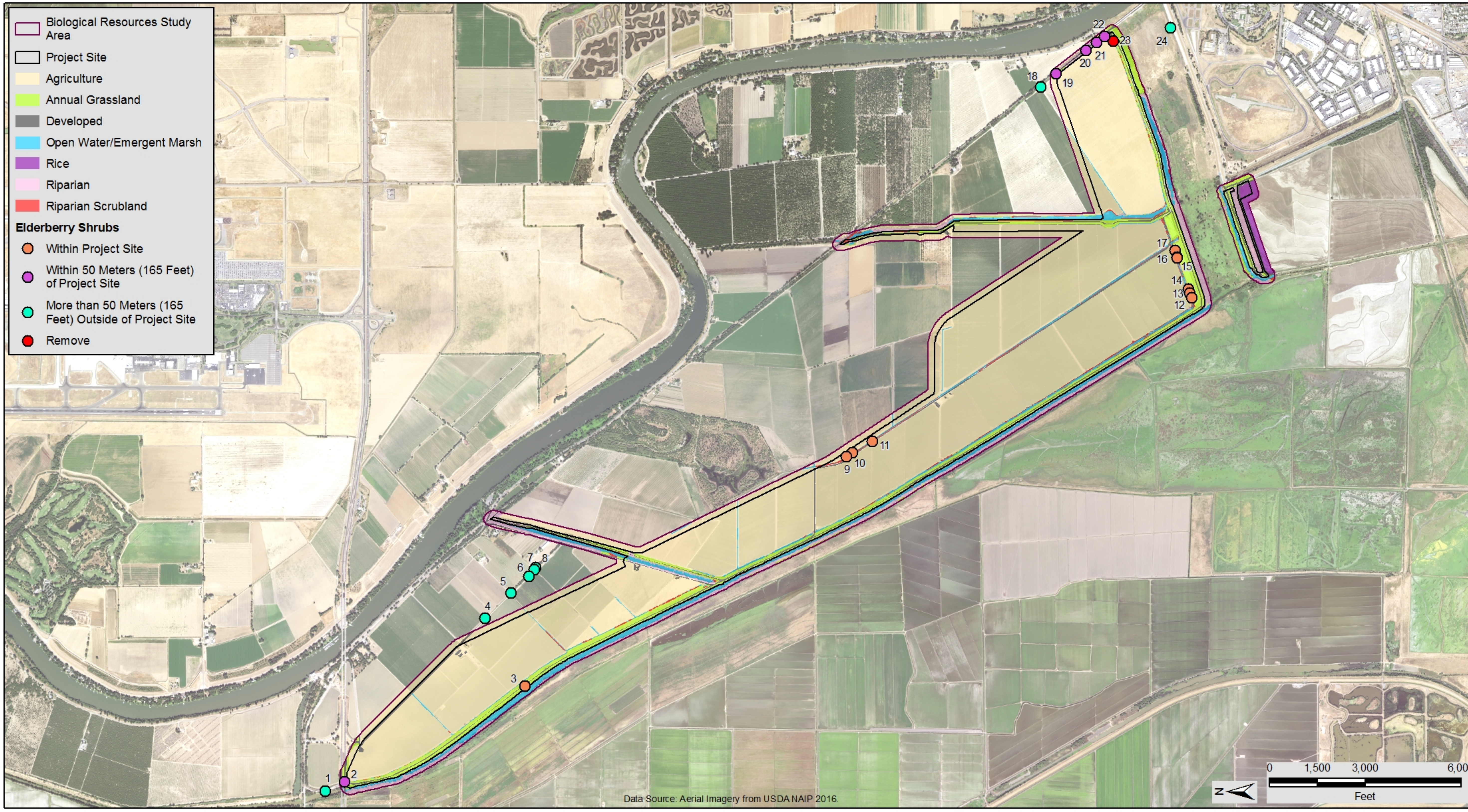
Annual Grassland. Annual grassland includes areas on the levee crown and slopes, toe roads, County and O&M roads, and a portion of the Sacramento Bypass. Annual grasslands are dominated by nonnative grass and forb species that are adapted to regular disturbance from vehicles and maintenance activities. Nonnative grasses include ripgut brome (*Bromus diandrus*), common wild oat (*Avena* fatua), slender wild oat (*Avena barbata*), false barley (*Hordeum murinum*), redstem filaree (*Erodium cicutarium*), black mustard (*Brassica nigra*), and soft chess brome (*Bromus hordeaceus*).

Aquatic. Aquatic includes open waters, such as irrigation and drainage canals and ditches, and emergent marsh. Open waters are bodies of water that are unvegetated for most of the water surface area, seasonally to year-round. These waters typically have flow or circulation, and vegetation occurs primarily along the water/land boundary. Occasionally, or seasonally for waters with fluctuating water surface elevations, floating vegetation may establish on the surface of these waterbodies. Species, such as water primrose (*Ludwigia peploides*) and water hyacinth (*Eichhornia crassipes*), can be present on the surface of these waterbodies during low water elevations. Emergent freshwater marsh species, such as cattail (*Typha latifolia*) and tule (*Schoenoplectus acutus* var. *occidentalis*), are present along the margins of open waters and where the water depth is shallow.

Developed. These areas are generally void of vegetation.

Riparian. Riparian vegetation characterized by over-story tree canopy occurs along canals, drainages, and ditches in the study area. Tree canopy is dominated by valley oak, Fremont cottonwood, box elder, Oregon ash (*Fraxinus latifolia*), arroyo willow (*Salix lasiolepis*), and Goodding's black willow

Figure 4.5-1. Vegetation and Land Cover Types in the Biological Resources Study Area



Source: GEI Consultants, Inc. 2016

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Riparian Scrub. Riparian scrub occurs along canals, drainages, and ditches, as well as adjacent to riparian tree canopy. Riparian scrub includes shrubby and herbaceous species, such as arroyo willow, narrowleaf willow (*Salix exigua*), Himalayan blackberry (*Rubus armeniacus*), California rose (*Rosa californica*), and poison hemlock (*Conium maculatum*).

Wildlife

Before European settlement, the Sacramento area floodplains supported a wide diversity and large numbers of wildlife species associated with its riparian habitats, permanent and seasonal wetlands, and oak woodlands and savannas. Much of this habitat was lost after levees were built to prevent flooding along the rivers, and land outside of the levees could be converted to agriculture. The abundance of species restricted to natural habitats has decreased, and in some cases particular species are no longer found. However, the remnant native habitats along the canals that are described above have allowed remnant wildlife populations to persist in the study area, and many species also use the agricultural and grassland habitats. In addition, natural and agricultural habitats in the adjacent Yolo and Sacramento Bypasses support cover, foraging, and breeding habitat for a wide variety of wildlife.

Based on observations made during field surveys conducted by DWR in spring 2016, a variety of birds use habitat in the study area for nesting and/or foraging (DWR 2016e, f). Species that were observed during the field surveys and are known or have potential to nest in or adjacent to the study area include Swainson’s hawk (*Buteo swainsoni*), red-tailed hawk (*Buteo jamaicensis)*, northern harrier *(Circus cyaneus)*, white-tailed kite (*Elanus leucurus*), American kestrel *(Falco sparverius)*, barn owl *(Tyto alba)*, great horned owl (*Bubo virginianus*), tree swallow *(Tachycineta bicolor)*, California towhee (*Melozone crissalis*), Anna's hummingbird (*Calypte anna*), house finch, (*Carpodacus mexicanus*), bushtit (*Psaltriparus minimus*), mourning dove (*Zenaida macroura*), California quail (*Callipepla californica*), American robin (*Turdus migratorius*), European starling (*Sturnus vulgaris*), western kingbird (*Tyrannus verticalis*), California scrub-jay (*Aphelocoma californica*), and red-winged blackbird (*Agelaius phoeniceus*) (DWR 2016e, f; California Department of Fish and Game [CDFG] 2008). Several raptor nests, as well as smaller nests, were observed in riparian habitat waterside of the Sacramento Bypass South Levee and the Yolo Bypass East Levee, from County Road 124 northward to I-5. Raptor nesting habitat along these levees is limited to a narrow corridor, often only one tree wide. More extensive habitat is available along the nearby Sacramento River and at the Katchituli Oxbow Restoration Mitigation Site. A heronry of at least 50 black-crowned night herons *(Nycticorax nycticorax)* was observed along the Yolo Bypass East Levee about 2,000 feet north from where County Road 124 turns to the east (DWR 2016e), and an egret rookery was found approximately 3/4 of a mile from the study area on the Sacramento River (DWR 2016f). In September 2016, DWR environmental scientists observed a small non-breeding satellite colony of tricolored blackbirds (*Agelaius tricolor*), with approximately 100 to 150 individuals, foraging along the Tule Canal, approximately 1.5 miles north of the Sacramento Bypass.

Several species of common amphibians, reptiles, and small- and medium-sized mammals are also likely to occur in the study area, although the diversity of species in these groups is likely to be much lower than the avian species because of their more limited mobility. Common amphibians, reptiles, and mammals that were observed during the field surveys (DWR 2016f) or are anticipated to occur in riparian, wetland, and/or grassland habitats in at least a portion of the study area include bullfrog (*Lithobates catesbeianus*), northwestern pond turtle (*Actinemys marmorata)*, red-eared slider (*Trachemys scripta elegans*), western fence lizard (*Sceloperus occidentalis*), gopher snake (*Pituophis catenifer*), Botta’s pocket gopher (*Thomomys bottae*), jackrabbit (*Lepus californicus*), California ground squirrel (*Spermophilus beecheyii*), raccoon (*Procyon lotor*), and North American beaver (*Castor canadensis*).

Sensitive Biological Resources

Sensitive biological resources include those that are afforded special protection through CEQA, NEPA, the California Fish and Game Code, California Endangered Species Act (CESA), Federal Endangered Species Act (ESA), Clean Water Act (CWA), and/or Porter-Cologne Water Quality Control Act. Special-status species include plants and animals that are legally protected or that are otherwise considered sensitive by Federal, State, regional, or local resource conservation agencies and organizations. Special-status species are plants and terrestrial wildlife that fall into any of the following categories:

- taxa (i.e., taxonomic categories or groups) officially listed by the State of California or the Federal government as Endangered, Threatened, or Rare;
- taxa that are candidates for State or Federal listing as Endangered or Threatened;
- taxa proposed for State or Federal listing as Endangered or Threatened;
- taxa that meet the criteria for listing, even if not currently included on any list, as described in California Code of Regulations (CCR) Section 15380 of the State CEQA Guidelines;
- plants considered by CNPS and CDFW to be Rare, Threatened, or Endangered;
- taxa identified by CDFW as Species of Special Concern;
- species listed as Fully Protected under the California Fish and Game Code; or
- taxa afforded protection under local or regional planning documents.

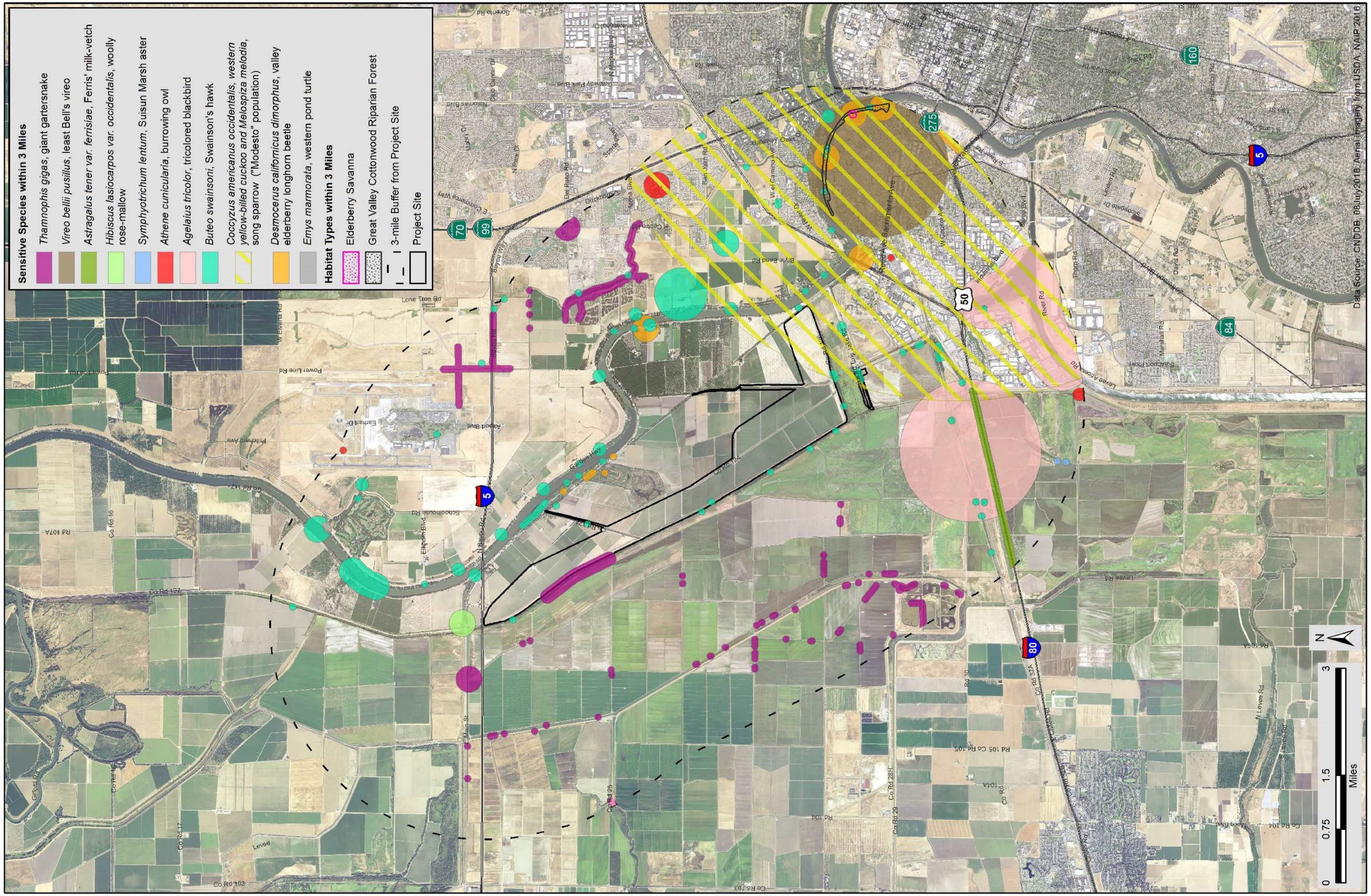
The determination of which special-status species could occur in the study area was based on review of the USFWS species list (USFWS 2016), CNDDB occurrences (CDFW 2016), and the CNPS online inventory (CNPS 2016). The CNDDB and CNPS inventory searches included the following U.S. Geological Survey 7.5-minute quadrangles: Davis, Grays Bend, Rio Linda, Sacramento East, Sacramento West, Clarksburg, Taylor Monument, Florin, and Saxon (see Appendix E1). (Note: The CNDDB contains only those records that have been reported to CDFW; additional species occurrences may exist in the vicinity of the project, and not all species tracked in the CNDDB meet the definition of a special-status species described above.) The USFWS species list includes species with potential to occur in an approximately 3-mile radius around the study area (see Appendix E2). Figure 4.5-2 depicts the CNDDB records within 3 miles of the study area.

Special-status Species

Special-status Plants

Twenty-nine special-status plant species were evaluated for their potential to occur in the study area (CDFW 2016; CNPS 2016; USFWS 2016). Table 4.5-2 summarizes, for each of these species, the regulatory or CNPS listing status, habitat associations, relevant CNDDB occurrence information, and potential to occur in the study area.

Figure 4.5-2. California Natural Diversity Database Records within 3 Miles of the Biological Resources Study Area



Data Source: CNDDB, 08July2018; Aerial Imagery from USDA NAIP 2016

RS/BMC Z:\Projects\1611277_Flood\1605_YoloBypass_Enviro\1611277_1605_G009_CNDDB_3mi_v2.mxd

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Source: GEI Consultants, Inc. 2016

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Table 4.5-2. Special-status Plant Species Evaluated for Potential to Occur in the Biological Resources Study Area

Scientific Name	Common Name	Legal Status Federal/State/CRPR[1]	Habitat Associations and Species Occurrences	Potential for Occurrence[2]
Hibiscus lasiocarpos var. occidentalis	woolly rose-mallow	–/–/1B.2	Often in riprap on sides of levees; marshes and swamps (freshwater). CNDDB occurrence within project vicinity.	Known to occur.
Symphyotrichum lentum	Suisun Marsh aster	–/–/1B.2	Marshes and swamps (brackish and freshwater). CNDDB occurrence approximately 3 miles from project site.	Could occur.
Astragalus tener var. ferrisiae	Ferris' milk-vetch	–/–/1B.1	Meadows and seeps (vernally mesic), valley and foothill grassland (subalkaline flats). No recent CNDDB occurrence within project vicinity.	Unlikely to occur.
Cuscuta obtusiflora var. glandulosa	Peruvian dodder	–/–/2B.2	Marshes and swamps (freshwater). Presumed extirpated in California since 1948 (CNPS 2016).	Unlikely to occur.
Juglans hindsii	Northern California black walnut	–/–/1B.1	Riparian forest and woodland.	Unlikely to occur.
Lepidium latipes var. heckardii	Heckard's pepper-grass	–/–/1B.2	Valley and foothill grassland (alkaline flats). CNDDB occurrence approximately 4 miles from the study area.	Unlikely to occur.
Lilaeopsis masonii	Mason's lilaeopsis	–/R/1B.1	Marshes and swamps (brackish or freshwater), riparian scrub; generally found in tidal zones, on bare depositional soils in the Delta.	Unlikely to occur.
Puccinellia simplex	California alkali grass	–/–/1B.2	Alkaline, vernally mesic; sinks, flats, and lake margins; Chenopod scrub, meadows and seeps, valley and foothill grassland, vernal pools. CNDDB occurrence approximately 4 miles from the study area.	Unlikely to occur.
Sagittaria sanfordii	Sanford's arrowhead	–/–/1B.2	Marshes and swamps (assorted shallow freshwater).	Unlikely to occur.
Trifolium hydrophilum	saline clover	–/–/1B.2	Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools. CNDDB occurrence approximately 5 miles west of the study area.	Unlikely to occur.
Astragalus pauperculus	Depauperate milk-vetch	–/–/4.3	Alkaline soils; playas, valley and foothill grassland (adobe clay), vernal pools.	No potential to occur.
Astragalus tener var. tener	alkali milk-vetch	–/–/1B.2	Playas, valley and foothill grassland (adobe clay), vernal pools.	No potential to occur.
Atriplex cordulata var. cordulata	heartscale	–/–/1B.2	Chenopod scrub, meadows and seeps, valley and foothill grassland (sandy).	No potential to occur.
Atriplex depressa	brittlescale	–/–/1B.2	Chenopod scrub, meadows and seeps, valley and foothill grassland, vernal pools.	No potential to occur.

Table 4.5-2. Special-status Plant Species Evaluated for Potential to Occur in the Biological Resources Study Area

Scientific Name	Common Name	Legal Status Federal/State/CRPR[1]	Habitat Associations and Species Occurrences	Potential for Occurrence[2]
Carex comosa	bristly sedge	–/–/2B.1	Marshes and swamps (lake margins), valley and foothill grassland.	No potential to occur.
Centromadia parryi ssp. rudis	Parry's rough tarplant	–/–/4.2	Alkaline, vernally mesic, seeps; valley and foothill grassland; vernal pools.	No potential to occur.
Chloropyron palmatum	palmate-bracted bird's-beak	E/E/1B.1	Alkaline; chenopod scrub, valley and foothill grassland.	No potential to occur.
Downingia pusilla	dwarf downingia	–/–/2B.2	Valley and foothill grassland (mesic), vernal pools.	No potential to occur.
Eryngium jepsonii	Jepson's coyote thistle	–/–/1B.2	Clay; valley and foothill grassland, vernal pools.	No potential to occur.
Etriplex joaquinana	San Joaquin spearscale	–/–/1B.2	Alkali playa, chenopod scrub, meadows and seeps, valley and foothill grassland.	No potential to occur.
Fritillaria agrestis	stinkbells	–/–/4.2	Clay, sometimes serpentine; chaparral, cismontane woodland, pinyon and juniper woodland, valley and foothill grassland.	No potential to occur.
Gratiola heterosepala	Boggs Lake hedge-hyssop	–/–/1B.2	Clay; marshes and swamps (lake margins), vernal pools.	No potential to occur.
Hesperevax caulescens	hogwallow starfish	–/–/4.2	Sometimes alkaline; valley and foothill grassland (mesic, clay), vernal pools (shallow).	No potential to occur.
Legenere limosa	legenere	–/–/1B.1	Vernal pools.	No potential to occur.
Myosurus minimus ssp. apus	little mousetail	–/–/3.1	Valley and foothill grassland, vernal pools (alkaline).	No potential to occur.
Navarretia leucocephala ssp. bakeri	Baker's navarretia	–/–/1B.1	Mesic; cismontane woodland, lower montane coniferous forest, meadows and seeps, valley and foothill grassland, vernal pools.	No potential to occur.
Neostapfia colusana	Colusa grass	T/E/1B.1	Vernal pools (adobe, large).	No potential to occur.
Plagiobothrys hystriculus	bearded popcornflower	–/–/1B.1	Often vernal swales, also valley and foothill grassland (mesic), vernal pools margins.	No potential to occur.
Tuctoria mucronata	Crampton's tuctoria or Solano grass	E/E/1B.1	Valley and foothill grassland (mesic), vernal pools.	No potential to occur.

Notes: Study area = Biological Resources Study Area; CNPS = California Native Plant Society = California Natural Diversity Database; CRPR = California Rare Plant Rank

[1] **Legal Status Definitions:**

Federal

E Plant species listed as Endangered under the Federal Endangered Species Act.
T Plant species listed as Threatened under the Federal Endangered Species Act.
– No listing under the Federal Endangered Species Act.

State

E Plant species listed as endangered under the California Endangered Species Act.
R Plant species 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

Table 4.5-2. Special-status Plant Species Evaluated for Potential to Occur in the Biological Resources Study Area

Scientific Name	Common Name	Legal Status Federal/State/CRPR[1]	Habitat Associations and Species Occurrences	Potential for Occurrence[2]

designation.
– No listing under the California Endangered Species Act.

<u>CRPR / California Rare Plant Rank</u>
1B Plant species considered Rare, Threatened, or Endangered in California and elsewhere.
2B Plant species considered Rare or Endangered in California but more common elsewhere.
3 Plant species about which more information is needed.
4 Plant species with a limited distribution or are infrequent throughout a broader area in California; their status should be monitored regularly.

California Rare Plant Rank Extensions:
.1 Seriously threatened in California (greater than 80 percent of occurrences are threatened and/or have a high degree and immediacy of threat).
.2 Moderately threatened in California (20 to 80 percent of occurrences are threatened and/or have a moderate degree and immediacy of threat).
.3 Not very threatened in California (less than 20 percent of occurrences threatened/low degree and immediacy of threat or no current threats known).

[2] Potential for Occurrence Definitions

Note: Grey rows denote species determined to have reasonable potential to occur in the study area.

- *Could occur:* Suitable habitat is available; however, there are few or no other indicators that the species may be present.
- *Unlikely to occur:* Potentially suitable habitat present but species unlikely to be present because of very restricted distribution.
- *No potential to occur:* Potentially suitable habitat is not present.

Sources: Baldwin et al. 2012; California Department of Fish and Wildlife 2016; California Native Plant Society 2016; U.S. Fish and Wildlife Service 2016; data collected and compiled by GEI Consultants Inc. in 2016

A total of 19 out of the 29 special-status plant species were determined to have no potential to occur in the study area because these species require alkaline soils (NRCS 2016) or habitats that are not present in the study area. Eight special-status plant species were determined to be unlikely to occur in the study area because they have a restricted current distribution and do not have recent CNDDB occurrences in the project vicinity. The two remaining species, woolly rose-mallow (*Hibiscus lasiocarpos* var. *occidentalis*) and Suisun Marsh aster (*Symphyotrichum lentum*), were determined to have the potential to occur in the study area and are addressed further in this document. Both of these species occur in freshwater habitats, including marshes and swamps. Potentially suitable habitat for them is provided by irrigation and drainage canals in the study area (see “Aquatic,” in Table 4.5-1), but the quality of this habitat is relatively low and potential for these special-status plants to occur in the study area is relatively low. Special-status plant reconnaissance surveys were conducted during blooming period of Suisun Marsh aster (on April 25 and May 12, 2017), and this species was not observed in the study area; therefore, this species is unlikely to occur in the study area.

Woolly Rose-Mallow. Woolly rose-mallow is CRPR designated 1B.1: rare or endangered in California and elsewhere, and seriously threatened in California (greater than 80 percent of occurrences are threatened and/or have a high degree and immediacy of threat). The species occurs along freshwater wetlands, wet banks, and marshes below 350 feet in elevation and blooms from July through September.

There is an occurrence of woolly rose-mallow in the Tule Canal, immediately north of the study area (CDFW 2016) (see Figure 4.5-2).

Habitat suitability and CNDDB occurrence records indicate this species could potentially occur in the study area. Special-status plant reconnaissance surveys are planned to be conducted during blooming period of woolly rose-mallow in June 2017.

Special-status Wildlife

Twenty-four special-status wildlife species were evaluated for their potential to occur in the study area (CDFW 2016, USFWS 2016). Table 4.5-3 summarizes, for each species, the regulatory status, habitat associations, relevant CNDDB occurrence information, and potential to occur in the study area.

Two amphibian species, four invertebrates, and one bird are not addressed further in this subsection because the study area does not support the habitats in which they occur. Five additional bird species have been documented in the project vicinity in the past and/or have potential to occur in the study area very occasionally but are not likely to nest in the study area and are not discussed further. Two mammal species have not been recently documented in the project vicinity and are also not discussed further. The remaining ten species were determined to have potential to occur in the study area during at least part of the year and are discussed below.

Valley Elderberry Longhorn Beetle. Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) is Federally listed as Threatened. The range of this species extends throughout the Central Valley and associated foothills from about 3,000 feet in elevation to the east and the watershed of the Central Valley to the west. The valley elderberry longhorn beetle is dependent on its host plant, elderberry, for all stages of its life cycle. Adults feed on the elderberry leaves and mate within the

Table 4.5-3. Special-status Wildlife Species Evaluated for Potential to Occur in the Biological Resources Study Area

Scientific Name	Common Name	Legal Status Federal/State[1]	Habitat Associations and Species Occurrences	Potential for Occurrence[2]
Invertebrates				
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	T/–	Closely associated with blue elderberry (*Sambucus nigra* subsp. *caerulea*), which is an obligate host for the beetle larvae. Recent CNDDB occurrences along the Sacramento River less than 1 mile west of the study area; at least four elderberry shrubs are present on or near the study area.	Could occur.
Branchinecta conservatio	Conservancy fairy Shrimp	E/–	Vernal pools and other seasonal wetlands, typically large, deep and turbid.	No potential to occur.
Branchinecta lynchi	Vernal pool fairy shrimp	T/–	Vernal pools and other seasonal wetlands, typically small but including a wide range of sizes.	No potential to occur.
Elaphrus viridis	Delta green ground beetle	T/–	Open habitats, namely the edges of vernal pool and nearby trails, roads, and ditches. Only known to occur in Solano County.	No potential to occur.
Lepidurus packardi	Vernal pool tadpole shrimp	T/–	Vernal pools and other seasonal wetlands, typically medium to large but including a wide range of sizes with relatively long inundation period.	No potential to occur.
Amphibians				
Ambystoma californiense	California tiger salamander	T/T	Typically found in annual grassland of lower hills and valleys; breeds in temporary and permanent ponds and in streams; uses rodent burrows and other subterranean retreats in surrounding uplands for shelter.	No potential to occur.
Rana draytonii	California red-legged frog	T/–	Lowlands and foothill streams, pool, and marshes in or near permanent or late season sources of deep water with dense, shrubby, riparian, or emergent vegetation (e.g. ponds, perennial drainages, well-developed riparian); the study area is outside the species current range.	No potential to occur.
Reptiles				
Actinemys marmorata	Northwestern pond turtle	–/SSC	Permanent or nearly permanent water bodies with abundant vegetation and rocky or muddy bottoms in a variety of habitat types; also requires basking sites such as logs, rocks, cattail mats, and exposed banks. Observed in the study area (DWR 2016d).	Known to occur.
Thamnophis gigas	Giant garter snake	T/T	Open water associated with marshes, rivers, streams, sloughs, and irrigation/drainage ditches within the Central Valley; requires emergent herbaceous wetland vegetation for escape and foraging habitat, grassy banks, and opening in waterside vegetation for basking, and higher elevation upland habitat for cover and refuge from flooding; documented in the Tule Canal in 1999 (CDFW 2016).	Could occur.

Table 4.5-3. Special-status Wildlife Species Evaluated for Potential to Occur in the Biological Resources Study Area

Scientific Name	Common Name	Legal Status Federal/State[1]	Habitat Associations and Species Occurrences	Potential for Occurrence[2]
Birds				
Buteo swainsonii	Swainson's hawk	–/T	Forages in grasslands and agricultural fields; nests in open woodland or scattered trees; CNDDB includes nest sites along Tule Canal and the Sacramento Bypass; potential nest locations observed in the study area during field surveys (DWR 2016d).	Known to occur.
Circus cyaneus	Northern harrier	–/SSC	Nests and forages in grasslands, agricultural fields, and marshes; no CNDDB occurrences within project vicinity but species is rarely documented in CNDDB.	Known to occur.
Elanus leucurus	White-tailed kite	–/FP	Nests in woodlands and isolated trees and forages in grasslands, pasture, and agricultural fields; no recent CNDDB occurrences in the project vicinity, but could forage onsite and nest in trees along Tule Canal and Sacramento Bypass.	Known to occur.
Agelaius tricolor	Tricolored blackbird	/C	Forages in croplands, grassy fields, flooded land, and along edges of ponds. Nests in dense cattails, tules, and other dense vegetation, often near freshwater. CNDDB includes nest colony within 1 mile of the study area and a small colony was observed foraging in the study area during surveys.	Known to occur.
Athene cunicularia	Burrowing owl	–/SSC	Nest and forages in grasslands and agricultural fields with natural of artificial burrows or friable soils; several CNDDB occurrences within 3 miles of the study area.	Could occur.
Coccyzus americanus occidentalis	Western yellow-billed cuckoo	T/E	Nests in extensive deciduous riparian thickets or forests with dense, low-level or understory vegetation. In the Sacramento Valley, also uses adjacent walnut orchards. The nearest recent nesting sites are approximately 50 miles north of the study area, but individuals could forage in the study area during migration.	Could occur.
Vireo bellii pusillus	Least Bell's vireo	E/E	Typically occurs in structurally diverse riparian habitat with dense shrub layer; largely extirpated from the Central Valley, but is presumed to have attempted to nest in 2010 and 2011 in the Yolo Bypass Wildlife Area, approximately 6 miles south of the study area.	Could occur.
Melospiza melodia	Song sparrow ("Modesto" population)	–/SSC	Nests and forages in emergent freshwater marsh and riparian scrub and woodland; a nesting colony was recently located within project vicinity.	Could occur.
Riparia riparia	Bank swallow	–/T	Forages in a variety of habitat and nests in vertical banks or bluffs of suitable soil, typically adjacent to water; no recent occurrences in the project vicinity, but individuals could forage in the study area during migration.	Could occur.

Table 4.5-3. Special-status Wildlife Species Evaluated for Potential to Occur in the Biological Resources Study Area

Scientific Name	Common Name	Legal Status Federal/State[1]	Habitat Associations and Species Occurrences	Potential for Occurrence[2]
Charadrius alexandrines nivosus	Western snowy plover	T/–	Primarily a coastal species, but scattered inland breeding populations exist; occurs rarely in the project vicinity.	Unlikely to occur.
Progne subis	Purple martin	–/SSC	Nests in bridges in urban area and forages in adjacent open habitat; nearest occurrence approximately 4 miles east of the study area.	Unlikely to occur.
Xanthocephalus xanthocephalus	Yellow-headed blackbird	–/SSC	Nests in reedy marshes, prairies, and parks. Winters in open agricultural fields and pastures; rarely nests in the project vicinity.	Unlikely to occur.
Ammodramus savannarum	Grasshopper sparrow	–/SSC	Nests and forages in natural grasslands, with a mix of grasses, forbs, and scattered shrubs, on rolling hills and lowland plains.	No potential to occur.
Mammals				
Antrozous pallidus	Pallid bat	–/SSC	Occurs in a wide variety of habitats and roosts in tree cavities and caves, as well as artificial sites (e.g., bridges and buildings); several historic and recent occurrences from Sacramento and Yolo Counties, but none in the project vicinity.	Could occur.
Taxidea taxus	American badger	–/SSC	Arid, open grassland, shrubland, and woodland with soils suitable for burrowing; no known occurrences in the project vicinity.	Unlikely to occur.

Notes: study area = Biological Resources Study Area; CNDDB = California Natural Diversity Database

[1] **Legal Status Definitions:**

Federal
E Wildlife species listed as Endangered under the Federal Endangered Species Act.
T Wildlife species listed as Threatened under the Federal Endangered Species Act.
– No listing under the Federal Endangered Species Act.

State
E Wildlife species listed as Endangered under the California Endangered Species Act.
T Wildlife species listed as Threatened under the California Endangered Species Act.
FP Wildlife species listed as Fully Protected under the California Fish and Game Code.
C Wildlife species identified as a candidate species for listing as threatened or endangered under the California Endangered Species Act.
SCC Wildlife species listed as Species of Special Concern by the California Department of Fish and Wildlife.
– No listing under the California Endangered Species Act.

[2] **Potential for Occurrence Definitions:**

Notes: Grey rows denote species determined to have reasonable potential to occur in the study area.

- *Known to occur:* The species, or evidence of its presence, was observed during reconnaissance-level surveys or was reported by others.
- *Likely to occur:* Habitat conditions, behavior of the species, known occurrences, or other factors indicate a relatively high likelihood that the species would occur.
- *Could occur:* Suitable habitat is available; however, there are few or no other indicators that the species may be present.
- *Unlikely to occur:* Potentially suitable habitat present but species unlikely to be present because of very restricted distribution.
- *No potential to occur:* Potentially suitable habitat is not present.

Sources: California Department of Fish and Wildlife 2016; U.S. Fish and Wildlife Service 2016; data collected and compiled by GEI Consultants Inc. in 2016 elderberry canopy. Females deposit eggs on or adjacent to the host elderberry. The larvae bore into the wood of the host plant where they feed on the pith of the plant for 1 to 2 years. The larvae metamorphose between December and April; the adult then emerges from the chamber through an exit hole. Most records for adults occur from late April to mid-May (USFWS 2007), although April 15 to June 15 is considered to be the "flight season" for the species. This is when the beetle is in the adult stage and present within the elderberry shrub canopy. The active beetles may be found in the immediate vicinity of the shrubs.

Twenty-four (24) elderberry shrubs are documented within the study area and vicinity, including along the east edge of the existing Yolo Bypass East Levee and the Sacramento Bypass north levee,

Northwestern Pond Turtle. Northwestern pond turtle (*Actinemys marorata*) is a CDFW Species of Special Concern. This species is found in and adjacent to a variety of aquatic habitats, including ponds, marshes, rivers, streams, and irrigation ditches that typically have muddy or rocky bottoms and support aquatic vegetation. Preferred habitat for the turtle consists of calm waters, such as near stream banks, backwater, or pools, with vegetated banks and logs or rocks for basking. Hatchlings and juveniles require shallow water with abundant emergent vegetation (Jennings and Hayes 1994).

Drainage canals and irrigation ditches throughout the study area provide potential habitat for northwestern pond turtle (see "Aquatic," in Table 4.5-1). Potential breeding habitat is very limited because of the predominance of agriculture, but turtles could nest along ditches and margins of other aquatic habitat. Several northwestern pond turtles were observed in the study area during the 2016 field surveys (DWR 2016d).

Giant Garter Snake. The giant garter snake (*Thamnophis gigas*) is Federally and State-listed as Threatened. This species formerly ranged throughout the wetlands of California's Central Valley but appears to have been extirpated from the southern San Joaquin Valley (Hansen and Brode 1980, USFWS 2012) and has suffered serious declines in other parts of its former range. The primary cause of decline, loss, or degradation of aquatic habitat is agricultural development compounded by the loss of upland refugia and bankside vegetation cover.

Giant garter snakes inhabit agricultural wetlands and other waterways, such as irrigation and drainage canals, rice fields, marshes, sloughs, ponds, small lakes, low-gradient streams, and adjacent uplands in the Central Valley. Emergent marsh and open water habitat present within irrigation and drainage canals in the study area (see "Aquatic," in Table 4.5-1) provide important aquatic habitat for giant garter snake during summer, as long as their prey is present in sufficient densities (USFWS 1999). Despite their aquatic habits, giant garter snakes also make extensive use of adjacent terrestrial habitats during the inactive season, primarily during brumation (Halstead et al. 2015). The snakes require upland habitat with grassy banks and clearings in waterside vegetation for basking, as well as upland refugia during the inactive winter season (see "Annual Grassland," in Table 4.5-1). Many summer basking and refuge areas used by this snake are immediately adjacent to drainage canals and irrigation ditches, and may even be located in the upper canal banks. Although the USFWS considers 200 feet to be the width of upland vegetation needed to provide adequate habitat for giant garter snake along the borders of aquatic habitat (USFWS 1997), giant garter snakes are found within 33 feet of water under most conditions; however, in some instances they can be found more than 66 feet from water (Halstead et al. 2015).

A reconnaissance-survey for giant garter snake habitat suitability was conducted in August and September 2016 (DWR 2016g). No giant garter snakes were observed during the survey, but habitat suitability was determined according to DWR's Flood Maintenance Office's Giant Garter Snake Habitat

Suitability Protocol (DWR 2016g) (see Appendix E4 for the habitat assessment methodology and data sheets.). Aquatic habitats were evaluated for habitat suitability (Figure 4.5-3). Any aquatic habitat assigned a "suitable" or "marginal" ranking is considered suitable aquatic habitat for giant garter snake; annual grassland located within 200 feet of suitable or marginal aquatic habitat is considered suitable upland for giant garter snake.

Swainson's Hawk. Swainson's hawk (*Buteo swainsonii*) is State-listed as Threatened. This species typically occurs in California only during the breeding season (March–September) and winter in Mexico and South America; the Central Valley population migrates only as far south as central Mexico. Swainson's hawks begin to arrive in the Central Valley in March; nesting territories are usually established by April, with incubation and rearing of young occurring through June. Swainson's hawks are found most commonly in grasslands, low shrublands, and agricultural habitats that include large trees for nesting. Nests are found in riparian woodlands, roadside trees, trees along field borders, and isolated trees. Nesting pairs frequently return to the same nest site for multiple years and decades.

Prey abundance and accessibility are the most important features determining the suitability of Swainson's hawk foraging habitat. In addition, agricultural operations (e.g., mowing, flood irrigation) have a substantial influence on the accessibility of prey and thus create important foraging opportunities for Swainson's hawk. Certain crops provide better foraging than others due to crop height and the frequency of the disturbance regime. Periodic disturbances such as harvesting, tilling, and flooding can increase prey availability. Generally, alfalfa crops are considered the highest value foraging habitat for Swainson's hawk. Crops that are tall and dense enough to preclude the capture of prey do not provide suitable habitat except around field margins, but prey animals in these habitats are accessible during and soon after harvest. Swainson's hawks feed primarily on small rodents but also consume insects and birds. Any habitat within the foraging distance may provide food at some time in the breeding season that is necessary for reproductive success.

Reconnaissance-surveys for special-status species in April 2016 identified Swainson's hawk in the study area, and several potential raptor nests were identified in or adjacent to the study area (DWR 2016f). There are numerous CNDDB records of Swainson's hawk within 3 miles of the study area (Figure 4.5-2); most of these records are associated with historically active Swainson's hawk nests located along the Sacramento River. Eleven of the CNDDB records indicate historically active Swainson's hawk nests along the Tule Canal and the Sacramento Bypass (CDFW 2016). Suitable foraging habitat for Swainson's hawk is present within the study area (see "Annual Grassland" and "Agriculture" in Table 4.5-1), including approximately 110 acres of alfalfa fields concentrated along either side of the north cross-canal.

Burrowing Owl. Burrowing owl (*Athene cunicularia)* is a CDFW Species of Special Concern. Burrowing owls and their nests are also protected under Section 3503.5 of the California Fish and Game Code, which states that it is unlawful to take, possess, or destroy any raptors, including their nests or eggs. Burrowing owls typically inhabit grasslands and other open habitats with low-lying vegetation. They are also known to nest and forage in idle agricultural fields, ruderal fields, and the edges of cultivated fields, although these areas provide lower-quality habitat than native grasslands. Burrow availability is an essential component of suitable habitat. Burrowing owls are capable of digging their own burrows in areas with soft soil, but they generally prefer to adopt those excavated by other animals, typically ground squirrels. In areas where burrows are scarce, they can use pipes, culverts, debris piles, and other artificial features. Burrowing owl sightings have been recently recorded within 1 mile of the study area (CDFW 2016). Although no burrowing owl observations in the study area have been documented, potentially suitable burrows and foraging habitat is present.

Tricolored Blackbird. Tricolored blackbird is a candidate species for protection under CESA, and USFWS is currently reviewing a petition for listing under the Federal ESA. As a candidate species under CESA, the tricolored blackbird receives the same legal protection afforded to an endangered or threatened species (Section 2085 of the California Fish and Game Code). This species nests April – July, in a variety of substrates, including cattails, bulrushes, and willows in freshwater marshes, as well as other dense vegetation, such as mustard, blackberry, milk thistle (*Silybum marianum*), mallow (*Malva* spp.), and cultivated grain crops (e.g., triticale). Nesting areas must be large enough to support a minimum colony of 50 pairs as tricolored blackbirds are highly colonial. Tricolored blackbirds forage on the ground in croplands, grassy fields, flooded land, and pond edges.

Tricolored blackbird has historically nested in the Yolo Bypass, and more recently approximately 4 miles west of the study area (CDFW 2016). In September 2016, DWR environmental scientists observed a small non-breeding satellite colony of tricolored blackbirds foraging along the Tule Canal, approximately 1.5 miles north of the Sacramento Bypass. Potentially suitable nesting and foraging habitat is present.

Northern Harrier. Northern harrier is a CDFW Species of Special Concern. This species breeds and forages in a variety of open habitats that provide adequate vegetative cover, an abundance of suitable prey, and scattered perches such as shrubs or fence posts. Harriers nest on the ground, mostly within patches of dense, often tall, vegetation.

Two pairs of northern harriers were observed in the Sacramento Bypass during the 2016 field surveys (DWR 2016e), and suitable foraging habitat and some potential nesting habitat is present in the study area.

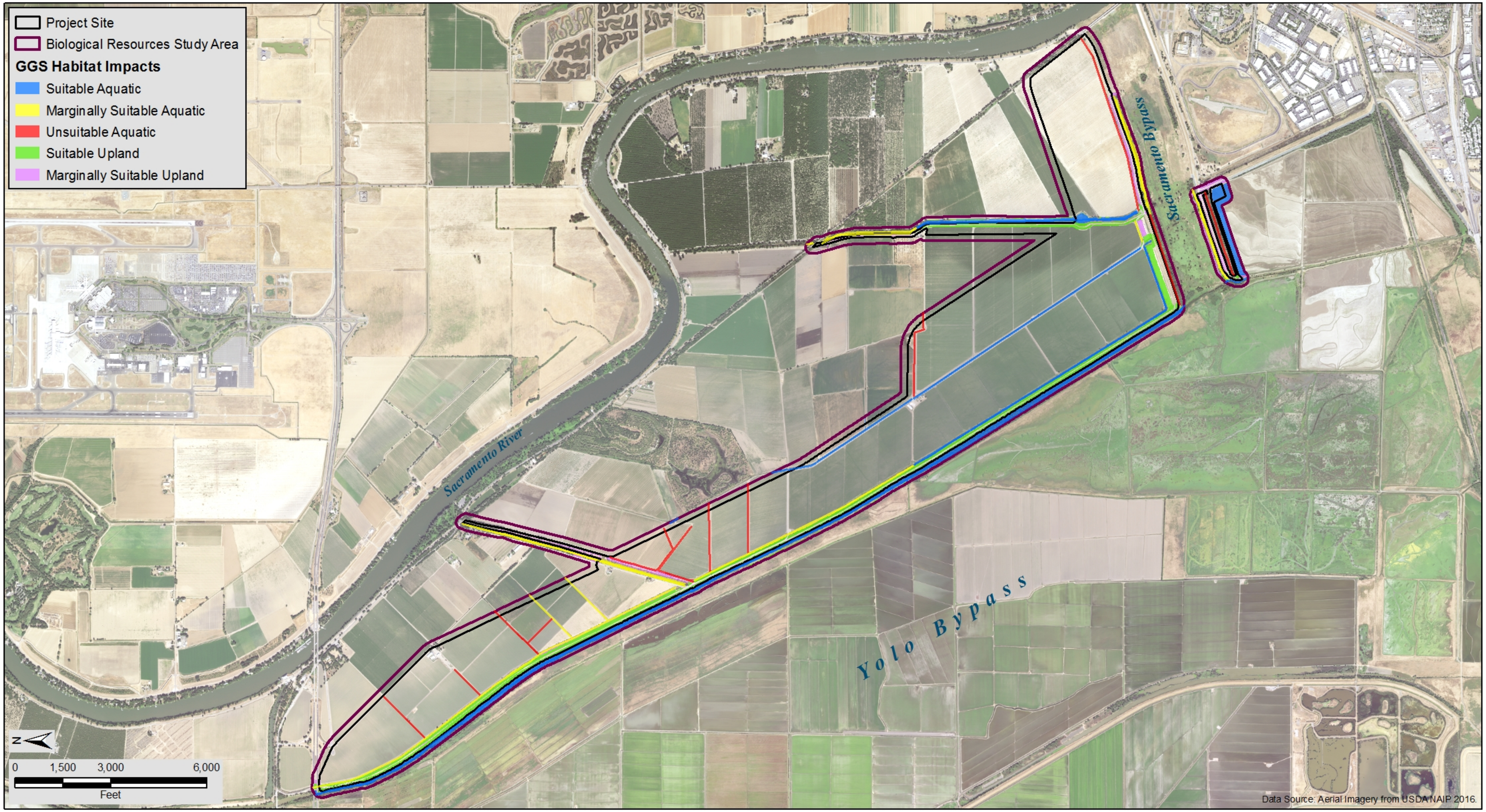
White-tailed Kite. White-tailed kite (*Elanus leucurus*) is a CDFW Species of Special Concern. They nest in trees and shrubs, especially along marshes or rivers and forage in grasslands and agricultural fields.

Two pairs of white-tailed kites were observed in the Sacramento Bypass during the 2016 field surveys (DWR 2016e), and suitable nesting and foraging habitat is present in the study area.

Western Yellow-Billed Cuckoo. Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) is Federally listed as Threatened and State-listed as Endangered. This neotropical migratory bird breeds in scattered riparian areas in the western United States, including California, and winters in South America. Western yellow-billed cuckoos nest almost exclusively in large (25 acres or more), wide patches of cottonwood-willow riparian forests. The nesting season generally begins in mid-June and continues through August (78 Federal Register 61622).

The nearest documented occurrences of western yellow-billed cuckoo in the past decade are from several locations in Yolo County, including Putah Creek, Cache Creek, and in the vicinity of the Fremont Weir (Hampton 2017). Although nearly the entire Central Valley population of this subspecies nests along the Sacramento River, the nearest likely nesting location is approximately 50 miles north of

Figure 4.5-3. Giant Garter Snake Habitat Suitability in the Biological Resources Study Area



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Source: GEI Consultants, Inc. 2016

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the study area (Dettling et al. 2014). Therefore, the only potential for yellow-billed cuckoo to use the study area is as stopover habitat during migration.

Least Bell's Vireo. Least Bell's vireo (*Vireo bellii pusillus*) is Federally and State-listed as Threatened. It is a neotropical migratory songbird that breeds in riparian habitats in southern and central California and northern Baja California, Mexico and winters in southern Baja California. This subspecies once ranged through the San Joaquin Valley and north in the Sacramento Valley to Tehama County, but it has largely been extirpated from the Central Valley. Least Bell's vireos occur in cottonwood-willow forest, oak woodland, and shrubby thickets. Individuals breed from April through September in early- to mid-successional riparian vegetation that provides low-lying dense foliage for nesting and structural diversity for foraging (Kus 2002).

Two territorial least Bell's vireo males were documented and presumed to have attempted to nest in 2010 and 2011 in the Yolo Bypass Wildlife Area, approximately 6 miles south of the study area. Potential for least Bell's vireo to occur in the study area is limited by its rare occurrence in very small numbers in the region. Habitat conditions in the study area are only marginally suitable, based on typical habitat preferences, but conditions share some similarities to those farther south in the Yolo Bypass, where the species has recently occurred. The study area is unlikely to provide suitable nesting habitat for least Bell's vireo, but there is some potential for this subspecies to occur in the study area if it returns to the Yolo Bypass in future years.

Song Sparrow ("Modesto" Population). The Modesto song sparrow (*Melospiza melodia*) is a CDFW Species of Special Concern. This resident sparrow is typically closely associated with freshwater wetlands and riparian thickets. However, they can also nest along irrigation canals (Shuford and Gardali 2008).

No observations of Modesto song sparrow in the study area have been documented, but suitable foraging and nesting habitat is present.

Bank Swallow. Bank swallow (*Riparia riparia*) is State-listed as Threatened. Bank swallow is a migratory bird species that nests along rivers, lakes, and ocean coasts in California. Bank swallows are generally a riparian species, nesting in colonies in earthen banks and bluff, and sand and gravel pits. They forage over a variety of habitats, including grasslands, riparian forest, agricultural fields, and aquatic habitats (CDFG 1995).

Historic and recent nest colonies have been documented along the Sacramento River in the vicinity of Fremont Weir, approximately 8 miles north of the study area. No suitable nesting habitat is present in or adjacent to the study area, but birds nesting in nearby colonies and migrant individuals could forage over the study area.

Pallid Bat. Pallid bat (*Antrozous pallidus)* is a CDFW Species of Special Concern. There are no known occurrences of this species in the project site or its vicinity, but trees along the Tule Canal could provide suitable roost cavities for pallid bats.

Sensitive Habitats

Sensitive habitats include those that are of special concern to resource agencies or are afforded specific consideration through CEQA, Section 1602 of the California Fish and Game Code, Section 404 of the CWA, and the Porter-Cologne Water Quality Control Act. Sensitive natural habitats may be of special concern for a variety of reasons, including their locally or regionally declining status, or because they provide important habitat to common and special-status species.

Open water is protected under the California Fish and Game Code and/or CWA. Riparian habitats are also considered sensitive habitats and are regulated under Section 1602 of the California Fish and Game Code. A description of each of these communities is provided under the “Vegetation and Land Cover” subsection above with acreages summarized in Table 4.5-1, above.

Areas designated as critical habitat are protected under the Federal ESA, and additional habitat that supports or could support Federally listed species may also be protected under the Federal ESA. However, there is no designated critical habitat for special-status plants and wildlife species in the study area.

Sensitive Natural Communities

CDFW maintains a list of terrestrial natural communities that are native to California, the *List of Vegetation Alliances and Associations* (CDFG 2010). Within that list, CDFW identifies and ranks natural communities of special concern (NCSC) considered to be highly imperiled. CDFW’s natural-community rarity rankings follow NatureServe’s 2009 *NatureServe Conservation Status Assessments: Methodology for Assigning Ranks* (Faber-Langendoen et al. 2012), in which all alliances are listed with a global (G) and state (S) rank, where G1/S1 is Critically Imperiled, G1/S2 is Imperiled, G3/S3 is Vulnerable, G4/S4 is Apparently Secure, and G5/S5 is Secure. Occurrences of NCSC are included in the CNDDB; however, no new occurrences have been added to the CNDDB since the mid-1990s. Vegetation types within 3 miles the study area that rank as NCSC include Elderberry savanna (G2; S2.1) and Great Valley Cottonwood Riparian Forest (G2; S2.1) (CDFW 2016). Neither of these NCSC are documented within the study area; however, the riparian habitat within the study area may include Great Valley Cottonwood Riparian Forest.

4.5.2 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to vegetation and wildlife apply to the alternatives under consideration, as listed below (see Appendix C, “Summary of Applicable Laws, Regulations, Policies, and Plans,” for additional information).

- Federal Endangered Species Act – Applies to the impact analysis.
- Migratory Bird Treaty Act – Applies to the impact analysis.
- Section 404 of the Clean Water Act – Applies to project construction and the impact analysis.
- Section 401 of the Clean Water Act – Applies to project construction and the impact analysis.

State

The following State plans, policies, regulations, or laws related to vegetation and wildlife apply to the alternatives under consideration, as listed below (see Appendix C, “Summary of Applicable Laws, Regulations, Policies, and Plans,” for additional information).

- California Endangered Species Act – Applies to the impact analysis.

- California Fish and Game Code – Fully Protected Species – Applies to the impact analysis.

- California Fish and Game Code – Protection of Bird Nests and Raptors – Applies to the impact analysis.
- California Fish and Game Code – Streambed Alteration – Applies to the impact analysis.
- Porter-Cologne Water Quality Control Act – Applies to the impact analysis and project construction.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to vegetation and wildlife are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County 2030 General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan (Yolo County 2009) regarding fish and aquatic organisms are relevant to project design, construction, and/or the impact analysis of the project (See Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

4.5.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

Methodology

This evaluation of potential impacts on vegetation and wildlife is based on data collected during field surveys, review of aerial photography, database searches, and information obtained from previously completed studies and analyses that addressed biological resources within or near the study area. See "Surveys and Methodology" under Subsection 4.5.1, "Environmental Setting," for a description of surveys completed in the study area and sources of information that were reviewed.

The impact analysis for vegetation and wildlife considered the following factors related to the project: project components; potential impact mechanisms; the extent of area that would be temporarily and permanently disturbed; existing habitat conditions in and adjacent to areas proposed for various project components; and known or potential occurrences of evaluated biological resources in and near the study area. In particular, the significance of each impact was evaluated in terms of the magnitude (severity) of the impact on each biological resource addressed. The magnitude depends on the quality of the resource being impacted (e.g., habitat quality, regional or range-wide rarity or importance of the resource, and site occupancy and/or population density); the extent (e.g., area) and duration (e.g., temporary versus permanent, number of seasons or generations affected) over which impacts occur; and the intensity of the impact on the resource (e.g., level of harm, injury/loss, or degradation suffered by the resource). An impact of substantial magnitude is considered a significant impact. Any direct impact on a Federally or State-listed species is considered a substantial (and therefore, significant) impact.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. EPA's comments on the NOI indicated the EIS/EIR should identify all Threatened and Endangered species and critical habitat that could occur on the project site, identify and quantify which species and habitats could be affected, and include mitigation for impacts to these species, with emphasis on protection and recovery of the species. As requested, impacts on relevant species and critical habitat designations are evaluated below and mitigation measures are identified where appropriate.

EPA's comments on the NOI also indicated that the EIS/EIR should describe how the project would meet the requirements of Executive Order 13112. Revegetation of the project site would be done in compliance with Executive Order 13112, and an invasive plant management plan would be implemented to monitor and control noxious weeds.

Input was directly sought from relevant regulatory agencies, including CDFW and USFWS. Comments from agency staff primarily focused on opportunities for habitat enhancement and restoration. No specific concerns related to impacts on vegetation and wildlife were identified during this initial agency coordination.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to biological resources – terrestrial and wildlife if they would do any of the following:

- have a substantial adverse impact, 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;
- have a substantial adverse impact on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by CDFW or USFWS;
- have a substantial adverse impact on Federally protected waters of the United States, including wetlands, as defined by Section 404 of the CWA through direct removal, filling, hydrological interruption, or other means;
- interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of nursery sites by native wildlife;
- conflict with any adopted local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;
- conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or State HCP; or
- have the potential to degrade the quality of the environment; substantially reduce the habitat of a fish or wildlife species; cause a fish or wildlife population to drop below self-sustaining levels; threaten to eliminate a plant or animal community; or substantially reduce the number or restrict the range of an endangered, rare, or threatened species.

Issues Not Discussed Further in this EIS/EIR

This impact analysis focuses on resources expected to be affected by implementation of the project. Therefore, those plant and wildlife species not expected to occur, or with a low probability to occur (because of a lack of suitable habitat, known extant range of the species, and/or lack of occurrence records) are not addressed in this analysis. Additionally, some special-status birds that do not nest in the study area, but could occur occasionally or seasonally, are not expected to be affected by implementation of the project and are not addressed.

Critical habitat for special-status plants and wildlife species is not addressed in this analysis because there is none designated in the study area.

Protected Trees—The project site is located in Yolo County. The Yolo County Oak Woodland Conservation and Enhancement Plan (Yolo County 2007) encourages the protection and growth of oak woodlands by providing financial incentives to landowners and establishing public outreach and educational programs, and working with the University of California to encourage oak woodland-related research in the County. However, this plan is not a specific County ordinance and is not addressed in this analysis.

Conflict with Provisions of an Adopted HCP or NCCP—The project site is within the planning area for the Yolo HCP/NCCP, which provides a framework to improve conservation of natural resources, including endangered species habitat, while streamlining the permitting process for planned development, infrastructure, and maintenance activities. The Second Administrative Draft of the HCP/NCCP (Yolo County HCP/NCCP Joint Powers Authority 2015) was issued in March 2015. However, the HCP/NCCP has not yet been adopted by participants or approved by the regulatory agencies. DWR will coordinate with the Yolo Habitat Conservancy, USFWS, and CDFW to ensure project implementation would not jeopardize feasibility of any key objectives or actions anticipated to be included in the HCP/NCCP. However, consistency of the project with this conservation plan is not required to be analyzed under CEQA or NEPA, and therefore, such analysis is not included in this EIS/EIR.

The project represents the approach to flood risk reduction reflected in the CVFPP for implementing multi-benefit flood risk reduction projects. Consequently, DWR would incorporate several management actions into the project to execute a multi-benefit project that is potentially self-mitigating and results in a net benefit for biological resources.

Impact Analysis

Project implementation would result in direct impacts through the permanent removal and temporary disturbance of vegetation and land cover. Figure 4.5-4 shows the vegetation and land cover types that are present in each action alternative footprint. The amount of each vegetation and land cover type that occurs within the footprint of each active alternative is presented in Table 4.5-4. As described below under each impact, however, the effects on the vegetation and land cover type could be temporary or permanent depending on the project component and/or could vary according to the specific habitat requirements and ecology of species or resource.

Levee improvements (i.e., construction of a new setback levee, seepage berms, cutoff walls, relief wells, and O&M corridors, as well as use of borrow areas, staging areas, and haul routes) would result in both permanent and temporary habitat loss. Permanent habitat loss would result from the removal (through vegetation clearing, stripping, excavating, and filling) and conversion of existing habitat (e.g., "agriculture, "aquatic," and "riparian") to intensively managed flood control features or roads. Some ground-disturbing activities associated with project implementation (e.g., movement and staging of equipment and materials, use of borrow areas) would result in temporary impacts to vegetation and land cover. However, although the project would only temporarily affect some land cover types, such as "agriculture," because these would be expected to revert to a similar land cover upon completion of

Table 4.5-4. Acreage of Vegetation and Land Cover Types Occurring in Each Action Alternative Footprint

Habitat/Land Cover Type	Approximate Impact Acreage			
	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Agriculture	1,515	1,768	1,132	880
Annual Grassland	173	173	99	99
Aquatic	47	48	31	31
Developed	62	62	37	37
Riparian	24	24	9	9
Riparian Scrub	23	23	19	19

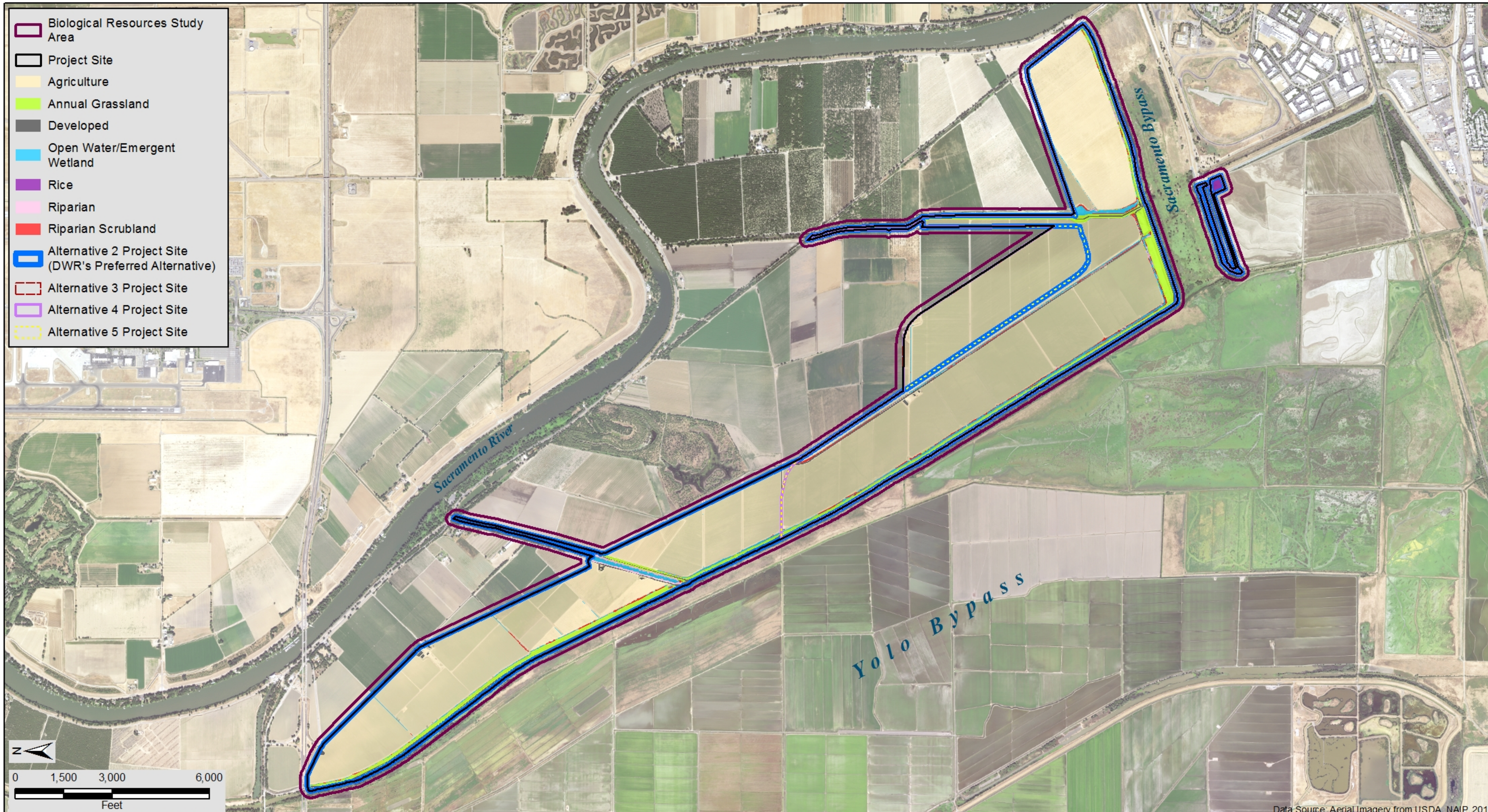
Source: Data compiled by GEI Consultants, Inc. in 2016

borrow activities, the crop type may change and result in adverse effects to special-status species, which could be a permanent effect. Other land cover types may be temporarily affected but restored to their original function postconstruction (i.e., the existing toe drainage ditch located landside of the Yolo Bypass East Levee would be dewatered to facilitate degrade of the existing levee, but would otherwise remain postconstruction). Some habitats may be removed, but relocated (i.e., "aquatic" with relocated canals and ditches), resulting a temporary loss of habitat.

O&M activities (i.e., rodent abatement; levee vegetation management; erosion repair; levee, road, and remnant levee maintenance; encroachment removal; channel sediment removal; channel vegetation management; channel scour repair; pump plant maintenance and repair; and pipe culvert repair and replacement) could also result in both permanent and temporary impacts to habitat. However, most impacts associated with implementation of the O&M activities are assumed to be temporary, particularly activities associated with removing nonnative vegetation (e.g., vegetation management), channel sediment, and encroachments, and repairing erosion areas, pump plants, and culverts. Direct impacts associated with most O&M activities are assumed be limited primarily to the specific areas where these activities would occur and, in general, earth-movement would include the minimum area necessary to conduct the O&M activity and would affect very little, if any, adjacent cover. Some O&M activities, such as rodent abatement and, in some cases, repairing erosion areas, could have more lasting impacts due to the removal of features (i.e., rodent burrows) that may affect habitat suitability for some special-status species. The new setback levee, where O&M activities would occur, is a "human-made, engineered earthen [structure] for which federal regulations (33 USC 208.11, USACE O&M Manuals, PL84-99), assurance agreements, and the California Water Code require maintenance to acceptable engineering standards…[that] do not allow holes or cracks in the levee that compromise flood control and public safety. For this reason, burrows, tunnels, or other penetrations in levees cannot be considered protected wildlife habitat" (DWR 2017), although the levee grasslands could provide suitable habitat for some species. The ecosystem project elements include creating and establishing floodplain habitat, floodplain benches, wildlife-friendly agriculture, native grasslands, riparian woodlands, and habitat corridors. Most of the ecosystem project elements would be implemented in areas that would have already been disturbed by borrow activities and levee degradation. In addition, permanent habitat conversions would generally be associated with restoring remnant levee segments and areas where the existing levee is degraded to riparian and woodland habitats. Therefore, the overall effect of implementing the ecosystem project elements is expected to be beneficial to sensitive habitats and special-status species.

Table 4.5-5 summarizes the impacts and mitigation for vegetation and wildlife, which are described in greater detail below.

Figure 4.5-4. Vegetation and Land Cover Types in the Action Alternative Project Footprints



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Source: GEI Consultants, Inc. 2016

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Table 4.5-5. Summary of Impacts and Mitigation Measures—Biological Resources – Vegetation and Wildlife

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
BIO-1: Potential Loss of Special-status Plants and Potential Loss and Degradation of Special-status Plant Habitat	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	BIO-1a: Conduct Focused Surveys for Special-status Plants, and Avoid Impacts, where Feasible BIO-1b: If Avoiding Construction-related Effects on Special-status Plants is Infeasible, Minimize and, where Appropriate, Compensate for Effects on Special-status Plant Species and Loss of Habitat BIO-1c: Prepare and Implement an Invasive Plant Management Plan	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
BIO-2: Potential Effects on Valley Elderberry Longhorn Beetle and Its Habitat	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	BIO-2a: Conduct Focused Surveys for Elderberry Shrubs, and Avoid Impacts, where Feasible BIO-2b: If Avoiding Construction-related Effects on Elderberry Shrubs is Infeasible, Minimize and, where Appropriate, Compensate for Effects on Valley Elderberry Longhorn Beetle and Loss of Habitat	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
BIO-3: Potential Disturbance or Loss of Giant Garter Snakes and Their Habitat	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	BIO-3a: Implement Measures to Avoid Impacts to Giant Garter Snake and Its Habitats, where Feasible BIO-3b: If Avoiding Effects on Giant Garter Snake is Infeasible, Minimize and, where Appropriate, Compensate for Effects on This Species and Loss of Habitat	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
BIO-4: Potential Disturbance or Loss of Northwestern Pond Turtles and their Habitat	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	BIO-4: Avoid and Minimize Impacts to Northwestern Pond Turtle and Its Habitats, where Feasible	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Table 4.5-5. Summary of Impacts and Mitigation Measures—Biological Resources – Vegetation and Wildlife

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
BIO-5: Potential Loss of Burrowing Owl Individuals from Destruction of Occupied Burrows and Nest Disturbance	Alternative 1: No-Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	BIO-5a: Conduct a Habitat Assessment and Focused Surveys for Burrowing Owls, and Avoid Impacts, where Feasible BIO-5b: If Surveys Detect Burrowing Owl in the Project Area, Implement Measures to Avoid and Minimize Effects to Burrowing Owl and Establish Protective Buffers Around Occupied Burrows and Monitor	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
BIO-6: Potential Disturbance of Nesting Special-status Birds and Common Raptor Species, Potential Loss of Active Nests and Nest Trees, and Potential Loss of Nesting and Foraging Habitat	Alternative 1: No-Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	PS	BIO-6a: Compensate for Loss of Swainson's Hawk Foraging Habitat. BIO-6b: Conduct Focused Surveys for Nesting Special-status Birds and Common Raptor Species, and Avoid Impacts, where Feasible BIO-6c: If Avoiding Construction-related Effects on Nesting Special-status Birds and Common Raptors is Infeasible, Implement Minimization Measures	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
BIO-7: Potential Disturbance or Loss of Roosting Special-Status Bats	Alternative 1: No Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	PS	BIO-7: Avoid and Minimize Disturbance and Loss of Roosting Special-status Bats	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
BIO-8: Potential Disturbance and Loss of Sensitive Habitats, including Riparian Habitat	Alternative 1: No-Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	PS	BIO-8a: Designate, Protect, Avoid, and Monitor Riparian Habitat, and Obtain and Comply with Required State Permits/Authorizations and Conditions BIO-8b: Obtain and Comply with Required State Permits/Authorizations, Implement Permit Conditions,	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			

Table 4.5-5. Summary of Impacts and Mitigation Measures—Biological Resources – Vegetation and Wildlife

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
	Alternative 5: 5-Mile Setback Full Degrade		and Develop and implement a Mitigation Plan	
BIO-9: Potential Interference with Terrestrial Wildlife Movement, Migration Corridors, and Nursery Sites	Alternative 1: No-Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact BIO-1: Potential Loss of Special-status Plants and Potential Loss and Degradation of Special-status Plant Habitat.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not authorize DWR to construct setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no construction-related impacts to habitat that may support special-status plants. This habitat would remain relatively unchanged from existing conditions, as land uses and levee O&M activities would generally be unchanged in the Lower Elkhorn Basin. There would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

One special-status plant, woolly rose-mallow (a CRPR 1B.2 species), could occur in the study area. Aquatic habitats, specifically the irrigation and drainage canals, within the study area support potentially suitable habitat for this special-status plant species.

Project components that include dewatering, excavating, filling, and removing suitable habitat for this special-status plant species could directly destroy individuals of this species. This special-status plant could also be indirectly affected by project activities if habitat quality is degraded sufficiently to result in loss of plants or render the habitat unsuitable. Levee improvements, O&M activities, and ecosystem project elements – where these activities involve disturbance to or removal of aquatic habitats – could disturb suitable habitat for special-status plants, and result in direct loss of special-status plants, if present. Levee improvements could also result in erosion, sedimentation, introduction of invasive species or noxious weeds not currently present, and other indirect adverse impacts that could render the habitat unsuitable for special-status plants and result in the eventual loss of populations that may be present.

All of the action alternatives would impact special-status plant habitat through direct permanent removal, indirect loss, and temporary disturbance. This impact analysis assumes that all aquatic habitat within borrow areas and the footprints of the setback levee, relocated canal, and relocated road would be permanently removed, because even if aquatic features are replaced – as may be the case with the relocated canal – any established habitat for this special-status plant would be lost. This impact analysis also assumes that the aquatic habitats adjacent to the levee degrade – that is, the Tule Canal and toe drain – would be avoided or temporarily affected, respectively. As highlighted in Table 4.5-6, the amount of acreage impacted would vary among the action alternatives, although total amount of disturbance or removal of special-status plant habitat would be similar under Alternatives 2 and 3, and under Alternatives 4 and 5.

Table 4.5-6. Acreages of Impacts to Potentially Suitable Special-status Plant Habitat from the Action Alternatives

Impact Type	Approximate Impact Acreage			
	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Permanent	40.7	42.4	28.1	27.8
Temporary	2.7	2.7	0.1	0.1
Total Impact	**43.4**	**45.1**	**28.2**	**27.9**

Source: Data compiled by GEI Consultants, Inc. in 2016

Implementing Alternative 2 would result in permanent loss of potentially suitable habitat for this special-status plant and temporary impacts to these habitats as a result of dewatering and temporary construction disturbance. Direct permanent loss would result from the removal of portions of ditches and canals within the project footprint, primarily during borrow extraction and construction of the new setback levee and associated features (see Figure 4.5-4). In addition, an irrigation ditch located in the southern portion of the study area outside of the project footprint would be indirectly and permanently impacted due to disruption of hydrology when a large portion of the ditch and a portion of the south cross-canal that appears to feed this ditch are removed.

Potentially suitable special-status species habitat would be temporarily impacted in the toe drainage ditch landside of the Yolo Bypass East Levee; this ditch is anticipated to be dewatered during project construction, and temporary crossing would likely be installed to facilitate access to the existing levee. At both cross-canals, temporary impacts are expected to result from dewatering and construction of temporary cofferdams to facilitate constructing the new setback levee and associated features and filling portions of the cross-canals that would be in the setback area.

Alternative 3 includes construction of the same facilities as Alternative 2, with a slightly expanded setback area in the southern portion of the project site. The main difference between the impacts of these two alternatives is that under Alternative 3, additional ditches would be permanently impacted in the expanded footprint at the southern end of the project site.

Alternatives 4 and 5 would generally include construction of the same types of facilities as Alternatives 2 and 3, but the new setback levee would only be constructed south of the north cross-canal, making it approximately 2.25 miles shorter under Alternatives 4 and 5. Because of the shorter setback levee under Alternatives 4 and 5, ditches in the northern portion of the Lower Elkhorn Basin and the north cross-canal would not be impacted, resulting in fewer acres of impact, compared to Alternatives 2 and 3. Alternative 4 would include construction of the same facilities as Alternative 5, with a slightly expanded setback area in the southern portion of the project site; thus, the permanent impacts under Alternative 4 are slightly higher than Alternative 5 (similar to that described for Alternative 3 above).

Because special-status plant surveys for woolly rose-mallow have not been conducted within the study area, the extent to which this special-status plant would be affected is unknown, but a substantial adverse impact to local populations could result. Therefore, implementing any of the action alternatives would have a **potentially significant** impact**.** Mitigation Measures BIO-1a, BIO-1b, and BIO-1c described below, have been identified to address this impact.

Mitigation Measure BIO-1a: Conduct Focused Surveys for Special-status Plants and Avoid Impacts, where Feasible.

To avoid effects of project activities on special-status plants, DWR will ensure that the following measures are implemented before commencement of ground-disturbing activities. If avoidance consistent with these measures cannot be achieved, DWR will implement the minimization and compensation measures included in Mitigation Measure BIO-1b described below.

- **Conduct Pre-construction Special-status Plant Surveys during the Blooming Periods.** A qualified botanist will conduct surveys for woolly rose-mallow with potential to occur in appropriate habitat within the project footprint. The surveys will follow the most current applicable guidelines established by CDFW, and will be conducted at the appropriate time of year when the target species would be clearly identifiable. If no special-status plants are found during focused surveys, no further action is required. However, if special-status species are found, DWR will implement Mitigation Measure BIO-1b.
- **Mark Special-status Plant Populations and Occupied Habitat in the Field for Avoidance during Construction Activities and Include a Minimum Habitat Buffer of 25 Feet.** If special-status plants are found, areas of occupied habitat will be identified. The construction contractor will avoid these areas where feasible. Temporary fencing will be installed to protect all occupied habitat located adjacent to construction areas that can be avoided. The avoidance area shall include a minimum habitat buffer of 25 feet.

Timing: Before and during construction.

Responsibility: California Department of Water Resources.

Mitigation Measure BIO-1b: If Avoiding Construction-related Effects on Special-status Plants is Infeasible, Minimize and, where Appropriate, Compensate for Effects on Special-status Plant Species and Loss of Habitat.

If the focused surveys described above in Mitigation Measure BIO-1a have been completed and avoiding effects on special-status plant species is infeasible, DWR will coordinate with CDFW to determine acceptable methods for minimizing or compensating for effects on a species. DWR will ensure that the measures described below are implemented to minimize and compensate for effects of the project on special-status plants.

- **Develop and Implement a Mitigation Plan for Directly Affected Special-status Plants.** If habitat occupied by special-status plants cannot be avoided during project construction, an appropriate and feasible mitigation plan to compensate for direct loss of special-status plants will be developed by DWR and provided to CDFW for approval. The plan will detail appropriate compensation measures determined through consultation with CDFW, methods for implementation, success criteria, monitoring and reporting protocols, and contingency measures to be implemented if the initial mitigation fails. Implementation methods may include salvaging and transplanting individual plants, collecting the seeds of affected plants, and collecting and translocating seed- and rhizome-containing mud. Compensation also may include preserving in perpetuity other known populations of this species in the project vicinity at ratios of or greater than 1 to 1. The plan will be developed in consultation with and approved by CDFW before construction activities begin in areas containing special-status plant species. DWR will implement the CDFW-approved plan.

Timing: Before, during, and after construction.

Responsibility: California Department of Water Resources

Mitigation Measure BIO-1c: Prepare and Implement an Invasive Plant Management Plan.

To ensure that no new invasive plants are carried onto the project construction sites, and that existing invasive plants are not spread, DWR will prepare and implement an Invasive Plant Management Plan that will contain the following measures at a minimum.

- Clean construction vehicles and equipment inside and out at an authorized washing facility before arrival at the project construction areas.
- Inspect vehicles and equipment to ensure they are free of soil and debris that could harbor nonnative plant seeds, roots, or rhizomes.
- Use certified weed-free vegetative materials for all imported materials, including all imported straw.
- Construction vehicles and equipment shall be cleaned inside and out at an authorized washing facility before arrival at the project construction areas and shall be inspected in an attempt to ensure they are free of soil and debris that could harbor nonnative plant seeds, roots, or rhizomes.
- Clean all construction vehicles if invasive or noxious weeds are already present in portions of the project construction areas before moving from infested areas to areas that are weed-free. Exterior cleaning will consist of pressure-washing vehicles and equipment, with close attention paid to the tracks, feet, and/or tires and on all elements of the undercarriage. Vehicle cabs will be swept out, and refuse will be disposed at an approved off-site location.

Timing: Before and during construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: With implementation of Mitigation Measures BIO-1a, BIO-1b, and BIO-1c, the potentially significant impact associated with loss of special-status plants and/or degradation of habitat under all action alternatives would be reduced to a **less-than-significant** level because measures will be implemented to avoid, minimize, and, if necessary, compensate for direct impacts to and loss of special-status plants.

Impact BIO-2: Potential Effects on Valley Elderberry Longhorn Beetle and Its Habitat.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5

miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no construction-related impacts to elderberry shrubs in the study area. These elderberry shrubs are anticipated to remain relatively unchanged from existing conditions, as land uses and levee O&M activities would generally be unchanged in the Lower Elkhorn Basin. There would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

Twenty-four (24) blue elderberry shrubs, the host plant for valley elderberry longhorn beetle larvae, occur in the study area and the vicinity. The shrubs are unevenly distributed, with some occurring along the east edge of the existing Yolo Bypass East Levee and along the Sacramento Bypass north levee.

Various project components, specifically levee construction and O&M activities, could require removing, trimming, or disturbing elderberry shrubs, which could result in adverse impacts to elderberry shrubs and the beetle. However, the overall result of implementing the ecosystem project elements would increase and enhance habitat quality for valley elderberry longhorn beetle because elderberry shrub seedlings and associated native species would be planted.

Up to sixteen (16) elderberry shrubs may be disturbed or removed as a result of implementing Alternatives 2 and 3, and fourteen (14) elderberry shrubs may be disturbed or removed as a result of implementing Alternatives 4 and 5. Although the ecosystem project elements could increase the amount of valley elderberry longhorn beetle habitat by establishing riparian habitat (which may include elderberry shrubs), the beetle could be adversely affected by trimming and/or removing elderberry shrubs. Therefore, Alternatives 2 through 5 would have a **potentially significant** impact**.** Mitigation Measures BIO-2a and BIO-2b, described below, have been identified to address this impact.

Mitigation Measure BIO-2a: Conduct Focused Surveys for Elderberry Shrubs and Avoid Impacts.

To avoid effects of project activities on valley elderberry longhorn beetle or the beetle's host plant, DWR will ensure that the following measures are implemented before commencement of ground-disturbing activities. If avoidance consistent with these measures cannot be achieved, DWR will implement the minimization and compensation measures included in Mitigation Measure BIO-2b described below.

- **Conduct Focused Survey for Elderberry Shrubs.** DWR will retain a qualified biologist to conduct a focused survey in areas where elderberry shrubs could occur within 100 feet of project construction and O&M areas. The survey will follow the USFWS conservation guidelines for the valley elderberry longhorn beetle (USFWS 2017). If elderberry shrubs are found, DWR will implement avoidance measures that are consistent with the USFWS conservation guidelines for this species (USFWS 2017).

- **Temporarily Fence All Elderberry Shrubs Adjacent to Construction Areas and Designate the Area as Environmentally Sensitive.** All elderberry shrubs located adjacent to construction areas, but can be avoided, will be temporarily fenced and designated as environmentally sensitive areas by DWR. These areas will be avoided by all construction personnel. Where feasible, effects will be avoided by establishing and maintaining a 100-foot-wide buffer around elderberry plants. Where a 100-foot buffer is not feasible, effects may be minimized by providing a minimum setback, with a buffer around elderberry plants measuring at least 20 feet wide.

- **Prohibit Use of Pesticides or Chemicals within 100 Feet of Elderberry Shrubs.** No insecticides, herbicides, or other chemicals that might harm the beetle or its host plant will be used by DWR within 20 feet of the elderberry shrubs.

  Timing: Before, during, and after construction.

  Responsibility: California Department of Water Resources.

Mitigation Measure BIO-2b: If Avoiding Construction-Related Effects on Elderberry Shrubs is Infeasible, Minimize and, where Appropriate, Compensate for Effects on Valley Elderberry Longhorn Beetle and Loss of Habitat.

If the focused surveys described above in Mitigation Measure BIO-2a have been completed and avoiding direct effects on valley elderberry longhorn beetle is infeasible, DWR will coordinate with USFWS to determine acceptable methods for minimizing or compensating for effects on this species. DWR will ensure that the measures described below are implemented to minimize and compensate for effects of the project on valley elderberry longhorn beetle and its habitat.

- **Transplant and Compensate for Elderberry Shrubs That Cannot be Avoided.** Elderberry shrubs that cannot be avoided and require removal will be transplanted by DWR. If none of the areas of suitable habitat to be created as part of the project would be available before the impact would occur, alternative transplant locations will be identified. Transplant activities will be conducted in accordance with USFWS guidelines (USFWS 2017). If ground-disturbing activities are to occur within 20 feet of the dripline of an elderberry shrub, minimization and compensation measures consistent with the USFWS conservation guidelines (USFWS 2017) will be implemented. These measures include transplanting elderberry shrubs to the riparian habitat creation areas and planting compensatory elderberry seedlings and associated native plantings.

- **Prepare and Implement a Mitigation Plan.** The mitigation plan will specify how to manage the elderberry transplant area to ensure that the appropriate habitat conditions are provided. At a minimum, the plan will specify the number of replacement elderberry shrubs and associated native plants to be established and associated success criteria; specify remedial measures to be undertaken if survival success criteria are not met; and describe short- and long-term maintenance and management.

- **Consult with USFWS, Obtain Appropriate Take Authorizations, and Implement All Conditions.** If it is determined that implementation of a project component would result in take of valley elderberry longhorn beetle (Federally listed species), despite implementation of avoidance and minimization measures, consultation with USFWS will be required and an incidental take authorization will be required. All measures developed through consultation with USFWS will be implemented by DWR to mitigate adverse impacts to this special-status species.

Timing: Before, during, and after construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: With implementation of Mitigation Measures BIO-2a and BIO-2b, the potentially significant impact associated with potential disturbance and loss of valley elderberry longhorn beetle under all action alternatives would be reduced to a **less-than-significant** level because the project will avoid, minimize, and, if necessary, provide and implement a mitigation plan that meets USFWS conservation guidelines.

Impact BIO-3: Potential Disturbance or Loss of Giant Garter Snakes and Their Habitat.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, there would be no construction-related impacts to giant garter snakes or their habitat in the study area. This habitat is anticipated to remain relatively unchanged from existing conditions, as land uses and levee O&M activities would generally be unchanged in the Lower Elkhorn Basin. There would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

Project components that require dewatering of suitable aquatic habitat (see Figure 4.5-3) could displace giant garter snakes. Ground-disturbing activities in uplands adjacent to suitable aquatic habitat could result in direct displacement, injury, or the mortality of snakes if the habitat is used for basking, hibernating, or aestivating. Indirect impacts could occur if snakes are displaced from occupied habitat or disturbed by nearby construction activities. Displacement and disturbance resulting from human activity, construction noise, and equipment vibrations could affect the ability of snakes to conduct essential life history functions, such as dispersal, movement, or foraging, and could increase competition for food and space and vulnerability to predation. Levee improvements and O&M activities could temporarily degrade aquatic habitat – including the potential for earthwork below the ordinary high water mark (OHWM) in the Tule Canal, but the overall result of implementing the ecosystem project elements would be an enhancement of habitat quality through the retention of upland refugia along the Tule Canal and the creation of a wetland bench in the Tule Canal (under Alternatives 2 and 4). Under these alternatives, portions of the east levee along Tule Canal, which is currently maintained as grassland, would be retained; nonnative invasive species would be removed and perennial native grasslands would be established on the upland areas. These upland areas would no longer be maintained for flood control purposes. Some rock may be added to stabilize the levee remnants and prevent erosion; these rocks would be expected to support potential hibernaculae for giant garter snakes. A small amount of riparian habitat exists along the waterside toe of the levee; planting of additional riparian areas would occur separate from these upland refugia. A wetland bench may be added along the Tule Canal; this could add additional structure and opportunity to giant garter snake foraging habitat, to the benefit of this species.

Giant garter snakes have been documented in the Yolo Bypass (CDFW 2016). There is potential for the species to occur, at least occasionally, in nearby portions of the study area. For the purposes of this impact analysis, any aquatic habitat assigned a “suitable” or “marginal” ranking (see DWR 2016g) is considered suitable aquatic habitat for giant garter snake; annual grassland located within 200 feet of suitable or marginal aquatic habitat is considered suitable upland for giant garter snake. If giant garter snakes are present during earth-moving activities, adverse impacts could include disturbance, displacement, injury, or the mortality of individuals.

Levee improvements, O&M activities, and ecosystem project elements – where these activities involve disturbance to aquatic habitats, as well as annual grasslands – could disturb suitable habitat for giant garter snake. Project construction and implementation would result in permanent and temporary loss and disturbance of potential giant garter snake habitat. Temporary loss of habitat is defined as habitat being unavailable or unusable for one giant garter snake active season. Fill, temporary and permanent dewatering, land conversion, and staging and other construction disturbances, as well as O&M activities, could disturb, injure, or kill snakes using affected habitats, including irrigation ditches, drainage canals, and associated uplands. Project construction activities in areas of potentially suitable habitat could also result in direct disturbance and loss of individual giant garter snakes. Beneficial impacts to giant garter snake would also result from implementing the ecosystem project elements, specifically where sections of the Yolo Bypass East Levee would not be degraded but retained as upland refugia for giant garter snake.

All action alternatives could impact giant garter snake habitat through direct permanent removal and temporary disturbance. This impact analysis assumes that all potentially suitable aquatic habitat within borrow areas and the footprints of the new setback levee and relocated road would be permanently removed. This impact analysis also assumes that most aquatic habitat associated within the Tule Canal would be avoided, and that the toe drain adjacent to the levee degrade as well as the ditch within the footprint of the relocated canal would be temporarily affected. This impact analysis assumes that, apart from the relocated road and aquatic component associated with the relocated canal, most potentially suitable upland habitat would only be temporarily affected by most project components, because annual grassland would be the postconstruction land cover for the new setback levee and seepage berm and these areas would continue to function as suitable upland habitat due to the proximity of suitable aquatic habitats. A small amount of rice field is located in the southernmost extent of the project footprints; since the rice field would be dry and fallow during the construction work in this area, it is considered “upland” habitat here; the effects in this area would be temporary.

As highlighted in Table 4.5-7, the approximate amount of acreage impacted would vary among the action alternatives, although the total approximate amount of disturbance or removal of giant garter snake habitat would be similar under Alternatives 2 and 3, and under Alternatives 4 and 5.

Table 4.5-7. Acreages of Impacts to Potentially Suitable Giant Garter Snake Habitat from the Action Alternatives

Impact Type	Approximate Impact Acreage			
	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Aquatic[1] – Temporary	8.9	5.4	2.1	5.3
Upland[2] – Temporary	204.9	214.5	88.2	5
Aquatic[1] – Permanent	24.8	35.6	24.7	12.9
Upland[2] – Permanent	1.1	1.3	0.7	0.5
Total Impact	**239.5**	**256.5**	**115.7**	**107.2**

Notes:

[1] Aquatic habitat that assigned a "suitable" or "marginal" ranking (see DWR 2016e) is considered suitable aquatic habitat for giant garter snake.

[2] Annual grassland located within 200 feet of suitable or marginal aquatic habitat is considered suitable upland for giant garter snake. A small amount of rice field, totaling 3.67 acres, is located in the southernmost extent of the project footprints; since the rice field would be dry and fallow during the construction work in this area, it is considered "upland" habitat here.

Source: Data compiled by GEI Consultants, Inc. in 2016

Implementing Alternative 2 could result in permanent loss of potentially suitable habitat for giant garter snake and temporary impacts to these habitats as a result of dewatering and temporary construction disturbance. Direct permanent loss of potential suitable habitat would result from removing portions of ditches and canals within the project footprint, primarily during borrow extraction and construction of the new setback levee and associated features (see Figure 4.5-4). Potentially suitable aquatic habitat would be temporarily impacted in the toe drainage ditch landside of the Yolo Bypass East Levee; this ditch is anticipated to be dewatered during project construction, and a temporary crossing would likely be installed to facilitate access to the existing levee. At the two cross-canals, temporary impacts are expected to result from dewatering and construction of temporary cofferdams to facilitate constructing the new setback levee and associated features and filling portions of the cross-canals that would be in the setback area. Additional temporary impacts to aquatic habitat could occur if earthwork is conducted below the OHWM in the Tule Canal to create a wetland bench.

Alternative 3 includes construction of the same facilities as Alternative 2, with a slightly expanded setback area in the southern portion of the project site. The main differences between the impacts of these two alternatives are that (1) under Alternative 3, additional ditches and associated upland would be permanently impacted in the expanded footprint at the southern end of the project site, and (2) Alternative 3 would not result in temporary effects to ditches and associated upland within the footprint of the relocated canal footprint. Because the entire existing Yolo Bypass East Levee would be degraded, there would no beneficial effect from retaining remnant levee segments to provide upland refugia as under Alternative 2.

Alternatives 4 and 5 would generally include construction of the same types of facilities as Alternatives 2 and 3, but the new setback levee would only be constructed south of the north cross-canal, making it approximately 2.25 miles shorter under Alternatives 4 and 5. Because of the shorter setback levee under Alternatives 4 and 5, ditches in the northern portion of the Lower Elkhorn Basin and the north cross-canal would not be impacted, resulting in fewer acres of impact, compared to Alternatives 2 and 3. Alternative 4 would include construction of the same facilities as Alternative 5, with a slightly expanded setback area in the southern portion of the project site; thus, the potential permanent impacts to aquatic habitat under Alternative 4 are nearly twice as high as Alternative 5, but have a smaller amount of temporary impacts to aquatic habitat (similar to that described for Alternative 3 above).

O&M activities could result in both beneficial and adverse effects to giant garter snakes. Beneficial effects would result from maintaining grasslands and preventing encroachment of woody vegetation into herbaceous grassland habitats (i.e., suitable upland for this species) and from maintaining canals and ditches through the periodic removal of sediment and dense nonnative floating and submerged vegetation (which could otherwise reduce giant garter snake movement and prey production), thereby maintaining and/or increasing habitat quality for giant garter snake. Some O&M activities, such as rodent abatement, may potentially affect the giant garter snake directly by killing individuals during grouting of rodent burrows and cracks in levees that are adjacent to aquatic habitat, or by capturing during excavation activities, and indirectly by removing or altering habitat (e.g. sediment removal from canals, channels, and structures). Rodent abatement and damage repair may result in direct mortality of giant garter snakes, which could become entombed in burrows when fumigants are placed inside burrows and sealed with earth, when small-mammal burrows are filled with grout, or when small-mammal burrow complexes on levees are excavated and backfilled. The potential for giant garter snakes to be killed or harmed by rodent abatement and damage repair activities exists throughout the year. While the potential for mortality or injury is greatest if these activities occur during the snake's inactive period when snakes are using upland burrows for brumation (approximately October 2 through May 1), the potential for direct mortality exists throughout the year because giant garter snakes use upland burrows extensively for thermoregulation, escape, birthing, and other activities during other times of the year when they are not otherwise active in aquatic habitats (Halstead et al. 2015). The new setback levee, where O&M activities would occur, is a "human-made, engineered earthen [structure] for which federal regulations (33 USC 208.11, USACE O&M Manuals, PL84-99), assurance agreements, and the California Water Code require maintenance to acceptable engineering standards…[that] do not allow holes or cracks in the levee that compromise flood control and public safety. For this reason, burrows, tunnels, or other penetrations in levees cannot be considered protected wildlife habitat" (DWR 2017). Therefore, it is unlikely that burrow systems would develop in the setback levee and that rodent abatement O&M activities would affect giant garter snake; however, the grasslands on the levee are expected to provide some degree of suitable upland for this species for moving overland and surface activities.

Because of the risk of harm, harassment, injury, and mortality to giant garter snakes that would result from habitat removal and disturbance, including O&M activities, implementing any of the action alternatives would have a **potentially significant** impact**.** Mitigation Measures BIO-3a and BIO-3b, described below, have been identified to address this impact.

Mitigation Measure BIO-3a: Implement Measures to Avoid Impacts to Giant Garter Snake and Its Habitats.

To avoid adverse effects of project activities on giant garter snakes, DWR will ensure that the following measures are implemented before commencement of ground-disturbing activities. If avoidance consistent with these measures cannot be achieved, DWR will implement the minimization and compensation measures included in Mitigation Measure BIO-3b, described below.

- **Avoid Construction Activities within 200 Feet from the Banks of Suitable Giant Garter Snake Habitat and Temporarily Fence and Designate Suitable Giant Garter Snake Habitat to be Avoided as an Environmentally Sensitive Area.** If potentially suitable aquatic habitat for giant garter snake is identified in or within 200 feet of project construction areas by a qualified biologist, DWR will establish a 200-foot buffer around the aquatic habitat, where feasible. Buffers will be marked in the field with guidance from a qualified biologist using temporary fencing, high-visibility flagging, or other equally effective means for clearly delineating the buffers. Construction activities will not occur within the buffer, and workers will avoid entering the buffer at all times. If avoidance buffers are observed, no other mitigation measures for impacts on giant garter snakes will be required. If work must occur within 200 feet of potentially suitable aquatic habitat, DWR will implement mitigation measures included in Mitigation Measure BIO-3b, as determined to be necessary by a qualified biologist.

Timing: Before and during construction.

Responsibility: California Department of Water Resources.

Mitigation Measure BIO-3b: If Avoiding Effects on Giant Garter Snake and Its Habitats is Infeasible, Minimize and, where Appropriate, Compensate for Effects on This Species and Loss of Habitat.

If the measures described above in Mitigation Measure BIO-3a have been completed and avoiding adverse effects on giant garter snake is infeasible, DWR will coordinate with USFWS and CDFW to determine acceptable methods for minimizing or compensating for effects on this species. DWR will ensure that the measures described below are implemented to minimize and compensate for effects of the project on giant garter snake.

- **Have a Qualified Biologist Available to Monitor Construction Activities Occurring in Suitable Giant Garter Snake Habitat.** If construction activities that could result in direct, adverse effects on giant garter snakes (e.g., burrow collapse, crushing) would occur during periods when giant garter snakes have a higher probability of occurring in terrestrial habitats (i.e., between October 1 and May 1 or outside this period in mornings, evenings, overnight, or when ambient air temperatures are less than approximately 75˚F or greater than approximately 90˚F), DWR will ensure that a qualified biologist is present during initial ground disturbance. The qualified biologist will follow the requirements specified in the bullet below to ensure that giant garter snakes are protected to the maximum extent feasible during construction activities.

  Staff trained in the identification of giant garter snakes will monitor all construction occurring in aquatic habitat during the active season. When initial ground disturbance will occur in areas of suitable giant garter snake habitat, a qualified biologist will monitor the work. As work is conducted, the qualified biologist will visually scan work areas, equipment, and materials (e.g., excavated sediment and associated aquatic vegetation) for giant garter snakes. If any snake and/or giant garter snakes are observed, DWR will halt all work and follow the requirements specified in the bullet below.

- **Stop Work if a Giant Garter Snake is Observed in Construction Area and Allow Snakes to Leave the Construction Area on Their Own or Have USFWS-qualified Biologist Capture and Relocate Giant Garter Snake.** If giant garter snakes are observed in a construction area, DWR will stop work until the snake moves out of the area of construction activity and will notify a qualified biologist immediately. If possible, the snake will be allowed to leave on its own volition, and the qualified biologist will remain in the area until the biologist deems his or her presence no longer necessary to ensure that the snake is not harmed. Alternatively, with prior CDFW and USFWS approval and appropriate handling permits, the qualified biologist may capture and relocate the snake unharmed to suitable habitat at least 200 feet from the construction area. DWR will notify CDFW and USFWS by telephone or email within 24 hours of a giant garter snake observation during construction activities. If the snake does not voluntarily leave the construction area and cannot be captured and relocated unharmed, construction activities within approximately 200 feet of the snake will stop to prevent harm to the snake, and CDFW and USFWS will be consulted to identify next steps. In that case, DWR will implement the measures recommended by CDFW and USFWS prior to resuming construction activities in the area.

- **Conduct Initial Earth-movement Activities within Suitable Upland Habitat for Giant Garter Snake between May 1 and October 1.** When possible, DWR will complete construction and other ground-disturbing activities within suitable upland habitat for the giant garter snake between May 1 and October 1. Initial earth-moving is expected to correspond with the snake's active season (as feasible in combination with minimizing disturbance of nesting Swainson's hawks). Work in giant garter snake upland habitat may also occur between October 2 and November 1 or April 1 through April 30 provided ambient air temperatures exceed approximately 75ºF during work and maximum daily air temperatures have exceeded approximately 75ºF for at least 3 consecutive days immediately preceding work. During these periods, giant garter snakes are more likely to be active in aquatic habitats and less likely to be found in upland habitats. Where feasible, before construction activities occur in potentially suitable terrestrial giant garter snake habitat during periods when snakes are active (between May 1 and October 1 when ambient air temperatures exceed 75 ºF), DWR will mow areas of herbaceous vegetation surrounding planned work areas to a height of no less than 6 inches where and when feasible to increase visibility and the probability of giant garter snake detection during surveys and monitoring.

- **Conduct a Pre-construction Survey within Suitable Giant Garter Snake Habitat within 3 Days before Commencement of Ground-disturbing Activities.** DWR will ensure that a qualified biologist surveys areas of planned ground disturbance for burrows, soil cracks, and crevices that may be suitable for use by giant garter snakes when within suitable terrestrial habitat. Surveys will be completed no more than 3 days before conducting any ground-disturbing maintenance activities in terrestrial habitat potentially supporting giant garter snakes. Any identified burrows, soil cracks, crevices, or other habitat features will be flagged or marked by the qualified biologist. The biologist will provide USFWS with written documentation of the monitoring efforts within 48 hours after the survey is completed. The construction area will be reinspected by a qualified biologist whenever a lapse in construction activity of 2 weeks or greater has occurred at any particular construction site.

  If feasible and accepted by CDFW and USFWS, DWR will also use other survey techniques (e.g., scent-detection dogs) as an alternative or a supplement to surveys conducted by a qualified biologist. Such surveys would be used to identify cracks and burrows to help determine giant garter snake occupancy, and these burrows would be flagged to be avoided during subsequent work as described above.

- **Limit Sediment Removal Activities between October 1 and April 30.** Where feasible for collection canals and other channels that involve sediment removal in the wet, DWR will conduct maintenance activities in aquatic habitats potentially supporting giant garter snakes between October 1 and April 30. During this time, giant garter snakes are more likely to be occupying upland burrows and are less likely to be in the aquatic habitat.

- **Deposit Excavated Spoils Outside of Designated Environmentally Sensitive Areas and Inspect Deposited Spoil Piles Prior to Grading.** When feasible, DWR staff members will deposit spoils in areas that do not provide suitable giant garter snake upland habitat. Such areas include compacted or gravel roadbeds, orchards, and recently disked farm fields. If spoils disposal would occur within potentially suitable upland habitat for giant garter snake, excavated spoils will be placed to avoid canal banks and burrows. A qualified biologist trained in giant garter snake identification will monitor all spoils disposal.

  Immediately preceding grading deposited spoils piles, a qualified biologist will survey planned work areas for giant garter snake and burrows. Additionally, a qualified biologist trained to identify garter snakes will monitor all work as it occurs. Grading of deposited spoils piles will only occur during periods when giant garter snakes are likely to be active in aquatic habitat.

- **Ensure that Suitable Giant Garter Snake Aquatic Habitat that is Dewatered Remains Dry for 15 Consecutive Days and if Not Possible, Remove Potential Snake Prey.** DWR will dewater maintenance areas potentially providing aquatic habitat for giant garter snakes to the extent feasible. Any dewatered aquatic habitat will be kept dry for at least 15 consecutive days before excavating or filling of the dewatered habitat. If 15 consecutive days are not feasible, then DWR will consult with both USFWS and CDFW to apply appropriate measures. If dewatering cannot remove all water, potential giant garter snake prey (e.g., fish and tadpoles) will be removed so that giant garter snakes and other wildlife are not attracted to the construction area.

- **Restore All Suitable Giant Garter Snake Habitat Subject to Temporary Ground-disturbance to Pre-project Conditions.** After construction activities are complete, DWR will ensure that all suitable giant garter snake habitat subject to temporary earth-movement, including storage and staging areas and temporary roads, will be restored to pre-project conditions. These areas will be recontoured, if appropriate, and revegetated with appropriate native plant species to promote restoration of the area to pre-project conditions. Appropriate methods and plant species used to revegetate such areas will be determined on a site-specific basis in consultation with USFWS and CDFW.

- **Develop and Implement a Mitigation Plan to Offset Unavoidable Loss of Habitat.** If potentially occupied habitat for giant garter snake cannot be avoided during project construction, DWR will develop and implement an appropriate and feasible mitigation plan to compensate for potential disturbance, displacement, injury, or the mortality of individuals. The plan will be provided to USFWS and, as necessary, CDFW for approval. Compensation for direct impacts may include preserving, enhancing, and/or creating giant garter snake habitat at an on- or off-site location, or purchasing credits at a USFWS-approved mitigation bank may be identified as appropriate mitigation. DWR will implement the plan once the plan is approved by USFWS (and CDFW, as necessary).

- **Consult with USFWS and CDFW and Obtain Appropriate Take Authorizations.** If it is determined that implementation of a project component would result in take of giant garter snake, despite implementation of avoidance and minimization measures, DWR will seek authorization for take of giant garter snake under the Federal ESA and possibly CESA. If it is determined that implementation of a project component is likely to result in take under either regulation, DWR will implement all measures developed through consultation with USFWS and CDFW to mitigate adverse impacts.

Timing: Before, during, and after construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: With implementation of Mitigation Measures BIO-3a and BIO-3b, the potentially significant impact associated with take and/or loss of habitat for giant garter snake under all action alternatives would be reduced to a **less-than-significant** level because the project will avoid, minimize, and provide compensation for loss of giant garter snake habitat as appropriate.

Impact BIO-4: Potential Disturbance or Loss of Northwestern Pond Turtles and Their Habitat.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, there would be no construction-related impacts to northwestern pond turtle habitat in the study area. This habitat is anticipated to remain relatively unchanged from existing conditions, as land uses and levee O&M activities would generally be unchanged in the Lower Elkhorn Basin. There would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

Project components that require dewatering of suitable aquatic habitat could result in stranding and displacement of northwestern pond turtles. Ground-disturbing activities in uplands adjacent to suitable aquatic habitat could result in direct injury or mortality of turtles if the habitat is used for basking, hibernating, or nesting. Indirect impacts could occur if pond turtles are displaced from occupied habitat or disturbed by nearby construction activities. Displacement and disturbance resulting from human activity, construction noise, and equipment vibration could affect the ability of turtles to conduct essential life history functions, such as dispersal, movement, or foraging, and could result in increased competition for food and space and vulnerability to predation. Construction activities could also temporarily degrade aquatic habitat. One of the beneficial results of implementing the ecosystem project elements under Alternatives 2 and 4 would be an enhancement of habitat quality through the retention of upland refugia along the Tule Canal.

Northwestern pond turtles have been observed in the study area (DWR 2016f). Despite the varying habitat conditions in the study area, most of the canals and ditches support at least some areas of suitable aquatic and upland habitat (see Figure 4.5-3). Levee improvements, O&M activities, and ecosystem project elements – where these activities involve disturbance to aquatic habitats, as well as annual grasslands – could disturb suitable habitat for northwestern pond turtles. Although construction activity along portions of the new setback levee footprint and borrow areas would not occur during the pond turtle hibernation period, movement of heavy equipment, grading, and other earth-movement in areas of suitable aquatic and upland habitats could result in direct injury or mortality of pond turtles.

Because the pond turtle uses similar habitats as the giant garter snake, Table 4.5-7 summarizes the amount of aquatic and upland habitat – including potential nesting habitat – for northwestern pond turtle that could be affected by implementing each alternative. Implementing Alternative 2 would result in permanent loss of potentially suitable habitat for giant garter snake, and thus pond turtle, through the removal of portions of ditches and canals during borrow extraction and construction of the new setback levee and associated features, and temporary impacts to these habitats as a result of dewatering and temporary construction disturbance. Alternative 3 includes construction of the same facilities as Alternative 2, with a slightly expanded setback area in the southern portion of the project site, a greater amount of ditches and associated upland that would be permanently impacted, and a lower amount of temporary effects to ditches and associated upland within the footprint of the relocated canal footprint. Because the entire existing Yolo Bypass East Levee would be degraded, there would be no beneficial effect from retaining remnant levee segments to provide upland refugia as under Alternative 2.

Alternatives 4 and 5 would generally include construction of the same types of facilities as Alternatives 2 and 3, but the new setback levee would only be constructed south of the north cross-canal and ditches in the northern portion of the basin and the north cross-canal would not be impacted, resulting in fewer acres of impact compared to Alternatives 2 and 3. Alternative 4 would include construction of the same facilities as Alternative 5, with a slightly expanded setback area in the southern portion of the project site; thus, the permanent impacts to aquatic habitat under Alternative 4 are nearly twice as high as Alternative 5, but have a smaller amount of temporary impacts to aquatic habitat (similar to that described for Alternative 3 above).

Because pond turtles, if present in the project site during project activities, could be directly affected or displaced by the high-disturbance levels, implementing any of the action alternatives would have a **potentially significant** impact**.** Mitigation Measure BIO-4 described below, has been identified to address this impact.

Mitigation Measure BIO-4: Avoid and Minimize Impacts to Northwestern Pond Turtle and Its Habitats.

To avoid effects of project activities on northwestern pond turtle, DWR will ensure that the measures described below are implemented before commencement of ground-disturbing activities.

- **Avoid Potential Northwestern Pond Turtle Habitat, to the Extent Feasible, and Establish Temporary Buffers.** DWR will avoid ground-disturbance (e.g., grading, disking, road construction, or similar activities that could disturb or crush western pond turtles and their nests) within 200 feet of potentially suitable western pond turtle aquatic habitat, as determined by a qualified biologist. Potential suitable aquatic habitat has suitable basking sites (such as logs, rocks, mats of floating vegetation, or open mud banks) and underwater refugia (such as rocks or submerged vegetation). DWR will observe this buffer during western pond turtle breeding periods (May 1 to November 1), when nests and hatchlings may be present. This 200-foot buffer, or another buffer approved in consultation with CDFW, will be marked in the field by a qualified biologist using temporary fencing, high-visibility flagging, or other means that are equally effective in clearly delineating the buffers. Construction activities that could result in ground disturbance will not occur within the buffer to the extent feasible. If such construction activities must occur in buffers, a buffer of reduced width will be established (in consultation with CDFW) by a qualified biologist, marked, and avoided during construction activities in that location. All ground-disturbing activities occurring within the original buffer distance will be monitored by a qualified biologist who would be either on-call or on-site, as appropriate to reduce impacts.

- **Where Feasible, Conduct Construction Activities within Suitable Northwestern Pond Turtle Habitat Between May 1 and November 1.** Where feasible, DWR will conduct construction activities in aquatic habitats that are potentially supporting western pond turtles between May 1 and November 1. During this time, western pond turtles are more likely to be active in aquatic habitats and can actively move to avoid maintenance activities in aquatic habitat.

- **Conduct a Pre-construction Survey for Northwestern Pond Turtles within Suitable Aquatic Habitats and Adjacent Suitable Uplands within 24 Hours of Project Disturbance and Immediately after Dewatering.** A pre-construction survey for northwestern pond turtles within aquatic habitats and adjacent suitable uplands to be disturbed by project activities will be conducted by a qualified biologist. In aquatic habitats to be dewatered during project construction, surveys will be conducted immediately after dewatering and before any subsequent disturbance. Elsewhere, surveys will be conducted within 24 hours before project disturbance.

- **Stop Work if Northwestern Pond Turtle Observed in Construction Area and, with CDFW Approval, Move Animal to the Nearest Suitable Habitat Outside the Area if Found On-site.** If northwestern pond turtles are observed in a construction area, DWR will stop work within approximately 200 feet of the turtle, and a qualified biologist will be notified immediately. If possible, the turtle will be allowed to leave on its own and the qualified biologist will remain in the area until the biologist deems his or her presence no longer necessary to ensure that the turtle is not harmed. Alternatively, the qualified biologist may capture and relocate the turtle, unharmed and with prior CDFW approval, to suitable downstream habitat at least 200 feet. If the turtle does not voluntarily leave the maintenance area and cannot be captured and relocated unharmed, construction activities within approximately 200 feet of the turtle will stop to prevent harm to the turtle, and CDFW will be consulted to identify the next steps, if needed.

Timing: Before and during construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: With implementation of Mitigation Measure BIO-4, the potentially significant impact associated with adverse impacts to northwestern pond turtle under all action alternatives would be reduced to a **less-than-significant** level because the project will avoid and minimize disturbance to pond turtles and their habitat.

Impact BIO-5: Potential Loss of Burrowing Owl Individuals from Destruction of Occupied Burrows and Nest Disturbance.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no construction-related impacts to potential burrowing owl habitat or disturbance of occupied burrows on or adjacent to the project site. This habitat is anticipated to remain relatively unchanged from existing conditions, as land uses and levee O&M activities would generally be unchanged in the Lower Elkhorn Basin. There would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

Although no burrowing owls have been identified within the study area, grasslands, agricultural fields, and other open habitats within the study area provide potentially suitable habitat for burrowing owls, and potentially suitable burrows were identified during surveys. Project implementation, including levee improvements, O&M activities, and ecosystem project elements, require earth-movement within areas of suitable burrowing owl habitat and could result in loss of occupied burrows. This could cause injury or mortality of burrowing owls, if they are present within the burrows when earth-moving occurs. If disturbance-levels are high enough, owls could be displaced from active burrows, potentially resulting in abandonment of active nests and loss of eggs or young. Areas of suitable foraging habitat for burrowing owls would also be affected by implementation of levee improvements and the O&M activities.

Implementation of levee improvements, including new setback levee and berm construction, borrow extraction, material transport and staging, and levee degradation, would occur within or adjacent to grasslands, agricultural lands, and other open habitats that could be occupied by burrowing owls. The primary potential for adverse impacts is disturbance from implementation of project components in the vicinity of occupied burrows that could be present adjacent to levee improvements, borrow sites, haul routes, and staging areas, as well as any areas where O&M activities occur. Implementation of the ecosystem project elements would result in establishment of native grasslands and wildlife-friendly agriculture and is anticipated to provide a net benefit for burrowing owls.

As highlighted in Table 4.5-8 the amount of acreage impacted would vary among the action alternatives, although total amount of temporary disturbance or permanent removal of potentially suitable burrowing owl habitat would be more similar under Alternatives 2 and 3, and under Alternatives 4 and 5. This impact analysis assumes that agricultural land cover within the borrow areas and that annual grassland within the new setback levee and levee degrade footprints would be temporarily disturbed because these land cover types would be expected to be present within these footprints postconstruction. It should be noted that portions of the levee degrade area may be restored as riparian habitat; however, the location and amount of that restoration has not been finalized at this time. This impact analysis assumes that agricultural land cover within the setback levee footprints would be permanently lost because most of this area would be converted to grassland habitat.

Table 4.5-8. Acreages of Impacts to Potentially Suitable Burrowing Owl Habitat[1] from the Action Alternatives

Impact Type	Approximate Impact Acreage			
	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Temporary	1,116	1,371	892	638
Permanent	546	548	317	256
Total Impact	**1,662**	**1,919**	**1,209**	**894**

Note:

[1] Suitable habitat includes annual grassland and agriculture land cover types.
Source: Data compiled by GEI Consultants, Inc. in 2016

Relative to Alternative 2, the amount of habitat removal and disturbance may be slightly more under Alternative 3, because the entire existing Yolo Bypass East Levee would be degraded, and the amount of upland habitat removal and disturbance may be substantially less under Alternatives 4 and 5, because no levee degradation would occur in the northern portion of the project site. Because of the potential for destruction and/or disturbance of occupied burrows, if present on the project site during project activities, implementing any of the action alternatives would have a **potentially significant** impact**.** Mitigation Measures BIO-5a and BIO-5b, described below, have been identified to address this impact.

Mitigation Measure BIO-5a: Conduct a Habitat Assessment and Focused Surveys for Burrowing Owls, and Avoid Impacts.

To avoid effects of project activities on burrowing owls, DWR will ensure that the following measure is implemented before commencement of ground-disturbing activities. If burrowing owls are detected in the construction area, DWR will implement the avoidance and minimization measures included in Mitigation Measure BIO-5b described below.

- **Conduct an Assessment of Burrowing Owl Habitat Suitability in Areas Subject to Project-Related Disturbance and Conduct a Focused Survey for Burrowing Owl.** A qualified biologist will conduct an assessment of burrowing owl habitat suitability in areas subject to project-related disturbance. The assessment will evaluate the area subject to direct impact, as well as adjacent areas within up to 1,500 feet, depending on the potential extent of indirect impact. If suitable burrows or sign of burrowing owl presence are observed, a focused survey for burrowing owls would be conducted in areas of suitable habitat within the area of potential direct and indirect impact. The survey will be conducted in accordance with Appendix D of the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012). A letter report documenting the survey methods and results shall be prepared and submitted to CDFW.

Mitigation Measure BIO-5b: If Surveys Detect Burrowing Owl in the Project Area, Implement Measures to Avoid and Minimize Effects to Burrowing Owl and Establish Protective Buffers Around Occupied Burrows and Monitor.

If the focused surveys described above in Mitigation Measure BIO-5a have been completed and burrowing owl are detected at the project site, DWR will coordinate with CDFW to determine acceptable methods for avoiding and minimizing effects on this species. DWR will ensure that the measures described below are implemented to avoid and minimize effects of the project on burrowing owl.

- **Consult with CDFW Regarding Best Approach to Avoid and Minimize Potential Impacts to Burrowing Owl if Active Burrows Are Observed and Implement Measures.** If any burrowing owls or active burrows are observed, DWR will establish a buffer based on the activity dates and the level of disturbance in accordance with the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012). Buffers will be marked in the field by a qualified biologist using temporary fencing, high-visibility flagging, or other means that are equally effective in clearly delineating the buffers. Construction activities will not occur within the established buffer and workers will avoid entering the area.

  If active burrows cannot be avoided with the minimum buffers, DWR will consult with CDFW to determine the best approach to avoid and minimize potential impacts. Such measures will conform to the *Staff Report on Burrowing Owl Mitigation* (CDFG 2012) and may modified buffers or passive relocation of owls during the non-breeding season, if it is infeasible to implement an adequate buffer. Passive relocation of owls will be conducted in accordance with an exclusion and relocation plan developed in coordination with and approved by CDFW. The relocation plan will describe methods for passive relocation of the owls, destruction of suitable burrows, and how the site will be maintained to prevent owl reoccupation.

- **Provide a Protective Buffer for Occupied Burrows during the Breeding Seasons and Monitor Burrows to Ensure that Project Activities do not Result in Adverse Effects on Nesting Burrowing Owls.** Burrows occupied during the breeding season (February 1 through August 31) will be provided with a protective buffer until a qualified biologist verifies through noninvasive means that either (1) the birds have not begun egg-laying, or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival. The size of the buffer will depend on distance from the nest to area of project disturbance, type and intensity of disturbance, presence of visual buffers, and other variables that could affect susceptibility of the owls to disturbance. Monitoring will be conducted to confirm that project activity is not resulting in detectable adverse impacts on nesting burrowing owls.

- **Instruct Construction Personnel of Potential Presence of Western Burrowing Owls and the Importance of Minimizing Impacts on Borrowing Owls and Their Habitat.** Before earth-movement, all on-site construction personnel will be instructed regarding the potential presence of western burrowing owls, identification of these owls and their habitat, and the importance of minimizing impacts on burrowing owls and their habitat.

  Timing: Before and during construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: With implementation of Mitigation Measures BIO-5a and BIO-5b, the potentially significant impact associated with adverse impacts to burrowing owl under all action alternatives would be reduced to a **less-than-significant** level because the project will avoid and minimize disturbance adjacent to occupied burrows and avoid direct or indirect loss of burrowing owls.

Impact BIO-6: Potential Disturbance of Nesting Special-status Birds and Common Raptor Species, Potential Loss of Active Nests and Nest Trees, and Potential Loss of Nesting and Foraging Habitat.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no construction-related impacts to nesting or foraging habitat for special-status birds and common raptors. Foraging habitat is anticipated to remain relatively unchanged from existing conditions, as land uses and levee O&M activities would generally be unchanged in the Lower Elkhorn Basin. O&M activities would likely result in direct or passive elimination of vegetation that provides suitable nesting habitat waterside of the Yolo Bypass East Levee and Sacramento Bypass North Levee. However, relatively little vegetation is present along these levees, compared to the west side of Tule Canal and elsewhere in the Sacramento Bypass. Therefore, impacts to special-status birds and common raptors from eventual loss of nesting habitat would be **less than significant**.

Alternatives 2 through 5: All Action Alternatives

Special-status birds with potential to be adversely affected by project components include those that could nest and/or forage in the study area: Swainson's hawk, white-tailed kite, northern harrier, bank swallow, western yellow-billed cuckoo, least Bell's vireo, song sparrow, and tricolored blackbird, as well as other birds protected under the Migratory Bird Treaty Act and California Fish and Game Code.

Trees along Tule Canal, the north cross-canal, and Sacramento Bypass provide suitable nest sites, and historical nests (CDFW 2016) for Swainson's hawk, white-tailed kite, and other tree-nesting raptor species (e.g., red-tailed hawk). Some crop types, specifically alfalfa, and fallow fields that may be present in the agricultural areas of the study area, including the project site, could provide suitable nesting habitat for northern harrier. Tricolored blackbirds and song sparrows could nest and forage in riparian and riparian scrub, and emergent marsh vegetation in and adjacent to the project site. Western yellow-billed cuckoo and least Bell's vireo could forage in riparian habitats. The agricultural lands and annual grasslands in the study area provide suitable foraging habitat for all raptors, as well as tricolored blackbird, and bank swallows could forage over all habitat types. Alfalfa is considered a higher-quality foraging habitat for Swainson's hawk, although this species forages in other agricultural crops as well as annual grasslands.

Table 4.5-9 summarizes the amount of potential nesting and foraging habitat for special-status birds and common raptor species that could be affected by implementing each action alternative. Grassland and suitable agricultural crops that provide foraging habitat for Swainson's hawk, white-tailed kite, northern harrier, common raptor species, and tricolored blackbird would be disturbed during construction of levee improvements (including borrow excavation, new setback levee and berm construction, and levee degradation) and implementation of O&M activities. Some foraging habitat would also be permanently converted to riparian woodland (which could then support suitable nesting habitat) as part of the ecosystem project elements. This impact analysis assumes that annual grassland within the new setback levee and levee degrade footprints would be temporarily disturbed because this land cover type would be expected to be present within these footprints postconstruction. This impact analysis assumes that agricultural land cover within the borrow areas would be converted from an upland agricultural cover

Table 4.5-9. Acreages of Impacts to Potentially Suitable Nesting and Foraging Habitat for Special-status Birds from the Action Alternatives

	Approximate Impact Acreage (Temporary/Permanent)			
Impact Type	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Potential Foraging Habitat				
Agriculture	967[1]/544[2]	1,215[1]/547[2]	810[1]/317[2]	557[1]/255[2]
- Alfalfa[3]	0/96	0/96	0/0	0/0
Annual Grassland	150/1	156/1	82/1	81/1
Total	**1,117 / 545**	**1,371/547**	**892/318**	**138/256**
Potential Nesting Habitat				
Riparian	0.5/19	0/20	1/6	0/6
Riparian Scrub	0/22	0/20	0/17	0/16
Total	**0.5/41**	**0/40**	**1/23**	**0/34**

Notes:

1 In borrow areas, upland agriculture would be converted to another crop type – in this case, rice. While reflected here as a "temporary impact," because it is a conversion from agriculture to agriculture, this impact could either be temporary (for most special-status birds) or permanent (for Swainson's hawk), depending on the species and its habitat requirements.

2 In some areas, upland agriculture would be converted to annual grasslands (e.g., setback levee, seepage berm, relocated canal banks). While reflected here as a "permanent" impact," because it is a conversion from agriculture to grassland, this impact could be either temporary or permanent, depending on the species and its habitat requirements.

3 Alfalfa supports high-quality foraging habitat for Swainson's hawk and potentially suitable nesting habitat for Northern harrier. Alfalfa is a subset of agriculture.

Source: Data compiled by GEI Consultants, Inc. in 2016

crop to rice; depending on the species and its foraging and nesting requirements, this may be either a temporary or permanent impact. This impact analysis assumes that agricultural land cover within the setback levee footprints would be permanently lost because most of this area would be converted to grassland habitat, which is still suitable foraging habitat for many special-status birds and common raptors. Although some riparian habitat would be retained along the levee degrade, most riparian and riparian scrub habitats within the project footprints would be permanent removed. The ecosystem project elements includes the restoration of riparian habitat, including in some areas that are currently annual grassland; however, the location and amount of that restoration has not been finalized at this time. Overall, the amount of acreage of potential foraging and nesting habitat impacted would vary among the action alternatives, although total amount of disturbance or removal of these habitats is most similar under Alternatives 2 and 3.

Alternatives 2 and 3 share a similar magnitude in the effects to potential foraging habitat. These alternatives would result in the conversion of agricultural land to either grassland or to another crop type, such as rice. The annual grassland would continue to support foraging habitat for special-status birds and common raptors. However, rice habitats may not provide suitable foraging habitat, particularly for Swainson’s hawk; thus, Swainson’s hawk foraging habitat could be lost through this conversion. The majority of agricultural crops provide moderate foraging value for special-status birds and common raptors. However, alfalfa is considered to be high-quality foraging habitat, particularly for Swainson’s hawk. A subset of the agricultural land that would be converted to rice includes alfalfa; there would be a reduction of up to 100 acres of high-quality foraging habitat under Alternatives 2 and 3 as this crop type could be converted to rice production postconstruction. Because of the expanded footprint in the southern part of the project site, Alternative 4 would result in a similar scale of effects to agriculture as Alternatives 2 and 3; however, the permanent loss of agriculture (converted to grassland) and temporary effects to grasslands would be substantially less than Alternatives 2 and 3. Alternative 5 would result in the smallest amount of foraging habitat that is temporarily or permanently lost.

Because the grassland would continue to function as foraging and habitat and because extensive areas of foraging habitat are in the project vicinity, the conversion of the agriculture from one crop to another within this area is not anticipated to substantially reduce foraging opportunities for most special-status birds – and many species of migratory birds, such as waterfowl – in the area. Therefore, there would be no long-term impact on the overall availability of foraging habitat in the study area, and is unlikely to have a substantial adverse impact on special-status birds (excluding Swainson’s hawk) and common raptors. For all action alternatives, this impact would be **less than significant**.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

It is expected that agricultural lands that are converted to grassland would continue to support suitable foraging habitat for Swainson’s hawk. However, the loss of suitable foraging habitat for Swainson’s hawk, including approximately 100 acres of high-quality foraging habitat (alfalfa) under Alternatives 2 and 3, through the conversion to rice (which is unsuitable foraging habitat for Swainson’s hawk except when it is fallow), could result in Swainson’s hawks having to forage farther from the nest or increase competition for prey with other hawks in the area.

Several studies have documented the importance of hay crops, especially alfalfa for Swainson’s hawks (Estep 1989, Estep 2008, and Woodbridge 1998). The characteristics that contribute to high-value habitat include:

- low vegetation structure, which increases prey accessibility;
- relatively large prey populations due to abundant cover and food;
- farming operations, such as weekly irrigation, which increases cover and food for prey; and
- regular mowing, which lowers vegetation structure, disturbs prey, and increases accessibility.

The greatest impact to overall foraging habitat value would be the permanent loss of alfalfa, which is considered the highest value foraging habitat type for Swainson's hawks in the Central Valley; however, the loss of additional foraging opportunities could reduce foraging opportunities for this species in the area. Therefore, this impact could be **potentially significant**.

Mitigation Measure BIO-6a: Compensate for Loss of Swainson's Hawk Foraging Habitat.

To minimize effects of project activities on foraging habitat for Swainson's hawk, DWR will ensure that the following measure is implemented.

- **Retain or Acquire and Preserve Suitable Swainson's Hawk Foraging Habitat.** To offset impacts to foraging habitat, DWR would either retain or acquire and preserve land that would be managed specifically to optimize its value as foraging habitat for Swainson's hawk. This would be accomplished by creating habitat types (e.g., agricultural or other vegetation types) that can be managed to provide high-quality foraging habitat for Swainson's hawk throughout the nesting season. Grasslands that are temporarily impacted would be converted to perennial native grasslands, which would be expected to provide higher-quality foraging habitat than the grasslands that would be impacted. Additional agricultural lands would be acquired for management as Swainson's hawk foraging habitat. DWR will coordinate with CDFW to identify suitable foraging habitat, based on the amount and quality of the habitat, to offset the loss.

  CDFW recommends a mitigation goal of 1:1 for Swainson's hawk foraging habitat loss, although this may be adjusted to account for the varying qualities of habitat that are converted and preserved. Compensatory Swainson's hawk foraging habitat should be located in close proximity to the impact sites, should contain at least the same quality or better of suitable foraging habitat than habitat impact sites, and should be connected to other protected habitat thereby contributing to a larger habitat preserve.

Timing:	Before and during construction.
Responsibility:	California Department of Fish and Wildlife.

Significance after Mitigation: With implementation of Mitigation Measures BIO-6a, the potentially significant impact associated with adverse impacts to Swainson's hawk foraging habitat would be reduced under all action alternatives to a **less-than-significant** level because the project will minimize and mitigate for project-related losses.

Implementation of levee improvements would result in removal of suitable nesting habitat for special-status birds and common raptor species under each of the action alternatives (see Table 4.5-9). The effects to potential nesting (riparian) habitats would be similar between Alternatives 2 and 3. Alternatives 4 and 5 would generally include construction of the same types of facilities as Alternatives 2 and 3, but the new setback levee would only be constructed south of the north cross-canal and riparian habitats in the northern portion of the Lower Elkhorn Basin and the north cross-canal would not be impacted, resulting in substantially fewer acres of impact, compared to Alternatives 2 and 3. It is possible that 5 acres (under Alternatives 4 and 5) to 15 acres (under Alternatives 2 and 3) of riparian and riparian scrub habitat along the Tule Canal could be avoided during the levee degrade; therefore, the amount of permanent loss under all action alternatives could be substantially less than what is identified in Table 4.5-9.

Suitable nesting habitat may also be removed to accommodate ecosystem project elements; this habitat loss would be minimized, but a very limited amount of riparian vegetation may be removed to enhance connection of the setback area to the existing Yolo Bypass area during floodplain inundation. Although some riparian habitat would be removed under all of the action alternatives, this loss would be very small relative the amount of habitat that would remain along Tule Canal and Sacramento Bypass canals. In addition, riparian woodland creation associated with the ecosystem project elements would compensate for the loss of potential nesting habitat. Therefore, there would be no long-term impact on the overall availability of nesting habitat in the study area, and loss of a relatively small amount of potential nesting habitat under each of the action alternatives is unlikely to have a substantial adverse impact on special-status birds, including Swainson's hawk and common raptor species. Therefore, loss of potential nesting habitat for special-status birds including Swainson's hawk and common raptor species, from implementing any of the action alternatives would have a **less-than-significant** impact**.**

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

The primary potential for substantial adverse impacts to nesting special-status birds, including Swainson's hawk and common raptor species, is disturbance from project construction and O&M activities in the vicinity of active nests. Noise and visual disturbances associated with all project components and under all action alternatives could disturb birds nesting nearby, potentially resulting in nest failure. Disturbance of nesting pairs of sufficient magnitude could result in nest abandonment, a reduction in the level of care provided by adults (e.g., duration of brooding, frequency of feeding), or premature fledging of young. Although the likelihood is low, active nests could be located in trees designated for removal, or, in the case of northern harrier, in agricultural lands subject to ground-disturbance; this could potentially result in the in direct destruction of an active nest and loss of the eggs or young present in the nest. Therefore, impacts on nesting habitat and active nests of special-status birds, including Swainson's hawk and common birds under all of the action alternatives, would have a **potentially significant** impact**.** Mitigation Measures BIO-6b and BIO-6c, described below, have been identified to address this impact.

Mitigation Measure BIO-6b: Conduct Focused Surveys for Nesting Special-status Birds and Common Raptor Species, and Avoid Impacts.

To avoid effects of project activities on nesting special-status birds and common raptor species, DWR will ensure that the following measures are implemented before commencement of construction activities, including tree removal. If avoidance consistent with these measures cannot be achieved, DWR will implement the minimization measures included in Mitigation Measure BIO-1b described below.

- **Conduct Vegetation Removal between September 16 and January 31 to the Extent Feasible.** Vegetation removal, particularly tree removal, will be conducted between September 16 and January 31, to the extent feasible, to minimize potential loss of active bird nests.

- **Conduct Pre-construction Surveys for Active Nests of Special-status Birds, Common Raptor Species, and Colonial-nest Egrets and Herons in Areas of Suitable Habitat before Starting Construction.** If construction activities that could affect suitable habitat for special-status birds, common raptor species, and colonial-nesting egrets and herons cannot be conducted outside of the respective nesting seasons, DWR will complete pre-activity surveys for nesting birds (including raptor and passerine nest surveys and heron and egret rookeries). Surveys of all potential nesting trees and habitat in the area will be conducted by a qualified biologist during the nesting season (generally February 15 – September 15 but may be adjusted for individual species). Surveys will be conducted within suitable nesting habitat that could be affected by construction activities and will include a 500-foot buffer area (or larger area if required by established survey protocol) surrounding these areas.

Where appropriate, pre-activity surveys will follow established survey protocols or guidelines. These protocols include the following:

- Staff Guidance Regarding Avoidance of Impacts to Tricolored Blackbird Breeding Colonies on Agricultural Fields in 2015 (CDFW 2015)
- Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley (Swainson's Hawk Technical Advisory Committee 2000)
- A Natural History Summary and Survey Protocol for the Western Yellow-billed Cuckoo Population (Halterman et al. 2015)
- Least Bell's Vireo Survey Guidelines (USFWS 2001)

If no established survey protocol exists, the qualified biologist will complete surveys within 1 week of the start of the activity, or within 2 weeks of restart of the activity after the activity has lapsed. If no nesting birds are detected during pre-activity surveys, no additional mitigation measures are required.

Timing: Before construction.

Responsibility: California Department of Water Resources.

Mitigation Measure BIO-6c: If Avoiding Construction-related Effects on Nesting Special-status Birds and Common Raptors is Infeasible, Implement Minimization Measures.

If the measures described above in Mitigation Measure BIO-6b have been completed and avoiding effects on nesting special-status birds and common raptor species is infeasible, DWR will coordinate with CDFW to determine acceptable methods for minimizing for effects on these species. DWR will ensure that the measures described below are implemented to minimize effects of the project on nesting special-status birds and common raptor species.

- **Establish and Maintain Buffers Around Active Nest Sites to Avoid Nest Failure and Monitor Nest Sites to Confirm that Project Activities Are Not Adversely Affecting the Nesting Birds or Their Young.** If any active nests, or behaviors indicating active nests are present, are observed, DWR will establish appropriate-sized avoidance buffers around the nest sites, as determined by a qualified biologist in coordination with CDFW to avoid nest failure resulting from project activities. The size and shape of the buffer will depend on the species, nest location, nest stage, and specific construction activities to be performed while the nest is active. For active tricolored blackbird nests, DWR will contact CDFW and a 300-foot no-disturbance buffer shall be established around the nesting colony. The buffer will be expanded if the birds are exhibiting agitated behavior, or the buffers may be adjusted (reduced) if a qualified biologist determines it would not be likely to adversely affect the nest. If required, buffers will be marked in the field by a qualified biologist using temporary fencing, high-visibility flagging, or other means that are equally effective in clearly delineating.

Monitoring will be conducted by a qualified biologist, either continuously or periodically during work, to confirm that project activity is not resulting in detectable adverse impacts on nesting birds or their young. The qualified biologist will be empowered to stop construction activities that, in the biologist's opinion, threaten to cause unanticipated and/or unpermitted adverse effects on special-status wildlife (e.g., nest abandonment). If construction activities are stopped, the qualified biologist will consult with CDFW (and USFWS if appropriate) to determine appropriate measures that DWR will implement to avoid adverse effects.

No project activity will commence within the buffer areas until a qualified biologist has determined that the young have fledged or the nest site is otherwise no longer in use.

- **Consult with USFWS and CDFW and Obtain Appropriate Take Authorizations.** If it is determined that any construction activity would potentially result in the incidental take of any bird protected under ESA or CESA (e.g., western yellow-billed cuckoo, bank swallow, least Bell's vireo, tricolored blackbird, Swainson's hawk), despite implementation of the above mitigation measures, DWR will obtain take authorization from USFWS and/or CDFW (as appropriate). All measures developed through consultation with USFWS and/or CDFW will be implemented by DWR to mitigate for authorized take. Take of a California Fully Protected species (e.g., white-tailed kite) is not authorized.

Timing: Before and during construction.

Responsibility: California Department of Fish and Wildlife.

Significance after Mitigation: With implementation of Mitigation Measures BIO-6a, BIO-6b, and BIO-6c, the potentially significant impact associated with adverse impacts to nesting special-status birds, including Swainson's hawk and common birds, would be reduced under all action alternatives to a **less-than-significant** level because the project will avoid and minimize nest disturbance and ensure no active nests are lost as a result of the project.

Impact BIO-7: Potential Disturbance or Loss of Roosting Special-status Bats.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no construction-related impacts to roosting special-status bats. O&M activities would likely result in direct or passive elimination of potential bat roosts located in riparian trees along the waterside of the Yolo Bypass East Levee and Sacramento Bypass North Levee. However, relatively few riparian trees are present along these levees, compared to the west side of Tule Canal and elsewhere in the Sacramento Bypass. Therefore, impacts associated with the eventual disturbance and loss of this habitat would be **less than significant**.

Alternatives 2 through 5: All Action Alternatives

Table 4.5-9 summarizes the amount of riparian habitat that could be removed by implementing each action alternative. Most of the trees that would be removed provide few, if any, cavities for roosting bats; however, trees that provide bat roosting habitat would be removed. The effects to potential bat roosting habitats would be similar between Alternatives 2 and 3. Alternatives 4 and 5 would generally include construction of the same types of facilities as Alternatives 2 and 3, but the new setback levee would only be constructed south of the north cross-canal. Riparian habitats in the northern portion of the Lower Elkhorn Basin and the north cross-canal would not be impacted, resulting in substantially fewer acres of impact compared to Alternatives 2 and 3. It is possible that 5 acres (under Alternatives 4 and 5) to 15 acres (under Alternatives 2 and 3) of riparian and riparian scrub habitat along the Tule Canal could be avoided during the levee degrade; therefore, the amount of permanent loss under all action alternatives could be substantially less than what is described in Table 4.5-9.

Removal of this habitat would reduce the amount of locally available roosting habitat, but tree loss would be compensated by implementation of the ecosystem project elements, which would ensure there is no long-term net loss in roosting habitat. Although there would be a temporal loss in the number of available roost sites while the replacement habitat matures, this loss is not anticipated to have a substantial effect on the local populations of special-status bats because habitat of equal or better quality would remain, particularly along the Tule Canal. Although the likelihood is low, it is possible this habitat would support a maternity colony, and its removal could result in loss of a large number of individuals. Therefore, these project elements would have a **potentially significant impact**. Mitigation Measure BIO-7, described below, has been identified to address this impact.

Mitigation Measure BIO-7: Avoid and Minimize Disturbance and Loss of Roosting Special-status Bats.

DWR will implement the following measures to avoid and minimize potential disturbance or loss of roosting special-status bats.

- **Conduct Bat Surveys for Active Maternity Roosts for Trees with Suitable Roost Cavities or Dense Cover Designated for Removal.** If removal of trees with suitable roost cavities and/or dense cover must occur during the bat pupping season (April 1 through July 31), surveys for active maternity roosts in trees designated for removal shall be conducted by a qualified biologist. The surveys shall be conducted from dusk until dark.

- **Establish Appropriate Buffers Around Roosts Sites to Avoid Destruction or Abandonment and Prohibit all Construction Activity Until the End of the Pupping Season.** If a special-status bat maternity roost is located, appropriate buffers around the roost sites shall be determined by a qualified biologist and implemented to avoid destruction or abandonment of the roost resulting from tree removal or other project activities. The size of the buffer shall depend on the species, roost location, and specific construction activities to be performed in the vicinity. No project activity shall commence within the buffer areas until the end of the pupping season (August 1) or until a qualified biologist confirms the maternity roost is no longer active.

- **Conduct Vegetation Removal Between September 16 and January 31 to the Extent Feasible.** Vegetation removal, particularly tree removal, shall be conducted between September 16 and January 31, to the extent feasible, to minimize potential loss of bat maternity roosts.

Timing: Before and during construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: With implementation of Mitigation Measure BIO-7, the potentially significant impact associated with adverse effects to roosting special-status bats under all action alternatives would be reduced to a **less-than-significant** level because the project would minimize removal of potential maternity roost trees during the pupping season and avoid removal of active maternity roosts.

Impact BIO-8: Potential Disturbance and Loss of Sensitive Habitats, Including Riparian Habitat.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no construction-related impacts to sensitive habitats, including riparian habitat. O&M activities would likely result in direct or passive elimination of riparian vegetation waterside of the Yolo Bypass East Levee and Sacramento Bypass North Levee. However, relatively little riparian vegetation is present along these levees, compared to the west side of Tule Canal and elsewhere in the Sacramento Bypass. Therefore, impacts associated with the eventual loss of this habitat would be **less than significant**.

Alternatives 2 through 5: All Action Alternatives

Sensitive habitats in the study area include riparian and aquatic habitats. Impacts on waters of the United States that are protected under the Clean Water Act are described in Section 4.6, "Biological Resources – Wetlands and Other Waters." Therefore, this discussion focuses on impacts to riparian habitat, which is protected under Section 1602 of the California Fish and Game Code and may also be considered to be a sensitive natural community by CDFW. Riparian habitat occurs along relatively narrow corridors in several locations in the study area. This sensitive habitat would be affected by implementation of the project components in a variety of ways, including permanent loss and long-term creation and enhancement. Permanent riparian loss would primarily result from constructing the setback levee and berm, but a small amount may also be removed to accommodate ecosystem project elements designed to enhance connection of the setback area to the existing Yolo Bypass area during floodplain inundation. Preserving, enhancing, and restoring riparian habitats would also result from implementing the ecosystem project elements.

Table 4.5-9 summarizes the amount of riparian habitat that could be removed by implementing each action alternative. The effects to sensitive habitats would be similar between Alternatives 2 and 3. Alternatives 4 and 5 would generally include construction of the same types of facilities as Alternatives 2 and 3, but the new setback levee would only be constructed south of the north cross-canal and riparian habitats in the northern portion of the Lower Elkhorn Basin and the north cross-canal would not be impacted, resulting in substantially fewer acres of impact compared to Alternatives 2 and 3. It is possible that 5 acres (under Alternatives 4 and 5) to 15 acres (under Alternatives 2 and 3) of riparian and riparian scrub habitat along the Tule Canal could be avoided during the levee degrade; therefore, the amount of permanent loss under all action alternatives could be substantially less than what is described in Table 4.5-9.

The amount of riparian habitat that could be removed under each action alternative is relatively small compared to the overall amount of similar available in adjacent portions of the Yolo and Sacramento Bypasses. In addition, the ecosystem project elements would include creation and enhancement of riparian habitat. However, because these elements have not been finalized, it is not assured that they would fully compensate for the riparian habitat loss that would occur. Therefore, impacts on riparian habitat under all of the action alternatives would have a **potentially significant** impact**.** Mitigation Measures BIO-8a and 8b have been identified to address this potential impact.

Mitigation Measure BIO-8a: Designate, Protect, Avoid, and Monitor Riparian Habitat and Obtain and Comply with Necessary State Permits/Authorizations and Conditions.

DWR will implement the measures described below to avoid impacts riparian habitat.

- **Limit Ground-Disturbance to Construction Areas and Avoid and Limit Disturbance to River and Creek Banks and Habitats When Feasible.** Ground-disturbance will be limited to construction areas, including necessary access routes and staging areas. The number of access routes, size of staging areas, and total area of the project activity will be limited to the minimum necessary. When possible, existing access routes and points will be used. All roads, staging areas, and other facilities will be placed to avoid and limit disturbance to river and creek banks and habitat when feasible.

- **Erect and Maintain High-visibility Fencing during Construction to Protect Sensitive Biological Resource Areas, Inspect Fencing Daily, and Incorporate Sensitive Habitat Information into Bid Specifications.** Before the commencement of construction activities, high-visibility fencing will be erected to protect areas of sensitive biological resources that are located adjacent to construction areas, but can be avoided, from encroachment of personnel and equipment. The fencing will be inspected before the start of each work day and will be removed only when the construction within a given area is completed. Sensitive habitat information will be incorporated into project bid specifications, along with a requirement for contractors to avoid these areas.

- **Monitor Construction Activities in Sensitive Biological Resource Areas and Stop Work if Unauthorized Project Impacts Occur.** A qualified biologist will monitor all construction activities in sensitive biological resource areas to ensure that avoidance and minimization measures are being properly implemented and no unauthorized activities occur. If construction activities threaten to cause unanticipated and/or unauthorized project impacts, the biologist will notify the onsite construction manager, who would stop work. Project activity will not resume until the conflict has been resolved.

Mitigation Measure BIO-8b: Obtain and Comply with Necessary State Permits/Authorizations and Develop and Implement a Mitigation Plan.

DWR will implement the measures described below to minimize, and, if necessary, compensate for loss of riparian habitat.

- **Coordinate with Regulatory Agencies to Obtain Appropriate Permits/Authorizations and Implement Permit Conditions.** If it is determined that implementation of a project component would result in direct impacts to riparian habitat, despite implementation of avoidance and minimization measures, a CDFW streambed alteration agreement will be obtained under Section 1602 of the California Fish and Game Code for all work on the waterside of the levees and along jurisdictional canals and ditches.

- **Develop and Implement a Mitigation Plan to Compensate for Loss of Sensitive Habitats.** A riparian habitat mitigation plan resulting in no-net-loss of riparian functions and values will be prepared to compensate for loss of riparian vegetation along the rivers and creeks in the project site. This mitigation plan will be developed and provided to the appropriate regulatory agencies for review and approval. The plan will detail appropriate compensation measures determined through consultation with CDFW, methods for implementation, success criteria, monitoring and reporting protocols, and contingency measures to be implemented if the initial mitigation fails. The plan will be developed in consultation with and approved by the appropriate regulatory agencies before construction activities begin in areas containing sensitive habitats. The plan will be implemented by DWR.

- **Implement Mitigation.** Mitigation may be accomplished through replacement, enhancement of degraded habitat, or off-site mitigation at an established mitigation bank. The mitigation plan developed under Mitigation Measure WATERS-1 for impacts on waters of the United States may be suitable if it adequately covers project construction activities within CDFW-designated sensitive habitats or waterways under CDFW jurisdiction. Any conditions of issuance of the streambed alteration agreement, including minimization and compensation measure, will be implemented as part of project implementation.

Timing: Before, during, and after construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: With implementation of Mitigation Measures BIO-8a and BIO-8b, the potentially significant impact associated with potential disturbance and loss of sensitive habitats under all action alternatives would be reduced to a **less-than-significant** level because direct and indirect impacts to sensitive habitats will be avoided, minimized, and mitigated for on a no-net-loss basis.

Impact BIO-9: Potential Interference with Terrestrial Wildlife Movement, Migration Corridors, and Nursery Sites.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no construction-related impacts to wildlife movement, migration corridors, or nursery sites in the study area. Movement and migration corridors are anticipated to remain relatively unchanged from existing conditions, as land uses and levee O&M activities would generally be unchanged in the Lower Elkhorn Basin. There would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

Implementation of project components that result in disturbance of natural habitat that is used as wildlife movement corridors could disrupt such movement patterns. Movement could be substantially affected or even cut off completely if the entire width of the corridor is disturbed. Nursery sites could be abandoned temporarily or permanently, depending on the level of disturbance.

The Tule Canal and its associated upland, as well as the riparian habitat that borders this feature, is the primary movement corridor for birds and other wildlife in the project site. The Tule Canal would be avoided by project activities, and most riparian habitat would be avoided. In addition, under Alternatives 2 and 4, portions of the remnant levee would be retained, providing upland refugia for species along the Tule Canal.

A black-crowned night heron nesting colony is located adjacent to the study area (along the Yolo Bypass East Levee about 2,000 feet north from where County Road 124 turns to the east [DWR 2016e]). Because the riparian corridor along the Tule Canal would be retained, and because nesting bird surveys and monitoring would be conducted prior to and during project construction, this colony would be avoided during project implementation.

Because project implementation would avoid or minimize disturbance to the key corridors, it would not interfere with wildlife movement. Further, the ecosystem project elements would establish, protect, and enhance riparian habitat throughout the study area, thereby increasing opportunities for terrestrial wildlife movement and migration corridors. Finally, the heron nesting colony would be avoided during project construction. Therefore, under all of the action alternatives this impact would be **less than significant**.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Residual Significant Impacts

Some impacts associated with terrestrial biological resources are either considered less than significant or no impact would occur (i.e., Impact BIO-8, Interference with Terrestrial Wildlife Movement, Migration Corridors, and Nursery Sites). Other impacts associated with terrestrial biological resources may be potentially significant. These consist of: Impact BIO-1 (Potential Loss of Special-status Plants and Loss and Degradation of Special-status Plant Habitat); Impact BIO-2 (Effects on Valley Elderberry Longhorn Beetle); Impact BIO-3 (Potential Disturbance or Loss of Giant Garter Snakes and Their Habitat); Impact BIO-4 (Potential Disturbance or Loss of Northwestern Pond Turtles and their Habitat); Impact BIO-5 (Potential Loss of Burrowing Owl Individuals from Destruction of Occupied Burrows and Nest Disturbance); Impact BIO-6 (Potential Disturbance of Nesting Special-status Birds and Common Raptor Species, Potential Loss of Active Nests and Nest Trees, and Loss of Nesting and Foraging Habitat); Impact BIO-7 (Potential Disturbance or Loss of Roosting Special-status Bats); and Impact BIO-8 (Potential Disturbance and Loss of Sensitive Habitats, including Riparian Habitat). However, with implementation of Mitigation Measures BIO-1a through BIO-8b, these impacts would be reduced to less-than-significant levels. Therefore, no residual significant impacts would occur.

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4.6 Biological Resources – Wetlands and Other Waters

4.6.1 Environmental Setting

This section describes the environmental and regulatory setting, impacts, and minimization and mitigation measures associated with jurisdictional biological resources – wetlands and other waters, including wetlands and other waters of the United States, as defined by the Clean Water Act, and wetlands and other waters of the State, as defined by the Porter-Cologne Water Quality Act. Project impacts on fish and aquatic organisms are discussed in Section 4.4, "Biological Resources – Fish and Aquatic Organisms," on vegetation and wildlife species in Section 4.5, "Biological Resources – Vegetation and Wildlife," and on water quality in Section 4.22, "Water Quality."

Methodology and Surveys

The biological resources study area (study area), described in Section 4.5, "Biological Resources – Vegetation and Wildlife," consists of the project site, including borrow areas, haul routes, and staging areas (including the staging area for the Sacramento International Airport jet fuel pipeline construction), and a 200-foot-wide buffer of the maximum project footprint of each action alternative to ensure consideration of indirect construction impacts outside of the project footprint. The study area contains many habitats and waterways that have the potential to be considered waters of the United States and waters of the State (referred to hereafter as potentially jurisdictional waters).

USACE, the State Water Resources Control Board (SWRCB), and the Central Valley Regional Water Quality Control Board (CVRWQCB) have issued guidance and regulations for considering whether habitats and waterways may be considered as waters of the United States. USACE issued *Revised Guidance on Clean Water Act Jurisdiction Following the Supreme Court Decision in Rapanos v. U.S. and Carabell v U.S.* (Grumbles and Woodley 2008), and SWRCB and RWQCB implement and enforce the Porter-Cologne Water Quality Control Act (California Water Code Division 7), which defines waters of the State (SWRCB 2016). These guidelines and regulations were applied in making the determination of habitats and waterways in the study area that have the potential to be jurisdictional waters. For the purposes of this section, all of the habitats and waterways in the study area that have the potential to be considered waters of the State are also considered waters of the United States; therefore, they are potentially under the jurisdiction of both USACE and RWQCB.

DWR environmental scientists conducted surveys for plants, vegetative communities, and habitat mapping on June 23; July 27; August 1, 2, 11, 12, 15, and 16; and September 16, 20, and 27, 2016. DWR environmental scientists then reviewed the field data in combination with review of National Wetland Inventory (NWI) data (USFWS 2016) and aerial photograph interpretation to make a determination of habitats and waterways in the study area that have the potential to be jurisdictional waters. Geographic Information Systems (GIS) shapefiles of these habitats and waterways considered to be jurisdictional waters were used in this analysis. Aerial photo interpretation and Google Earth street view imagery also were used to produce supplemental habitat and vegetative community mapping as well as mapping of jurisdictional waters that occur within the study area.

Potentially Jurisdictional Waters in the Biological Resources Study Area

Based on the surveys and mapping described above, habitats and waterways in the study area with potential to be considered jurisdictional waters were identified. No wetlands are present within the study area. The potentially jurisdictional waters in the study area are bodies of water that are unvegetated over most of the water surface area, seasonally to year-round. These waters typically have flow or circulation, and vegetation occurs primarily along the water/land boundary of the waterbody. Occasionally, or seasonally for waters with fluctuating water surface elevations, floating vegetation will establish on the surface of these waterbodies. Species such as water primrose (*Ludwigia peploides*) and water hyacinth (*Eichhornia crassipes*) can be present on the surface of these waterbodies during low-water elevations. Emergent freshwater marsh species such as cattail (*Typha latifolia*) and tule (*Schoenoplectus acutus* var. *occidentalis*), and riparian scrub species such as narrowleaf willow (*Salix exigua*), are present along the waters margins, at the boundary between the water and land, as well as in the middle, where the water depth is shallow.

Approximately 175.43 acres of potentially jurisdictional waters occur within the study area and are subdivided into two types: canals and ditches. A rice field (located south of the Sacramento Bypass Training Levee) was not identified as a potential jurisdictional area. Figure 4.6-1 shows the locations of potentially jurisdictional waters present in the study area.

Canals

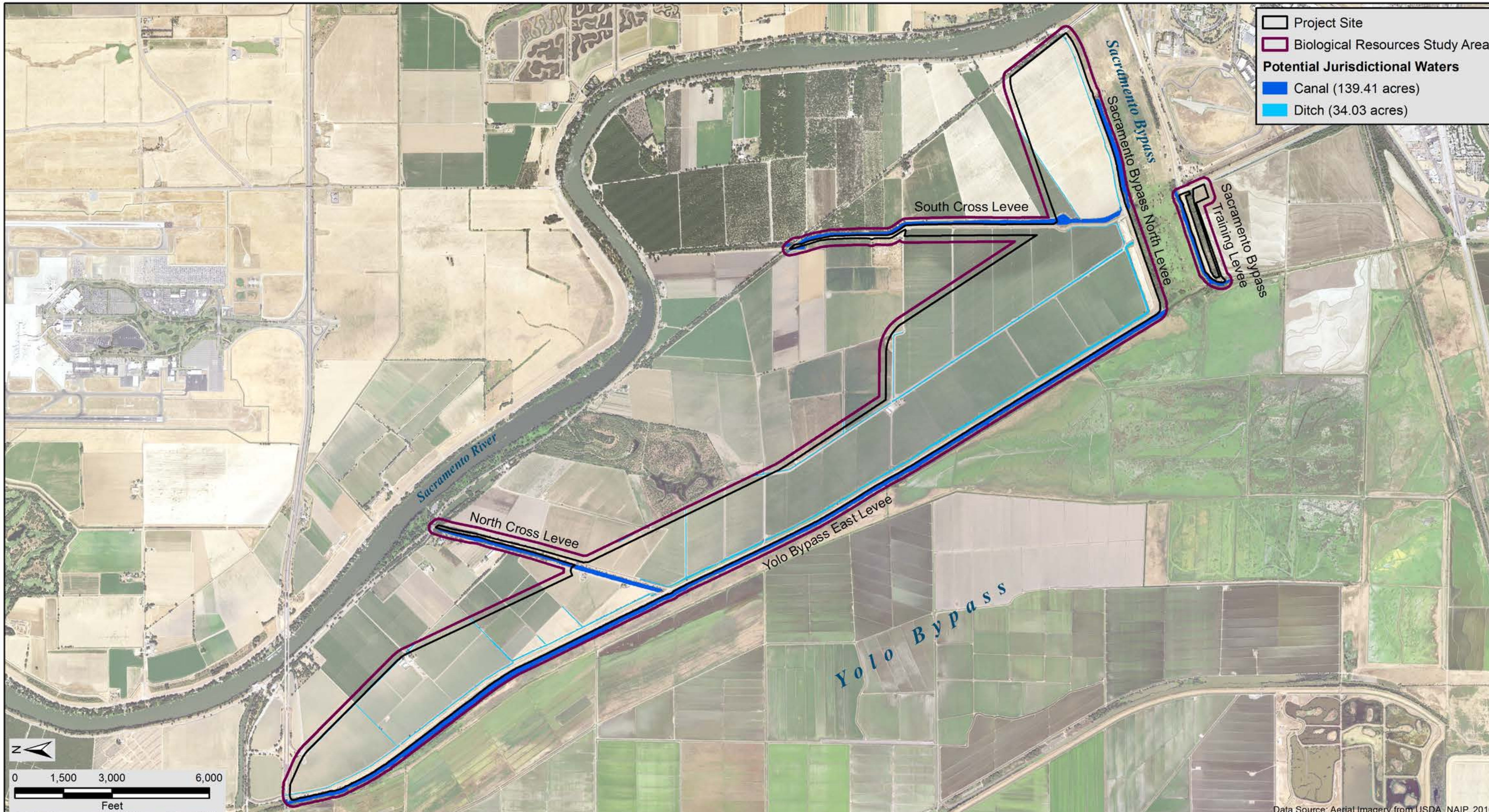
Canals total about 139.4 acres in the study area. The canals are large linear channels that contain persistent, year-round water and convey irrigation or drainage water. Canals in the study area include (1) the Tule Canal, located on the west side of the study area; (2) two "cross-canals" that separate RD 827 and RD 785 in the north part of the study area (north cross-canal) and RD 785 and RD 537 in the south part of the study area (south cross-canal); and (3) a drainage canal located adjacent to the waterside toe of the Sacramento Bypass Training Levee. The cross-canals transport water from the Sacramento River into the study area and act as the main drainage channels that pump return water into the Tule Canal and the Sacramento Bypass.

Ditches

Ditches total about 34.03 acres in the study area. Most waterways in the study area are classified as ditches, which are typically created in upland areas but sometimes excavated within natural drainages. The ditches in the study area are both vegetated and unvegetated, typically trapezoidal- or "V"-shaped, and used to irrigate field crops and drain agricultural wastewater away from the fields. Ditches within the study area include the irrigation lateral ditches that connect directly to the cross-canals and send irrigation water towards the agricultural fields, and drainage ditches such as the toe drainage ditch located immediately adjacent to the landside toe of the existing Yolo Bypass East Levee and the drainage ditch on the landside toe of Levee Road (Yolo County Road 126), which then drain into the Sacramento Bypass.

There are other ditches in the study area that move water around the perimeter of agricultural fields. These are considered "field ditches" and are typically created and plowed within a growing season to irrigate the fields. Once the crops are harvested, this field ditch is removed for planting of another crop or otherwise modified for different agricultural purposes. Because these field ditches are seasonal and temporary, they are not considered to be potentially jurisdictional waters, per the guidance and regulations previously cited in this section.

Figure 4.6-1. Potentially Jurisdictional Waters in the Biological Resources Study Area



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Source: GEI Consultants, Inc. 2016

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4.6.2 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to biological resources – wetlands and other waters apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Clean Water Act Section 404 – Applies to project construction and the impact analysis.
- Clean Water Act Section 401 – Applies to project construction and the impact analysis.

State

The following State plans, policies, regulations, or laws related to biological resources – wetlands and other waters apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Porter-Cologne Water Quality Control Act – Applies to the impact analysis.

Regional and Local

The following local plans, policies, regulations, or ordinances related to biological resources – wetlands and other waters are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County 2030 General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan (Yolo County 2009) regarding biological resources – wetlands and other waters are relevant to project design, construction, and/or the impact analysis of the (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

4.6.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

Methodology

This evaluation of potential impacts on jurisdictional waters in the study area is based on wetland delineations conducted during field surveys, NWI data, engineering design data, and aerial photography, and GIS analysis of project alternatives. The impact analysis of jurisdictional waters considered the following factors related to the project: project construction components, including the proposed new setback levee; removal of the existing levee (partial and whole based on the action alternative); features associated with the new setback levee (e.g., O&M corridor, seepage berm, road); the relocated main irrigation canal; borrow areas; project O&M activities to be performed once construction is complete; potential impact mechanisms (as defined under "Impact Analysis" below); the extent of area that would be affected; and construction methods.

GIS data of areas considered to be jurisdictional waters were overlaid with engineering design CADD data and additional GIS mapping of action alternative designs to evaluate impacts. Impacts were assessed for jurisdictional waters located in the study area and defined as either direct or indirect impacts and either temporary or permanent impacts, based on the proximity of the waters to project design components and the anticipated construction methods. Waters would be permanently impacted if they were removed, filled, or otherwise changed such that they could not function as they currently do under existing conditions. Waters would be temporarily impacted if they were disturbed by project activities but would be restored to current operations and functions after project construction.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to biological resources – wetlands and other waters if they would do any of the following:

- have a substantial adverse effect on Federally protected waters of the United States, including wetlands, as defined by Section 404 of the CWA, or waters of the State as defined by the Porter-Cologne Water Quality Control Act, including wetlands, through direct removal, filling, hydrological interruption, or other means; or
- conflict with any local policies or ordinances protecting biological resources, including wetlands and other waters.

Significance of each impact was evaluated in terms of the context and intensity of the impact on potentially jurisdictional waters. The context depends on the type and function of the aquatic resource while the intensity depends on the extent (e.g., area) of jurisdictional waters affected and whether the impact is permanent or temporary. Permanent impacts result in loss of jurisdictional waters through the discharge of dredged or fill material, excavating, draining, or otherwise physically removing the jurisdictional waters from the landscape, or from permanent changes to the hydrology of the area resulting in the permanent loss or reduction in the extent of jurisdictional waters. Temporary impacts are impacts that would result in disturbance to jurisdictional waters, but would be restored to existing functions and services once project activities are completed.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. None of the comments directly addressed impacts on biological resources – wetlands and other waters, although the U.S. Environmental Protection Agency requested that potential environmental impacts of each alternative be quantified to the greatest extent possible and cited acres of wetlands impacted as an example. The analysis below quantifies the amount of potentially jurisdictional waters that would be affected under each alternative. Input was also directly sought from fish and wildlife regulatory agencies: NMFS, USFWS, and CDFW. Comments from agency staff primarily focused on opportunities for habitat enhancement and restoration, and no comments specific to consideration of impacts to biological resources – wetlands and other waters were provided.

Impact Analysis

Project implementation would result in permanent and temporary impacts to potentially jurisdictional waters in the study area.

Table 4.6-1 summarizes impacts and mitigation for biological resources – wetlands and other waters, which are described in greater detail below.

Table 4.6-1. Summary of Impacts and Mitigation Measures—Biological Resources – Wetlands and Other Waters

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
WATERS-1: Potential Disturbance and/or Loss of Jurisdictional Waters	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	WATERS-1: Implement Measures to Avoid, Minimize, and Compensate for Loss of Jurisdictional Waters WQ-1: Limit Ground-disturbance to Construction Areas and Avoid and Limit Disturbance to Stream Banks and Habitats WQ-2: Install, Monitor, and Maintain Erosion Control Measures to Minimize Soil or Sediment from Entering Waterways or Wetlands WQ-3: Inspect Sediment and Turbidity Control Barriers Daily during Construction for Proper Function and Replace Immediately if Not Functioning Effectively WQ-4: Remove Sediment from Sediment Controls and Dispose of Properly WQ-5: Treat Silted Water from Construction Activities WQ-6: Treat All Disturbed Soils with Appropriate Erosion Control GEO-2: Acquire Appropriate Regulatory Permits, and Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan and Bentonite Slurry Spill Contingency Plan to Reduce the Potential for Environmental Contamination during Construction Activities	LTS

Key:
B = Beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact WATERS-1: Potential Disturbance and/or Loss of Jurisdictional Waters

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of the setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, no construction-related effects would occur under this alternative, but existing O&M practices would continue. Maintenance of Tule Canal and other components of the drainage infrastructure in the Yolo and Sacramento Bypasses could result in temporary impacts to jurisdictional waters, but such effects are anticipated to be none to extremely minor, and unchanged from baseline conditions. Therefore, **no impact** would occur.

Alternatives 2 through 5: DWR's Preferred Alternative (7-Mile Setback Partial Degrade), 7-Mile Expanded Setback Full Degrade, 5-Mile Expanded Setback Partial Degrade, and 5-Mile Setback Full Degrade

All action alternatives would impact potentially jurisdictional waters through permanent removal or loss of waters and temporary disturbance. As highlighted in Table 4.6-2, on the next page, the acreages of potentially jurisdictional waters permanently and temporarily impacted would vary among the action alternatives, with Alternatives 2 and 3 resulting in similar impacts, and Alternatives 4 and 5 resulting in similar impacts.

Impacts to potentially jurisdictional waters would occur from grading and excavation activities associated with removing soils from the borrow areas, grading and excavation activities associated with constructing the new setback levee and associated features (O&M corridor, seepage berm, and relocated road and canal), and grading and excavation activities associated with constructing the new drainage canal on the landside of the new setback levee. Impacts also have the potential to occur from work below the ordinary high water mark of the Tule Canal. If activities occur within the Tule Canal, such activities would focus on habitat improvements, including enhancing hydrologic connectivity with canals in the setback area and, if necessary, reducing potential for fish stranding. Because the borrow areas are within the project footprint, and all haul routes outside of the project footprint are existing paved roads, there are no anticipated "off-site" impacts. Degrading the existing Yolo Bypass East Levee, Sacramento Bypass North Levee, and north and south cross levees would occur above the ordinary high water elevation of adjacent waters. Armoring the waterside slope of the Sacramento Bypass Training Levee and the remnant segments of the existing Yolo Bypass East Levee would be conducted above the toe of the levee slope and above the ordinary high water elevation. Therefore, there would be no direct removal or fill of potentially jurisdictional waters associated with these project components. Additionally, the existing toe drainage ditch located on the landside of the Yolo Bypass East Levee (see Figure 4.6-1) would be preserved. However, to facilitate degrade of the existing levee, the toe drainage ditch is anticipated to be entirely dewatered and portions of the ditch temporarily filled to create crossings for transport of degrade materials away from the existing levee. Therefore, the entire toe drainage ditch, parallel to the existing levee, is anticipated to be temporarily impacted. Regular O&M activities to ensure levee integrity and access would be conducted above the ordinary high water mark of channels and ditches and, therefore, are not anticipated to result in impacts to potentially jurisdictional waters.

All of the action alternatives would result in permanent removal of potentially jurisdictional waters as well as disruption of hydrology in one ditch, which is anticipated to result in permanent loss of the ditch as a functional water. The permanent removal would be a result of construction activities associated with borrow activities, construction of the new setback levee and associated components, and potential habitat improvements along the Tule Canal. Waters within the borrow area would be permanently excavated and removed as borrow materials are taken for construction of the setback levee. The borrow area would eventually be returned to agriculture, most likely rice, and new agricultural ditches would be required irrespective of the specific crop planted. However, the number and locations of these new ditches is unknown. For the purposes of this analysis, it is therefore anticipated that the borrow activities would result in permanent impacts. In addition, one irrigation ditch, located in the southern portion of the study area, outside of the project footprint, would be permanently impacted due to disruption of hydrology. When project construction occurs, the portion of the south cross-canal that appears to feed this ditch, as well as a large portion of the ditch itself, would be removed. Without a source of water, the remaining segment of the ditch is anticipated to be abandoned and no longer function as a water of the United States. Potential habitat improvements include creating seasonal floodplain habitat between the Tule Canal and canals in the setback area and improving hydrologic connectivity to reduce potential for fish stranding. These activities would be considered permanent impacts as they would change the geometry and hydrology of the Tule Canal and adjacent waters during high flows in the Yolo Bypass. Although the improvements would be considered a permanent change and permanent impact to existing waters, these activities would improve wetland and waters habitat and would not result in a loss of waters functions or acreage.

The action alternatives would also result in temporary impacts to potentially jurisdictional waters. As mentioned in Chapter 3, "Alternatives," the existing toe drainage ditch, located on the landside of the Yolo Bypass East Levee, is anticipated to remain and not be removed by project construction activities. Although the toe drainage ditch would not be removed, to facilitate degradation of the existing Yolo Bypass East Levee, the portion of the ditch parallel to the levee is anticipated to be dewatered during project construction. Additionally, temporary crossings of the ditch would likely be installed to facilitate access to the existing levee. At the two RD cross canals, temporary impacts are expected to result from dewatering and construction of temporary cofferdams to facilitate constructing the new setback levee and associated features and filling portions of the cross-canals that would be in the setback area.

The amount of impacts to potentially jurisdictional waters resulting from implementing each of the action alternatives is summarized in Table 4.6-2, and the locations of these impacts are shown in Figures 4.6-2 through 4.6-5.

As seen in Table 4.6-2, Alternatives 2 and 3 would result in similar acreage impacts, and Alternatives 4 and 5 would result in similar acreage impacts. The acreage difference between the two sets of alternatives is due to impacts to one ditch that is located within the expanded footprint area only. Alternatives 2 and 3 result in more impacts to waters because of the additional approximately 2 miles of linear project footprint (approximately 7 miles vs. approximately 5 miles). Additionally, as part of these two alternatives, the cross-canals would be impacted by project activities as the new setback levee would cross the canal alignments. Alternatives 4 and 5 would have less impacts because of the shorter levee alignment and because under these alternatives, the north cross-canal would not be affected.

Table 4.6-2. Impacts to Potentially Jurisdictional Waters

Impact Type	Approximate Impact Acreage			
	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Permanent	26.83	27.03	17.29	17.09
Temporary	21.51	21.51	13.13	13.13
Total Impact	**48.34**	**48.54**	**30.42**	**30.22**

Source: Data compiled by GEI Consultants, Inc. in 2016

Impacts to potentially jurisdictional waters from all action alternatives would be limited to canals and ditches which support current agricultural activities within the setback area. As mentioned previously, many of the impacted features would be replaced when the borrow area is returned to agriculture, but the number and location and timing of these new ditches and canals is unknown at this time. Therefore, impacts to potentially jurisdictional waters for all alternatives would be a **potentially significant** impact. Mitigation Measure WATERS-1, described below, and Mitigation Measures WQ-1 through WQ-6 and GEO-2 have been identified to address this impact.

Mitigation Measure WATERS-1: Implement Measures to Compensate for Loss of Jurisdictional Waters.

For impacts to jurisdictional waters that cannot be avoided (i.e., loss of waters), DWR will implement the measures described below.

- A formal delineation of waters of the United States was conducted by DWR biologists during field surveys. The findings will be documented in a detailed report and submitted to USACE for verification as part of the formal Section 404 wetland delineation process.
- DWR will develop an appropriate and feasible mitigation plan to compensate for loss of jurisdictional waters. In accordance with USACE and CVRWQCB policy, jurisdictional waters will be replaced or restored on a "no-net-loss" basis. Replaced or restored waters will, preferably, be located in the study area and will have the same functions and services as the permanently affected waters. The mitigation plan will detail appropriate compensation measures determined through consultation with the respective regulatory agencies ((USACE, CVRWQCB, and possibly CDFW), methods for implementation, success criteria, monitoring and reporting protocols, and contingency measures to be implemented if the initial mitigation fails. The final mitigation plan will be approved by the regulatory agencies prior to issuance of the Section 401 Water Quality Certification and Section 404 permit. DWR anticipates that compensatory mitigation for impacts to jurisdictional waters will be implemented consistent with Ecosystem Project Elements framework described in Section 3.4.10 in Chapter 3, "Alternatives," and shown on Table 3-5.
- Authorization for fill of jurisdictional waters will be secured from USACE via the Section 404 permitting process before starting project construction. Any measures determined necessary during the 404 permitting process will be implemented.

- Water quality certification pursuant to Section 401 of the Clean Water Act will be obtained from CVRWQCB before starting project construction. Any measures required as part of the issuance of water quality certification will be implemented.

  Timing: Before and during construction activities.

  Responsibility: California Department of Water Resources.

Mitigation Measure WQ-1: Limit Ground-disturbance to Construction Areas and Avoid and Limit Disturbance to Stream Banks and Habitats.

Please refer to Impact WQ-1 in Section 4.22, “Water Quality,” for the full text of this mitigation measure.

Mitigation Measure WQ-2: Install, Monitor, and Maintain Erosion Control Measures to Minimize Soil or Sediment from Entering Waterways or Wetlands.

Please refer to Impact WQ-1 in Section 4.22, “Water Quality,” for the full text of this mitigation measure.

Mitigation Measure WQ-3: Inspect Sediment and Turbidity Control Barriers Daily during Construction for Proper Function and Replace Immediately if Not Functioning Effectively.

Please refer to Impact WQ-1 in Section 4.22, “Water Quality,” for the full text of this mitigation measure.

Mitigation Measure WQ-4: Remove Sediment from Sediment Controls and Dispose of Properly.

Please refer to Impact WQ-1 in Section 4.22, “Water Quality,” for the full text of this mitigation measure.

Mitigation Measure WQ-5: Treat Silted Water from Construction Activities.

Please refer to Impact WQ-1 in Section 4.22, “Water Quality,” for the full text of this mitigation measure.

Mitigation Measure WQ-6: Treat All Disturbed Soils with Appropriate Erosion Control.

Please refer to Impact WQ-1 in Section 4.22, “Water Quality,” for the full text of this mitigation measure.

Mitigation Measure GEO-2: Acquire Appropriate Regulatory Permits, and Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices.

Please refer to Impact GEO-2 in Section 4.11, “Geology, Soils, and Paleontological Resources,” for the full text of this mitigation measure.

Mitigation Measure HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan and Bentonite Slurry Spill Contingency Plan to Reduce the Potential for Environmental Contamination during Construction Activities.

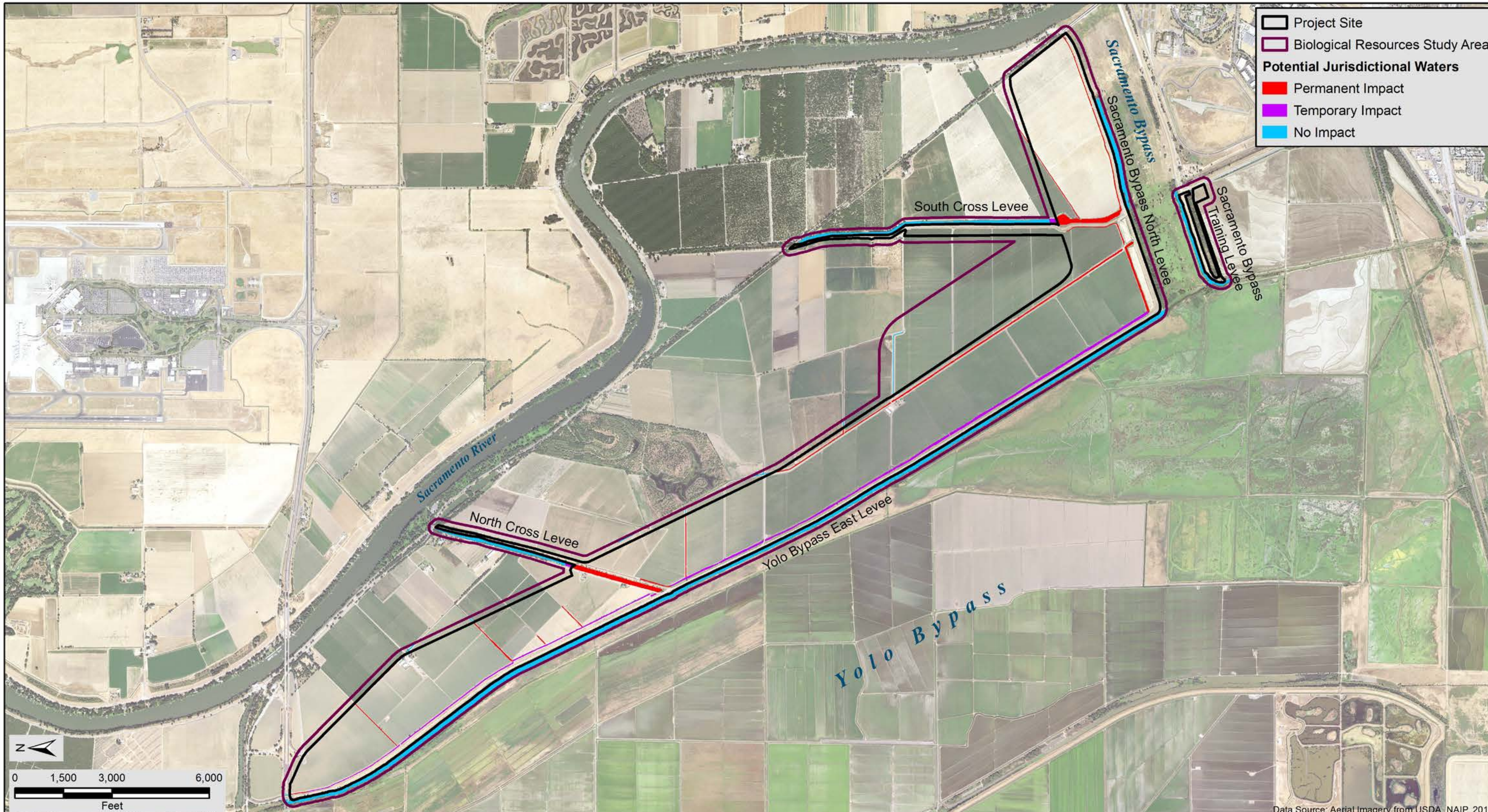
Please refer to Impact HAZ-1 in Section 4.13, “Hazards and Hazardous Materials,” for the full text of this mitigation measure.

Significance after Mitigation: With implementation of Mitigation Measures WATERS-1, WQ-1 through WQ-6, GEO-2, and HAZ-1, impacts to jurisdictional waters will be avoided, minimized, and compensated, resulting in no-net-loss of jurisdictional waters. Potentially significant impacts to jurisdictional waters would be reduced to less than significant.

Residual Significant Impacts

The impacts from project implementation on potentially jurisdictional waters (Impact WATERS-1) would be potentially significant. However, these impacts would be reduced to a less-than-significant level following implementation of Mitigation Measures WATERS-1, WQ-1 through WQ-6, GEO-2, and HAZ-1. Therefore, no residual significant impacts would occur.

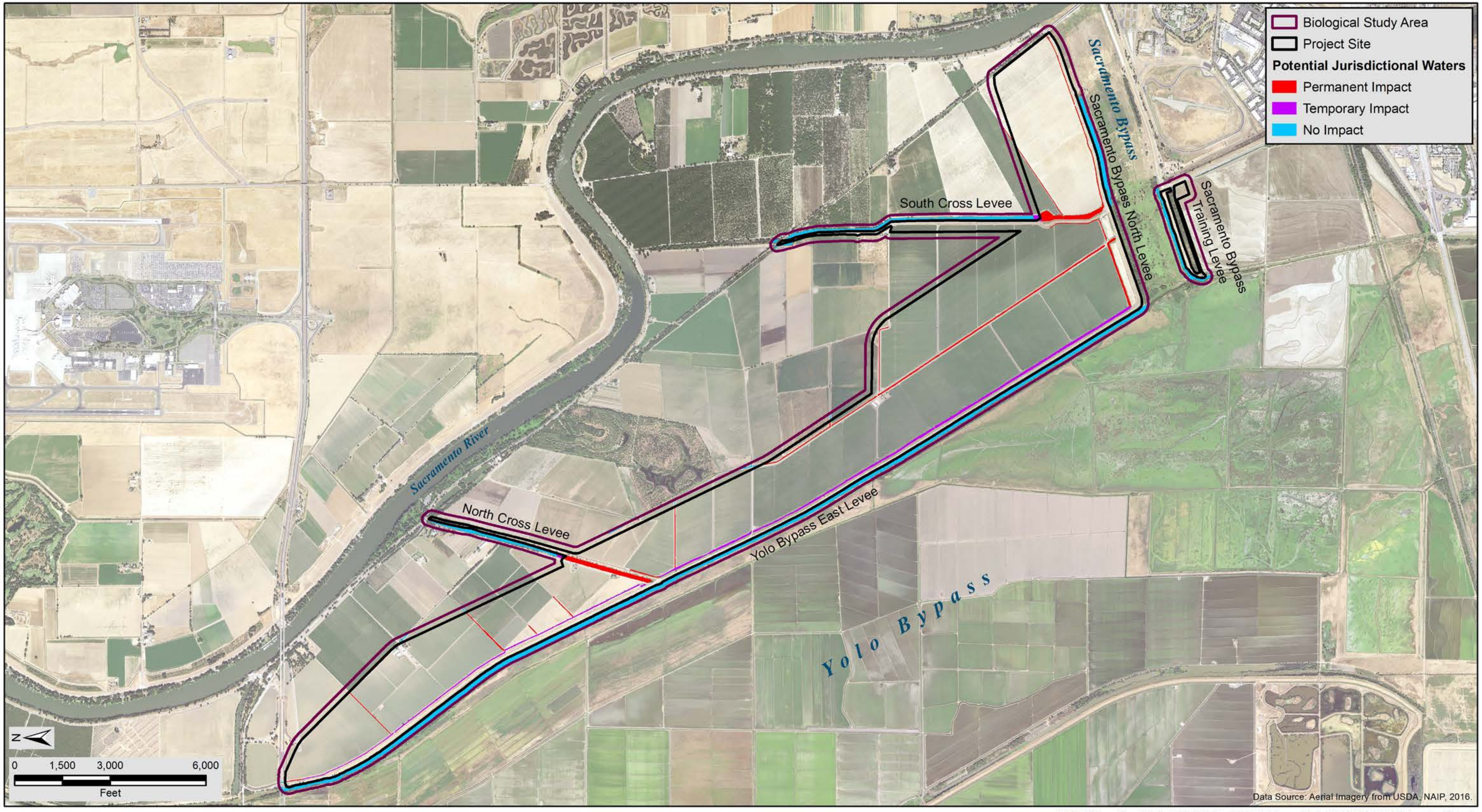
Figure 4.6-2. Impacts to Potentially Jurisdictional Waters under Alternative 2 – DWR's Preferred Alternative



26Feb2018 RS Z:\Projects\1611277_Flood\1605_YoloBypass_Enviro\1611277_1605_G064_Impacts_Alt2.mxd

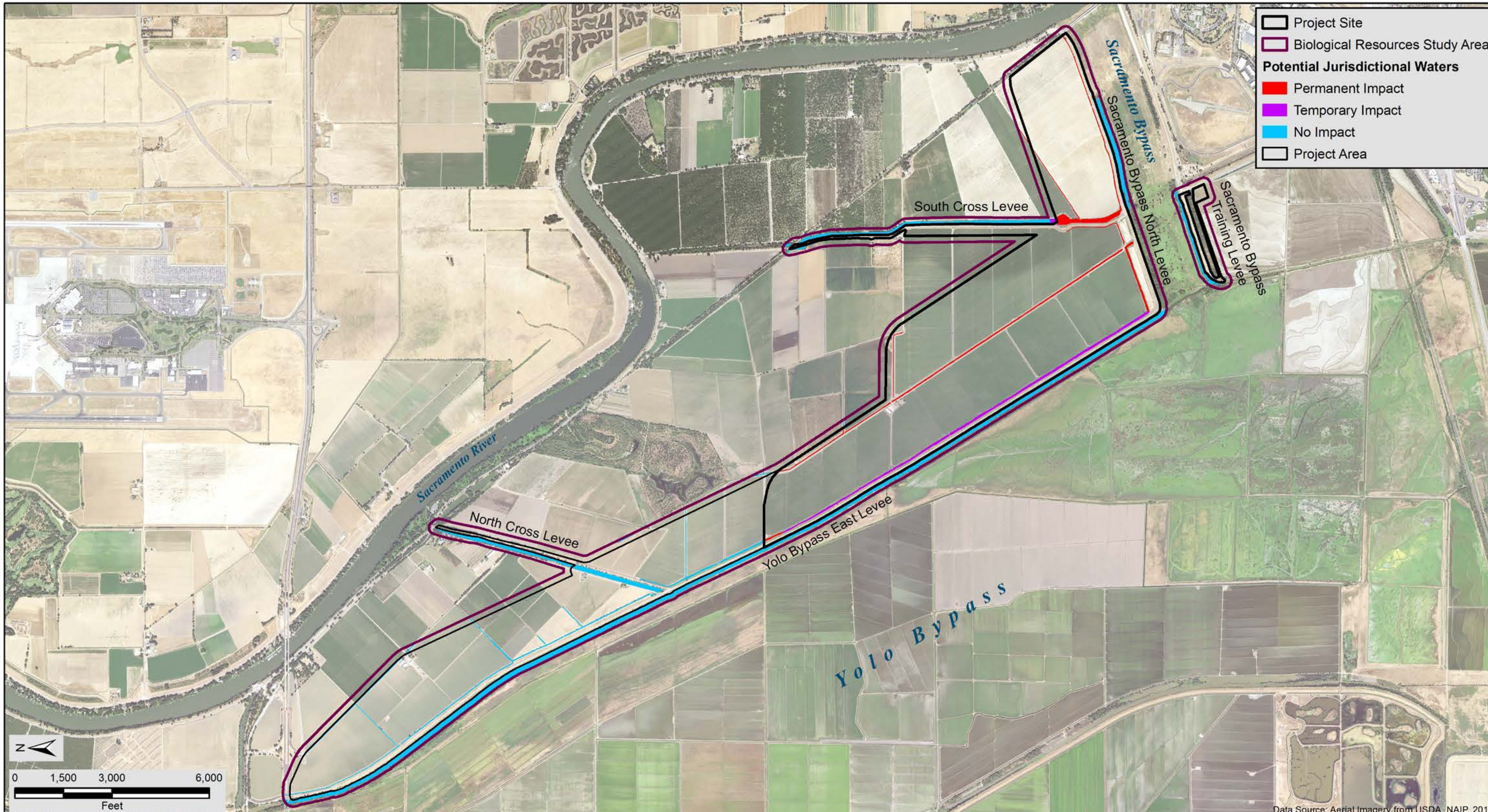
Source: GEI Consultants, Inc. 2016

Figure 4.6-3. Impacts to Potentially Jurisdictional Waters under Alternative 3



Source: GEI Consultants, Inc. 2016

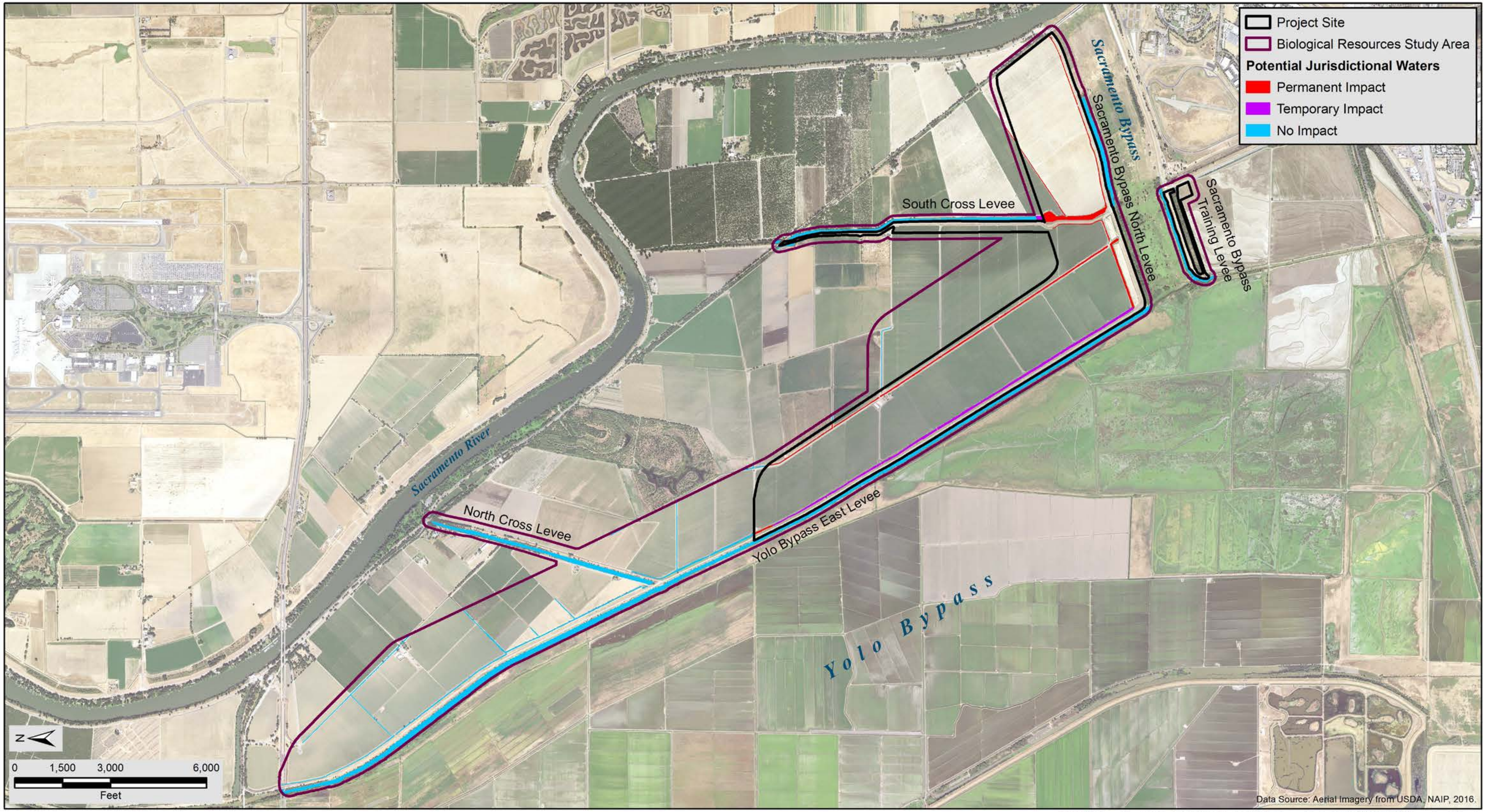
Figure 4.6-4. Impacts to Potentially Jurisdictional Waters under Alternative 4



26Feb2018 RS Z:\Projects\1611277_Flood\1605_YoloBypass_Enviro\1611277_1605_G066_Impacts_Alt4.mxd

Source: GEI Consultants, Inc. 2016

Figure 4.6-5. Impacts to Potentially Jurisdictional Waters under Alternative 5



26Feb2018 RS Z:\Projects\1611277_Flood\1605_YoloBypass_Enviro\1611277_1605_G067_Impacts_Alt5.mxd

Source: GEI Consultants, Inc. 2016

4.7 Climate Change

Global climate change is playing an increasingly important role in scientific and policy debates related to water management. The most consequential impacts of climate change on water resources in the United States are likely to occur in the mid-latitudes of the west, where the runoff cycle is largely determined by snow accumulation and subsequent melt patterns. It is well documented that the effects of warmer climates on the timing of runoff in these regions likely will shift a portion of spring and summer runoff to periods earlier in the year. Despite the high degree of regulation in many water supply systems throughout the western United States, the resultant effects of these shifts on runoff seasonality generally are considered to be undesirable, because the amount of water stored in snowpack can be substantial and, under normal (i.e., historical) conditions, this stored water is relied upon to augment low stream flows during the relatively dry summers (Van Rheenen et al. 2004).

Developing evidence indicates global climate change will have a marked effect on water resources in California. More than 150 peer-reviewed scientific articles on climate and water issues in California have been published to date, with many more in preparation, addressing a range of considerations from proposed improvements in the downscaling of general circulation models to understanding how reservoir operations might be adapted to new conditions (Kiparsky and Gleick 2003). Rising temperatures and sea levels, and changes in hydrological systems are recognized as potential threats to California's economy, public health and environment. In addition to the need for better understanding of the potential implications associated with these changes, it also is recognized that more research is necessary to identify which systems are most vulnerable (U.S. Climate Change Research Program 2016).

Various gases in the Earth's atmosphere, classified as atmospheric greenhouse gases (GHGs), play a critical role in determining the Earth's surface temperature. Solar radiation enters Earth's atmosphere from space, and a portion of the radiation is absorbed by the Earth's surface. The Earth emits this radiation back toward space, but the properties of the radiation change from high-frequency solar radiation to lower-frequency infrared radiation. GHGs, which are transparent to solar radiation, are effective in absorbing infrared radiation. As a result, this radiation that otherwise would have escaped back into space is now retained, resulting in a warming of the atmosphere. This phenomenon is known as the greenhouse effect.

Among the prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), ozone (O_3), water vapor, nitrous oxide, and chlorofluorocarbons (CFCs). Human-caused emissions of these GHGs in excess of natural ambient concentrations are responsible for enhancing the greenhouse effect. Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors (California Energy Commission [CEC] 2006). In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation (CEC 2006). A byproduct of fossil fuel combustion is CO_2. Methane, a highly potent GHG, results from offgassing associated with agricultural practices and landfills. Processes that absorb and accumulate CO_2, often called CO_2 "sinks," include uptake by vegetation and dissolution into the ocean.

As the name implies, global climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and toxic air contaminants, which are pollutants of regional and local concern, respectively. If California were a country, it would rank as the 12th to 16th largest emitter of CO_2 in the world. California produced 441 million gross metric tons of carbon dioxide equivalents in 2014 (California Air Resources Board [ARB] 2014). Carbon dioxide equivalents is a measurement used to account for the fact that different GHGs have a different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. This potential, known as the global warming potential of a GHG, is also dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, CH_4 is a much more potent GHG than CO_2. One ton of CH_4 has the same contribution to the greenhouse effect as approximately 25 tons of CO_2 (40 CFR 98). Expressing GHG emissions in carbon dioxide equivalents takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted. Consumption of fossil fuels in the transportation sector was the single largest source of California's GHG emissions in 2014, accounting for 37 percent of total GHG emissions in the State (ARB 2014). This category was followed by the industrial sector (24 percent) and the electric power/generation sector (including both in-state and out-of-state sources) (20 percent) (ARB 2014).

4.7.1 Environmental Setting

Since 1895, annual average air temperatures in California have increased by about 1.5 degrees Fahrenheit (°F), with minimum temperatures increasing at a rate almost twice as fast as the increase in maximum temperatures (approximately 2°F and 1°F per century, respectively). In most regions of the State, warming accelerated over the past three decades (California Environmental Protection Agency [CalEPA] 2013). The annual minimum temperature averaged over all of California has increased 0.33°F per decade during the period 1920 to 2003, while the average annual maximum temperature has increased 0.1°F per decade (Moser et al. 2009).

With respect to California's water resources, the most significant effects of climate change have been changes to hydrology and sea level rise. Spring snowmelt from the Sierra Nevada to the Sacramento and San Joaquin Rivers has declined over the past century. Lower water volumes of snowmelt runoff indicate warmer winter temperatures. More precipitation falls as rain instead of snow and directly flows from watersheds before spring. As a result, the portion of runoff that occurs between April and June has declined by about 9 percent. In addition to its impacts on the State's water supply, reduced spring runoff can have adverse ecological impacts (CalEPA 2013; Kapnick and Hall 2009; Knowles et al. 2006; Mote et al. 2005). While no overall trend is discernible in Statewide snow-water content (the amount of water stored in snowpack), a decreasing trend has been observed in the northern Sierra Nevada, and an increasing trend in the southern Sierra Nevada (CalEPA 2013). However, the average early spring overall snowpack in the Sierra Nevada has decreased by about 10 percent during the last century, a loss of approximate 1.5 million acre-feet (af) of snowpack storage (DWR 2008). These changes have significant implications for water supply, flooding, aquatic ecosystems, energy generation, and recreation throughout the State.

4.7.2 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to climate change and GHGs apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Clean Air Act Section 202(a), addresses current and projected GHG concentrations – Applies to project impacts.

State

The following State plans, policies, regulations, or laws related to climate change and GHGs apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Senate Bill (SB) 97, enacted in August 2007, recognizes climate change as a prominent environmental issue that requires analysis under the California Environmental Quality Act (CEQA). On December 30, 2009, the Natural Resources Agency adopted amendments to the CEQA Guidelines, as required by SB 97. These amendments provide guidance to public agencies regarding the analysis and mitigation of GHG emissions in draft CEQA documents. The amendments became effective March 18, 2010.

- With respect to the State's overall GHG emission reduction goals, Executive Order B-30-15 established a California GHG reduction target of 40 percent below 1990 levels by 2030. The executive order aligns California's GHG reduction targets with those of leading international governments (the 28-nation European Union, for instance, set the same target for 2030 in October 2014) (California Office of the Governor 2015).

- DWR's *Climate Action Plan, Phase 1: Greenhouse Gas Emissions Reduction Plan,* details DWR's progress and future plans for reducing GHG emissions consistent with the GHG emissions reduction targets established in AB 32, Executive Order S-3-05, and DWR-specific policies. The plan also outlines DWR's plan to monitor its progress and to reduce its emissions by over 80 percent below 1990 levels (DWR 2012).

  The Greenhouse Gas Emissions Reduction Plan estimates historical (going back to 1990), current, and future GHG emissions related to operations (e.g., energy use), construction (e.g., bulldozer), maintenance (e.g., flood protection facility upkeep), and business practices (e.g., DWR office building related). The plan specifies aggressive 2020 and 2050 emission reduction goals and identifies a list of GHG emissions reduction measures that DWR will undertake to achieve these goals.

  GHG emissions related to State Water Project (SWP) operations account for 98 percent of emissions from DWR activities. The overwhelming majority of DWR GHG emissions are emitted by non-hydroelectric-generation facilities which are needed to move water through the SWP, causing emissions of between 1.2 million and 4.1 million metric tons of carbon dioxide equivalent (MT CO_2e) per year, with an average of 2.4 MT CO_2e per year during 2007-2010. Emissions related to construction represent the second largest source of GHG emissions from the DWR's activities, but are less than 2 percent of the DWR's total GHG emissions.

  DWR adopted Extraordinary Construction Project thresholds to differentiate construction projects addressed within normal operations from construction projects that are undertaken by DWR from time-to-time and are extraordinarily large, far exceeding the normal construction operations DWR performs on an annual basis.. Construction projects with emissions exceeding 25,000 MT CO_2e for the entire construction phase, or 12,500 MT CO2e in any single year are not consistent with the plan and cannot use the plan for cumulative impact analysis under CEQA.

  As required by DWR's Greenhouse Gas Reduction Plan, BMPs are applied to all construction and maintenance projects that DWR completes or for which DWR issues contracts (including the

LEBLS project). DWR projects are expected to implement all construction BMPs, unless a variance is granted by the Division of Engineering Chief, Division of Operation and Maintenance Chief, or Division of Flood Management Chief, as applicable and the variance is approved by the DWR CEQA Climate Change Committee. Variances will be granted when specific project conditions or characteristics make implementation of the BMP infeasible and where omitting the BMP will not be detrimental to the project's consistency with the Greenhouse Gas Reduction Plan.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to climate change and GHGs are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County 2030 General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding GHGs are relevant to project design, construction, and/or impact analysis (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

4.7.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

The discussion below explains the analysis methodology of project construction and operation.

- **Construction.** GHG emissions and potential climate change impacts were evaluated quantitatively and qualitatively. The CalEEMod Model Version 2016.3.1 was used to estimate carbon dioxide equivalent (CO_2e) emissions for project construction under all action alternatives. Assumptions similar to those used in Section 4.3, "Air Quality," were also used to quantify GHG emissions from these on- and off-road fuel combustion sources. Emissions were estimated for two construction scenarios, a "long haul scenario" which assumes a high proportion of fill material for levee construction would be imported from a borrow site up to 50 miles from the project site, and a "reuse scenario" which assumes more of the levee degrade material can be reused on-site. Details for the emissions scenarios are discussed in Section 4.3, "Air Quality."

  A qualitative comparison was used to evaluate the GHG effects of the No Action Alternative. The analysis of potential effects relies on a review of the purpose of the action alternatives relative to the No Action Alternative in the context of the long-term and global scope of GHG emissions.

- **Operation.** The O&M requirements of all alternatives under consideration would be very similar. Consequently, operational emissions were not calculated for general O&M of the levee area. The project would replace either two or three existing pump stations (depending on the alternative) with a single new and more efficient pump station. Furthermore, the area of land inside the levees that would be drained by the pump stations would be reduced compared to existing conditions in all alternatives, reducing the amount of water that would need to be pumped out of the basin to drain. Consequently, it is expected that all action alternatives would reduce pump-related GHG emissions compared to existing conditions and no further analysis was provided for this project component.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. EPA submitted several comments specific to climate change analyses. These comments highlighted Council on Environmental Quality guidance for considering GHG emissions and climate change in NEPA reviews, which include recommendations to consider: (1) potential effects of a proposed action on climate change, as indicated by assessing GHG emissions, and (2) effects of climate change on a proposed action and its environmental impacts. EPA indicated the analysis should include an estimate of the GHG emissions associated with the proposed action, qualitatively describe relevant climate change impacts, and analyze reasonable alternatives and/or practicable mitigation measures to reduce project-related GHG emissions. EPA also indicated the analysis should address the appropriateness of considering changes to the design of the proposed action to incorporate GHG reduction measures and resilience to foreseeable climate change. The analysis should make clear whether commitments have been made to ensure implementation of design or other measures to reduce GHG emissions or to adapt to climate change impacts, including whether climate change may necessitate changes to the operations of the Sacramento River Flood Control Project and the Yolo Bypass. The analysis includes quantitative assessment of GHG emissions and qualitatively describes impacts and mitigation measures to reduce project-related GHG emissions. Furthermore, the project has been designed to improve resilience in the face of potential climate change effects on the frequency and/or intensity of flood events, or rise in sea level. In addition to providing additional capacity within the Yolo and Sacramento Bypasses, the project levees are also being constructed with wider crowns to facilitate potential later levee raises and build resilience into the future operation of the Sacramento River Flood Control Project.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27).The alternatives under consideration were determined to result in a significant impact related to climate change if they would do any of the following:

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

Several agencies have developed “thresholds” that might be used to determine what level of GHG emissions would constitute a significant impact. As described above, the action alternatives are unique and do not fit in as a typical land use development or stationary source project. Nevertheless, to establish additional context when considering the magnitude of GHG emissions associated with the project, this analysis also reviewed the GHG emissions thresholds developed by other entities, as listed below.

- DWR has adopted a threshold for construction projects exceeding 25,000 MT CO_2e for the entire construction phase, or 12,500 MT CO_2e in any single year. Projects with emissions larger than these thresholds must evaluate project-specific emissions under CEQA.
- The Sacramento Metropolitan Air Quality Management District (SMAQMD) has adopted a threshold of 1,100 million metric tons (MT) CO_2e per year for construction-related GHG emissions related to land development and construction, and stationary source construction and operation.
- The Bay Area Air Quality Management District (BAAQMD) temporarily adopted 10,000 MT CO_2e per year as the significance threshold for operational GHG emissions from stationary sources, and

1,100 MT CO_2e per year for evaluating land use development projects (BAAQMD 2011). These thresholds were later withdrawn based on a court order. No threshold was recommended for construction emissions.

- ARB requires operators of selected facility types that generate GHG emissions exceeding 10,000 MT CO_2e per year to comply with their Mandatory Reporting of Greenhouse Gas Emissions regulation (ARB 2015).

- The Western Climate Initiative may require participation in its cap-and-trade program if stationary sources generate greater than 10,000 MT CO_2e per year (Western Climate Initiative 2009).

- Facilities that generate greater than 25,000 MT CO_2e per year are required to report their emissions as part of the U.S. Environmental Protection Agency's (EPA's) Mandatory Reporting of Greenhouse Gases (EPA 2009).

Methods of analysis and thresholds developed for land use development projects are not suitable to evaluate an infrastructure project such as the project. Other methods of analysis and thresholds of significance developed for stationary sources and emissions levels for reporting and/or cap-and-trade programs are also not directly applicable to the project. Because of the unique nature of the project, existing methods of analysis and thresholds of significance (which were all developed for land use development projects and stationary source projects) are not entirely suitable to evaluate its GHG emissions, but can provide context for the level of magnitude of GHG emissions generated.

Issues Not Discussed Further in this EIS/EIR

Effects from Long-term Operations and Maintenance. Following the completion of project construction activities, periodic inspections and maintenance activities would continue to occur to check for potential damage to the levee system. These inspection and maintenance activities occur under existing conditions and the project is not anticipated to cause a net increase in inspection or maintenance activities because the new levees would meet current levee standards and result in less levee repair issues (and ostensibly less O&M activities) than would otherwise occur with the existing levees under the No Action Alternative. Furthermore, consolidation of existing drainage pump stations as proposed by the action alternatives would reduce energy and fuel use associated with pump operation compared to existing conditions or the No Action Alternative. Therefore, because project O&M activities are not anticipated to result in a net change in GHG emissions, and likely in a reduction of activities that may generate GHG emissions, effects from project-related O&M are not evaluated further in this EIS/EIR.

Impact Analysis

Table 4.7-1 provides a summary of climate change impacts and mitigation measures for all alternatives under consideration.

Table 4.7-1. Summary of Impacts and Mitigation Measures—Climate Change

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
Impact GHG-1: Generate Construction-related GHG Emissions that could Potentially Make a Cumulatively Considerable Contribution to a Significant Cumulative Impact on Climate Change	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	GHG-1: Implement DWR Best Management Practices	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact GHG-1: Generate Construction-related GHG Emissions that Could Potentially Make a Cumulatively Considerable Contribution to a Significant Cumulative Effect on Climate Change.

Alternative 1 – No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would not generate GHGs and would have **no impact** on climate change from direct project-related activities.

Alternative 2, 3, 4, and 5 – All Action Alternatives

Construction-related GHG emissions would be substantial under all action alternatives (Table 4.7-2) and would exceed the thresholds established by DWR for projects that require a project-specific GHG emissions analysis under CEQA. GHG emissions are generated primarily from fuel combustion in on- and off-road construction equipment (e.g. earth-moving equipment, haul trucks, material delivery trucks, and construction worker vehicles). Like air pollutant emissions, daily GHG emissions would vary depending on the type of construction activities planned for each day. For example, daily GHG emissions would be greater during construction-intensive phases, such as site grading and excavation, where large construction equipment is used, than during less intensive phases, such as material delivery or construction inspections. However, unlike air pollutant emissions, which are evaluated on a local and regional basis, GHG emissions have global effects because of their long atmospheric lifetime and resulting long-term ability to continue contributing to climate change. Therefore, although construction activities and subsequent GHG emissions would be temporary and short-term, total GHG emissions were considered.

Construction emissions for Alternatives 2 and 3 are planned to occur over a 2-year construction period. Construction emissions for the smaller Alternatives 4 and 5 are planned to occur within a single year. In addition to the GHG emissions calculated for each action alternative, Table 4.7-2 details the two construction season scenarios.

If considered in the context of thresholds applied to annual emissions from a stationary source, the calculated construction emissions from all action alternatives are comparable to 2 to 11 years of emissions at levels below thresholds considered significant. If considered over the expected life of the levees (assumed to be 50 years), and within the context of good long range planning to reduce GHG emissions on a risk basis relative to the No Action Alternative, the GHG emissions of the action alternatives would not be substantial (approximately 350 to 2,250 MT CO_2e per year). The impact of project construction under the action alternatives would not result in a cumulatively considerable incremental contribution to a significant cumulative impact on climate change and would be **less than**

significant. Mitigation Measure GHG-1, described below, has been identified to address this impact, to further minimize this less-than-significant impact.

Table 4.7-2. Lower Elkhorn Basin Levee Setback Project Construction Emissions

	Total CO_2E Emissions (metric tons)
Long Haul Scenario	
Alternative 2 (7-Mile Setback Partial Degrade)	112,735
Alternative 3 (7-Mile Expanded Setback Full Degrade)	111,727
Alternative 4 (5-Mile Expanded Setback Partial Degrade)	72,097
Alternative 5 (5-Mile Setback Full Degrade)	73,241
Reuse Scenario	
Alternative 2 (7-Mile Setback Partial Degrade)	36,215
Alternative 3 (7-Mile Expanded Setback Full Degrade)	35,892
Alternative 4 (5-Mile Expanded Setback Partial Degrade)	16,698
Alternative 5 (5-Mile Setback Full Degrade)	17,842

Source: GHG emissions calculated by GEI Consultants, Inc. in 2017

Mitigation Measure GHG-1: Implement DWR Best Management Practices.

To reduce GHG emissions from project construction, DWR will implement the measures described below which are considered best management practices (BMPs) for DWR construction and maintenance activities from DWR's Climate Action Plan, Phase 1: Greenhouse Gas Emissions Reduction Plan (Greenhouse Gas Reduction Plan) (DWR 2012). By implementing the BMPs listed below, DWR will minimize construction equipment fuel use, reduce fuel consumption for transportation of construction materials, reduce the amount of material to be hauled to a landfill, and reduce emissions from cement production.

DWR will design the project to incorporate BMPs into preconstruction and final project design. These BMPs are designed to ensure that individual projects are evaluated and their unique characteristics taken into consideration when determining if specific equipment, procedures, or material requirements are feasible and efficacious for reducing GHG emissions from the project. While DWR evaluates all projects to determine if the BMPs are applicable, not all projects will implement all the BMPs listed below, if they are determined to be infeasible (DWR 2012).

- **BMP 1**– Evaluate project characteristics, including location, project work-flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high-efficiency technologies are appropriate and feasible for the project or specific components of the project.
- **BMP 2 –** Evaluate the feasibility and efficacy of performing on-site material-hauling with trucks equipped with on-road engines.
- **BMP 3 –** Ensure that all feasible avenues have been explored for providing an electrical service drop to the construction site for temporary construction power. When generators must

be used, use alternative fuels, such as propane or solar, to power generators to the maximum extent feasible.

- **BMP 4 –** Evaluate the feasibility and efficacy of producing concrete on-site and specify that batch plants be set up on-site or as close to the construction site as possible.

- **BMP 5 –** Evaluate the performance requirements for concrete used on the project and specify concrete mix designs that minimize GHG emissions from cement production and curing while preserving all required performance characteristics.

- **BMP 6 –** Limit deliveries of materials and equipment to the site to off-peak traffic congestion hours.

- **BMP 7 –** Minimize idling time by requiring that equipment be shut down after 5 minutes when not in use (as required by the State airborne toxics control measure [Title 13, Section 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the construction site and provide and implement a plan for the enforcement of this requirement.

- **BMP 8 –** Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules will be detailed in an Air Quality Control Plan prior to commencement of construction and implemented during construction.

- **BMP 9 –** Implement a tire inflation program on-site to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every 2 weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an Air Quality Management Plan prior to commencement of construction and implemented during construction.

- **BMP 10 –** Develop a project-specific ride-share program to encourage carpools, shuttle vans, transit passes, and/or secure bicycle parking for construction worker commutes.

- **BMP 11 –** Reduce electrical use in temporary construction offices by using high-efficiency lighting and requiring that heating and cooling units be Energy Star® compliant. Require that all contractors develop and implement procedures for turning off computers, lights, air conditioners, heaters, and other equipment each day at close of business.

- **BMP 12 –** For deliveries to project construction sites where the haul distance exceeds 50-miles and a heavy-duty Class 7 or Class 8 semi-truck or 53-foot or longer box type trailer is used for hauling, a SmartWay[1] certified truck will be used to the maximum extent feasible.

[1] The U.S. Environmental Protection Agency has developed the SmartWay® truck and trailer certification program to set voluntary standards for trucks and trailers that exhibit the highest fuel efficiency and emissions reductions. These tractors and trailers are outfitted at point of sale or retrofitted with equipment that significantly reduces fuel use and emissions

- **BMP 13 –** Minimize the amount of cement in concrete by specifying higher levels of cementitious material alternatives, larger aggregate, longer final set times, or lower maximum strength where appropriate.

- **BMP 14 –** Develop a project-specific construction debris recycling and diversion program to achieve a documented 50 percent diversion of construction waste.

- **BMP 15 –** Evaluate the feasibility of restricting all material hauling on public roadways to off-peak traffic hours. During construction scheduling and execution minimize, to the extent possible, use of public roadways that would increase traffic congestion.

Timing: Before and during construction activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure GHG-1 would further reduce the **less-than-significant** impact associated with temporary and short-term construction-related GHG emissions because DWR will implement the comprehensive elements of Mitigation Measure GHG-1, the impact is temporary during 1-2 years, project-related O&M is likely to be reduced during the remaining project life (at least 50 years). Furthermore, the GHG emissions from construction activities triggered by a flood under the No Action Alternative would be substantially greater than under project conditions.

Residual Significant Impacts

The project would have a temporary, short-term impact during 1-2 years of construction, but project-related O&M is likely to be reduced during the remaining project life (at least 50 years). Furthermore, the GHG emissions from construction activities triggered by a flood under the No Action Alternative would be substantially greater than under project conditions. The project GHG emissions during construction would not be a cumulatively considerable incremental contribution to a significant cumulative impact on global climate change (i.e., a less-than-significant impact). Implementation of Mitigation Measure GHG-1 would further reduce this impact Therefore, no residual significant impacts would occur.

Additional mitigation measures beyond the DWR BMPs (e.g., offsets) are not proposed for any of the action alternatives for reasons listed below.

- The action alternatives do not show substantial annual GHG emissions when considered in the context of the useful life of the levees (at least 50 years).

- The action alternatives are preferable to the No Action Alternative as good planning to avoid the risk of huge and uncontrolled GHG emissions that would potentially result from construction activities after flooding, which would be much more likely to occur under the No Action Alternative.

- The action alternatives are consistent with plans, policies, and regulations without offsets through maintaining and enhancing open spaces and riparian habitats.

including idle reduction technologies, improved aerodynamics, automatic tire inflation systems, advanced lubricants, advanced powertrain technologies, and low-rolling resistance tires.

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4.8 Cultural Resources

This section contains an evaluation of the potential impacts on cultural resources that could result from project implementation. Cultural resources may include archaeological remains such as early Native American occupation sites and artifacts, historic-era (50 years old or older) archaeological remains, buildings and structures, places used for traditional Native American observances or places with special cultural significance, including Tribal Cultural Resources (TCRs) as defined by California Public Resources Code (PRC) Section 21074, Traditional Cultural Properties (TCPs), and cultural landscapes. Cultural resources also include built environment resources (buildings, structures, objects, sites, and districts). Paleontological resources are addressed in Section 4.11, “Geology, Soils, and Paleontological Resources.”

The area in which cultural resources are identified and in which potential effects on Historic Properties are analyzed is called the Area of Potential Effects (APE). (Historic Properties are those cultural resources determined to be eligible for listing in the National Register of Historic Places [NRHP].) These resources can be found at many locations on the landscape and must be considered under various Federal, State, and local statutes, including Section 106 of the National Historic Preservation Act (NHPA). Prehistoric and historic human remains and associated grave-goods on non-Federal land, such as the project APE, are subject to State law and are not subject to Section 106 of the NHPA or other Federal laws or regulations.

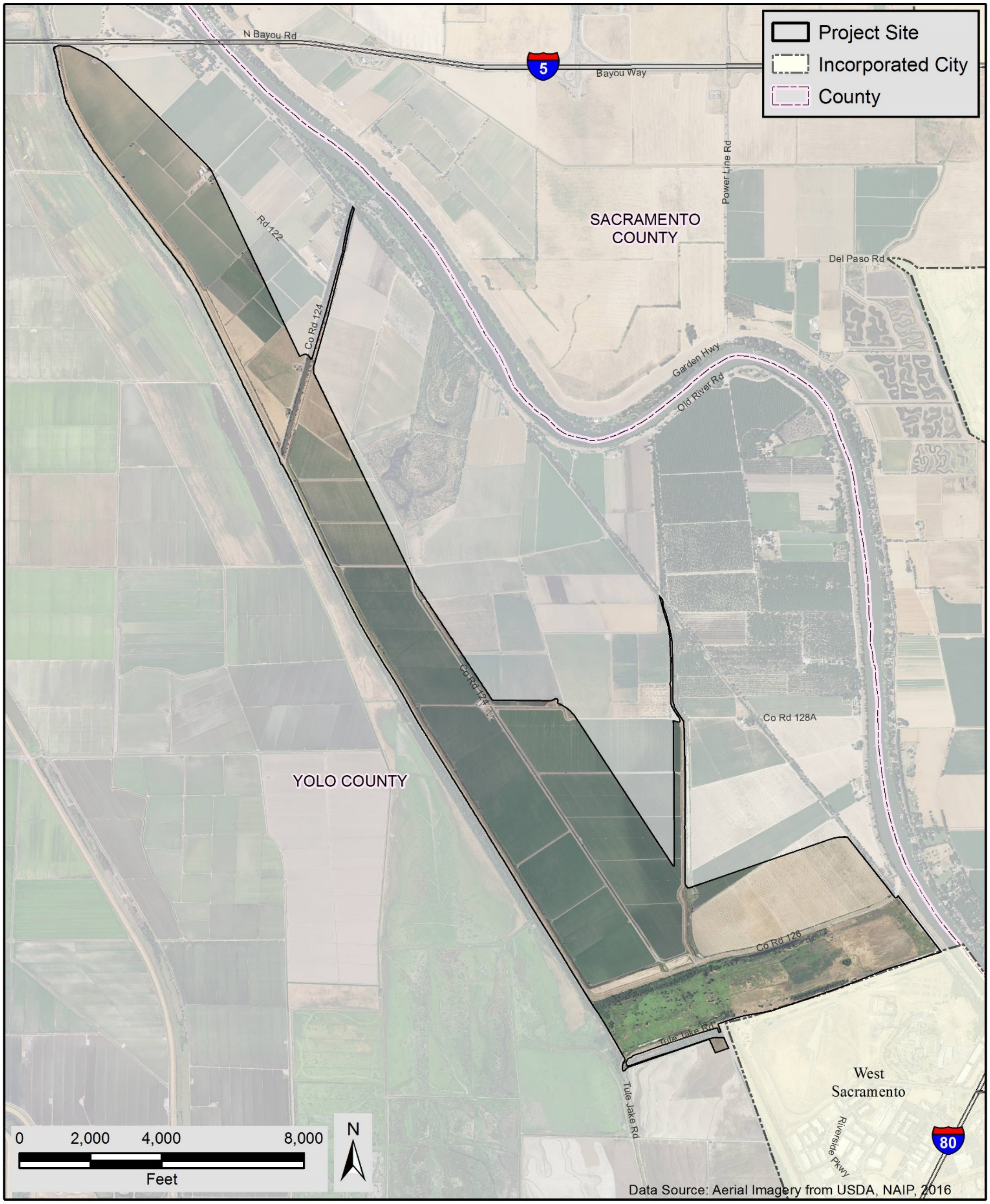
USACE has defined the APE as the “permit” area, which encompasses approximately 2,003 acres and includes all proposed construction activities, including levee degrade areas, new floodplain inundation areas, new levee setbacks, borrow areas, levee setback construction areas, utility relocation areas, relief well locations, berms, unpaved haul roads, and staging areas. The vertical APE extends up to 200 feet below ground-surface to account for excavation of borrow areas, levee degrade, cutoff wall and setback levee construction, relief wells, and utility removal and relocation. The project Draft APE is illustrated in Figure 4.8-1.

4.8.1 Environmental Setting

Prehistoric Setting

Early archaeologists divided the archaeological record of the Sacramento/San Joaquin Delta and Central Valley into three broad “cultural levels” that were thought to have relatively shallow time depth, based on artifact types and burial patterns (Lillard and Purves 1936; Schenk and Dawson 1929). Much early archaeological work was conducted by avocational archaeologists and collectors but soon academic archaeologists, notably from Sacramento Junior College (now Sacramento City College) and the University of California, Berkeley were conducting research in the region and they elaborated and expanded upon the early “cultural levels” into a new scheme that included four periods or horizons. These periods included the Early, Transitional, and Late (the Late divided into two phases) prehistoric and the fourth was a historic/contact period. These periods were based on artifact types and burials, as before, but with a greater emphasis and recognition that each period represented significant cultural differences. This very broad sequence was later expanded to include the San Francisco Bay Area and renamed the “Central California Taxonomic System.” The sequence was revised several times through the decades though it remained poorly dated (Beardsley 1948, 1954; Heizer and Fenenga 1939; Lillard et al. 1939).

Figure 4.8-1. Draft Area of Potential Effects



Z:\Projects\1611277_Flood\1605_YoloBypass_Enviro\1611277_1605_G097_APE.mxd
26Feb2018 RS

Source: GEI Consultants, Inc. 2016

Through ensuing decades, several revisions to the original sequence were proposed but with increasingly accurate radiocarbon assays informing the chronology and assemblage components (Bennyhoff and Fredrickson 1994; Heizer 1958, 1964; Ragir 1972). Fredrickson changed the sequence to reflect what he saw as changes to economy and social organization which triggered changes to material culture. His version of the sequence includes the Paleo-Indian, Lower, Middle, and Upper Archaic and Emergent periods, and encompasses approximately 13,000 years (Fredrickson 1973). Fredrickson's model and nomenclature have been increasingly used by researchers in the past few decades (Basgall et al. 2006; Rosenthal 2011a; White et al. 2002) and is followed in this document.

Early Inhabitants

To date, essentially no evidence for human occupation of the Delta/Central Valley lowlands prior to the Middle Archaic Period (7500-2500 calibrated Before Present [cal B.P.]) has been discovered. This is likely due in part to rapid deposition of alluvial sediment over much of the valley bottom during the Holocene geologic era that would have deeply buried early archaeological sites in the area.

The few Paleo-Indian (13,550-10,550 cal B.P.) components known from the region are characterized by basally thinned, lanceolate projectile points, well-made flake tools/scrapers, and bifaces; milling implements are rare to absent (Fredrickson and Grossman 1977; Moratto 1984; Riddell and Olsen 1969). The diversity of toolstone in early assemblages indicates that populations during the Paleo-Indian period were extremely wide-ranging. Plant foods appear to have had little importance in the diet based on the lack of milling equipment found at early sites; however, limited data indicate assumptions that Paleo-Indian populations depended primarily on the hunting of large, often extinct mammals (Moratto 1984) and selective exploitation of lacustrine habitats are not supported.

Lower Archaic (10500-7500 B.P.) components are also limited in the Central Valley/Delta due deep burial by alluvial deposits. Elsewhere in the region, Lower Archaic components tend to coincide in many of the same valley locations as Paleo-Indian remains (Wallace and Riddell 1991), as well as several Sierran and Coast Range sites with Lower Archaic material preserved in buried deposits (Meyer and Rosenthal 1997; Rosenthal 2011b). Artifacts diagnostic of this period include stemmed projectile points and flaked stone crescents like those in the Great Basin. Ground stone milling equipment is common in upland locations, and is in keeping with evidence from southern California, the Great Basin, and Mojave Desert, where the early Holocene appearance of grinding tools signals a growing reliance on plant foods. How these regional data relate to the Central Valley remains unclear (Rosenthal 2011b; Rosenthal et al. 2007) due to the paucity of Lower Archaic component.

Middle Archaic

The first substantial evidence for prehistoric occupation of the Central Valley/Delta occurs during the Middle Archaic (7500-2500 cal B.P.). Sites dating to the initial part of this interval are rare in lowland settings for where they are probably deeply buried, but are comparatively common in upland areas (Rosenthal et al. 2007). Late Middle Archaic remains from Central Valley/Delta and Bay Area sites have been recognized by researchers for their unique characteristics, giving rise to the original definition of the Early Period/Horizon or Windmiller Culture (Beardsley 1948, 1954; Lillard et al. 1939; Moratto 1984; Olsen and Wilson 1964; Ragir 1972).

Artifacts often found in the Middle Archaic sites include various types of stemmed, leaf-shaped, and less often concave-base projectile points frequently made of non-obsidian materials (Beardsley 1954; Moratto 1984; Ragir 1972). Domestic tools include an assortment of baked clay objects (e.g., "net sinkers," "cooking stones," basketry impressed pieces), and bone fish hooks, spears, "daggers," and matting needles. While there is some debate about the significance of plant food resources in general and specifically acorn and other nut crops (Basgall 1987; White 2003; Wohlgemuth 2004), there is consensus that the late Middle Archaic reflects comparatively intensive adaptations that included seasonal or more permanent settlements, extensive exchange networks, and increasing social complexity (Fredrickson 1973; Milliken et al. 2007; Moratto 1984; Rosenthal et al. 2007).

Several non-utilitarian traits are unique to the Middle Archaic in the Central Valley/Delta. Ventrally extended burials frequently oriented to the west are typical, although flexed interments are also reported. More than three-quarters of Middle Archaic burials contain grave goods and commonly include quartz crystals, red ochre, Thick Rectangular (L series) and small (A1a) Spire-Lopped *Olivella* beads, and abalone shell ornaments sometimes having asphaltum and bead applique (Moratto 1984; Ragir 1972). Other artifacts found in Middle Archaic mortuary contexts include various slate and canine tooth pendants, ground slate pins/pencils, turtle shell ornaments, conical smoking pipes or sucking tubes, and various types of often perforated charmstones.

Upper Archaic

The Upper Archaic interval (2500-850 cal B.P.) in the Central Valley/Delta region is characterized by an increase in the number of archaeological sites due to rapidly expanding human populations, but also greater preservation of more recent sites (Fredrickson 1973; Johnson 1967; Milliken et al. 2007; Moratto 1984; Moratto et al. 1988; Rosenthal et al. 2007). In addition to growing populations, the archaeological record in the Central Valley/Delta is considered to reflect social and economic intensification (Bennyhoff 1977; Bennyhoff and Fredrickson 1994; Sundahl 1992). Mound-based settlements became established in the Central Valley/Delta during the Upper Archaic, connoting presumably stable occupations and inception of the tribelet-like sociopolitical organization documented at contact (Bouey 1995; Lillard et al. 1939; Ragir 1972; Schenk and Dawson 1929).

Upper Archaic occupations are marked by significant changes in mortuary practices and artifact assemblages. Burials are for the most part tightly flexed, cremations still rare, and grave goods less common and lavish than those of the preceding Middle Archaic (Moratto 1984; Ragir 1972). Shell beads and other ornaments are replaced by new types (e.g., Class G saucer and later Class F saddle beads) that have proven important for archaeological dating and the study of exchange networks (Bennyhoff and Hughes 1987; Groza 2002).

Changes in the form and function of utilitarian tools are thought to reflect shifts in Upper Archaic economic patterns. Projectile points include heavy stemmed, leaf-shaped, and more frequently corner-notched forms (Rosenthal 2011c) predominantly made of non-obsidian stone. Large bifacial obsidian blades from North Coast Range or eastern Sierran quarries (Bennyhoff and Fredrickson 1994; Moratto 1984) also appear. An elaborate bone tool industry emerges during this period with the number of bone artifacts often surpassing those of stone (Delacorte 2001; Milliken et al. 2007; Moratto 1984; Rosenthal et al. 2007). Many of the new tools are associated with new types of fishing equipment (e.g., composite hooks, leisters, barbless spears) and textile weaving (e.g., net gauges, shuttles, awls). Mortars and pestles increase in both absolute and relative abundance to millingstones and handstones throughout the area (Basgall 1987; Moratto 1984; Rosenthal et al. 2007). By all accounts, the Upper Archaic Period witnessed a major intensification in subsistence and other cultural practices, accompanied by increasing sedentism and population growth. An increasing reliance on acorn and other nut crops, aquatic, and other "high-cost" resources, set the stage for subsequent cultural developments. The trade/acquisition of exotic materials (e.g., marine shell, obsidian, and other minerals) also appears to have increased, implying that mobility was reduced and populations were increasingly tethered to discrete territories.

Emergent Occupation

The Emergent or Late Period/Horizon (850 cal. B.P.-Historic) is characterized by increasing diversity in the archaeological record (Bennyhoff 1977a; Fredrickson 1974; Milliken et al. 2007; Rosenthal et al. 2007), and is often divided into two phases based on artifact forms and evidence for increased sociopolitical complexity (Heizer and Fenenga 1939; Lillard et al. 1939; Milliken et al. 2007; Rosenthal et al. 2007).

The appearance of the bow and arrow and flanged pipes/sucking tubes, as well as a variety of shell and bone artifacts including banjo-shaped *Haliotis* ornaments, incised bird bone tubes/whistles, and rectangular *Olivella* sequin (Class M) beads are diagnostic of the Lower Emergent Period. The Upper Emergent Period is marked by several small projectile point styles including corner-notched, side-notched, and triangular points; a variety of bead types such as *Olivella* lipped (Class E), clamshell disk, and magnesite cylinder beads; and house pits (Beardsley 1954; Elsasser 1978; Fredrickson 1984; Moratto 1984).

Changes in subsistence and economy during the Emergent Period are indicated by milling equipment and paleoethnobotanical remains, with mortars and pestles now dominating most milling assemblages (Moratto 1984; Rosenthal et al. 2007) and plant remains revealing extensive exploitation of both nut and seed crops (Wohlgemuth 2004). Previously little-represented obsidian and other toolstone sources increase in regional importance while imported large obsidian bifaces disappear, implying a fundamental shift in the organization and structure of exchange relations. This may reflect the establishment of increasingly localized and competitive groups, as expected with increasing intensifications. The manufacture and exchange of shell beads grows increasingly decentralized during the Emergent Period, and local groups begin to instead produce their own beads (Meyer and Rosenthal 1997).

The association of archaeological remains with house and larger semi-subterranean structures indicates increasingly stable and centralized settlement patterns and complex sociopolitical organization. Moreover, shifts in the type and intensity of economic activities are reflected by the appearance of newly intensive fishing technologies (e.g., toggling harpoon, hooks, fish weirs, textiles and often abundant quantities of baked clay) (Beardsley 1954; Bennyhoff 1950; Moratto 1984; Sundahl 1982). Bake clay artifacts include items interpreted as cooking stones, primitive pottery, figurines, and generic refuse related to prolonged domestic activity (Delacorte 2001; Johnson 1990; Schenk and Dawson 1929).

Changes in mortuary practices and grave goods are also diagnostic of the Emergent Period (Fredrickson 1974; Moratto 1984). Grave pits that were burnt prior to interment of tightly flexed burials and cremations become common, especially during the Upper Emergent times. Grave goods include both valuables (e.g., shell ornaments), as well as more utilitarian objects (e.g., projectile points, milling implements, bone tools), many of which were ritually broken when placed with the deceased.

The changes observed in the archaeological record of the Emergent Period are considered to result from the establishment of large, residentially stable populations, resembling those at contact. Less clear is when, how, and why specific traits initially appeared, as is the establishment of various ethnolinguistic groups that were present across the aboriginal landscape when Europeans arrived in the Central Valley.

Ethnographic Setting

The project is situated in the ethnographic territory of both the Patwin (Wintun) and Valley Nisenan Tribes. More specifically, the project lies at the eastern extent of Patwin territory and the western extent of Nisenan territory (Johnson 1978: Figure 1; Wilson and Towne 1978: Figure 1). Most tribes in central California, including the Patwin and Nisenan, had similar subsistence-settlement patterns, material culture, and social structures (Kroeber 1929). The following section therefore is a generalized description of the Tribes with differences discussed as appropriate.

Subsistence and Settlement

The Patwin and Valley Nisenan inhabited an area that included several micro-environments including densely vegetated riverine zones, tule marshes, open grasslands, and few oak groves (Johnson 1978; Wilson and Towne 1978). Resources were taken from these areas but larger, permanent villages were placed on higher ground such as natural levees, knolls, and mounds. In the project area, settlements along major water ways were favored (Kroeber 1925, 1932; Wilson and Towne 1978). Other factors considered for settlement locations included exposure and proximity to water and other resources. Permanent villages tended to be along major waterways on low rises, from which specialized task groups would go out to harvest resources in surrounding microenvironments that villages controlled (Du Bois 1935; Johnson 1978; Kroeber 1929, 1932).

Fish were a key component of the diet and much effort and technology was devoted to capturing this important food resource. Salmon were either dried raw or cooked, dried, and crushed into a powder; both kinds were transported in mid-summer to villages and stored in “granaries” (DuBois 1935; Kroeber 1929, 1932; Wilson and Towne 1978). Other fish resources included sturgeon, suckers (caught in nets or using fishhooks), pike, chub, perch, trout and hardhead; mussels were gathered from riverbanks or dived for and were used as spoons and knives for meat and fish (Johnson 1978; Kroeber 1932). Fish were caught in drives, communally built weirs, from riverbanks, and by boat (Beals 1933; Kroeber 1929; Wilson and Towne 1978).

Various birds were also captured for food and for their feathers, including ducks, geese, mudhen, and quail. Avifauna were caught in a number of ways using nets, decoys, a double net system, long tunnel-like nets, fences, arrows, bird blinds, and snares (Beals 1933; Du Bois 1935; Kroeber 1932; Johnson 1978; Wilson and Towne 1978).

Several large mammals were hunted including deer, tule elk, antelope, and bear (Johnson 1978; Kroeber 1929). The most economically important of these animals appears to have been deer. Deer were usually hunted in groups. A variety of methods were used to hunt deer, including a group of men using bows and arrows, with one hunter wearing a deer mask attached to his head and hide covering his shoulders, a group of hunters running down deer in relays or driving the deer towards hidden hunters, and driving deer (and other animals) using burns. Hunting parties were generally accompanied by a doctor who received a share of any taken animals (Beals 1933; Kroeber 1932). Another important technique for capturing deer included driving deer into nets (Kroeber 1932). It is also possible that pits were used, but if so it was rarely done. Among the Wintu, there were also several rules regarding the eating of deer. Likewise, there were several procedures for cooking deer meat (Du Bois 1935).

Brown bears were usually hunted in fall or in winter while they hibernated. Again, several techniques were used such as bear pits, smoking a bear to death in its den, and a group of three or four hunters going to a bear’s den and either spearing it or shooting it to death with a bow and arrow. Brown bears could also be communally hunted, with some individuals beating vegetation to drive bears into canyons where experienced hunters waited. Rabbits were communally hunted among the Wintu, with the rabbits driven towards lines of snares and clubbed by hidden hunters when caught. Rabbits would also be driven into nets, which were sometimes connected into fences up to 1 mile long (Beals 1933; Du Bois 1935). Gophers were also hunted as well as squirrels, small mice, and wood rats. These would be caught by deadfalls, snares, or clubbing after being roused from their dens (Du Bois 1935). Other mammals that were eaten include dog, coyote, badger, and skunk, though there were differences between the Patwin and Nissenan over which animals were eaten and which were avoided (Beals 1933; Du Bois 1935; Kroeber 1932). Dogs were used extensively in hunting (Beals 1933; Du Bois 1935).

Numerous plants were used for food. Acorn was the staple food in the area (Beals 1933; Du Bois 1935). Among the Patwin, oak groves were communally owned, though individual trees and even branches were claimed by individuals (Beals 1933; Johnson 1978). Women were primarily responsible for gathering acorns though men did assist. Men generally climbed trees and shook a branch until acorns fell which were then gathered by women; a family could gather the acorns from one large or two small trees a day. The acorns were shelled after being carried back to camp and stored in bark-lined pits (Du Bois 1935; Johnson 1978; Kroeber 1929, 1932). Numerous other plants were used for food and for medicine. Buckeye was important in some areas, second only in importance to acorns. Buckeye, like acorns, would be leached and pounded into a meal. Manzanita berries were gathered in burden baskets, dried, pounded into a powder, and made into a sweet soup. Several varieties of pinenuts, including gray pine and sugar pine, were imported into the project area and eaten either raw or baked. Nuts were usually hulled and sometimes pounded before cooking (Beals 1933; Du Bois 1935).

Other plants that were used includes nearly everything that was edible, including tule root, wild onion, sunflower, wild oat, alfilaria, wild grape, and various mushrooms, berries, other grass seeds, and roots (Beals 1933; Du Bois 1933; Johnson 1978).

Material Culture

A variety of textiles were made by the Nissenan and Patwin. Rabbitskin blankets, goose-feather blankets, belts, and headbands were a few types of textiles. As noted previously, several types of net for capturing game were also made. Baskets have also been previously mentioned, but other types of woven/coiled basket items that were made include seed beaters, water bottles, and burden baskets with feathers (Beals 1933; Kroeber 1932).

Bows were made of gray pine or yew with sinew backing attached with glue. Glue was made by boiling salmon heads or soaproot. Bowstrings were made of deer sinew. Arrow shafts were about as long as the bow itself and Nissenan bows had a 6-inch foreshaft. Projectile points were sometimes made of hard oak as well as stone (Beals 1933; Kroeber 1929). According to Kroeber, the Patwin imported sinew-backed bows from the north (Kroeber 1932). Harpoons were bone-pointed (Beals 1933; Du Bois 1935; Kroeber 1932).

Houses among the Nisenan were built with green oak poles for frames and, in areas where bark was scarce, were covered in grasses, brush, or wormwood tied to the frame. The houses had a round floor plan and a smoke hole. Bedding consisted of rabbitskin blankets or deerskins. Wintu homes were conical bark houses with no center pole, semi-subterranean perhaps 1-3 feet below the surface with circular entrances and conical burden baskets used as a door. Dance houses were found in larger villages; these structures generally were semi-subterranean and covered in brush, needles, grass, and dirt. Dance houses had forked oaks for center posts, young pines or buckeyes for rafters, and floors could be 3-5 feet below the surface. Dance houses were sometimes used as a dwelling for unmarried men but also used for ceremonial purposes, including sweats, men's gathering, local feasts, visitor reception, and ceremonial/ritual dances (Beals 1933; Du Bois 1935; Wilson and Towne 1978).

Nisenan made balsas out of tule but also had rafts made of two logs lashed together or sometimes a single large log. The Patwin made rafts from grapevine-wrapped bundles of tule. Boats for long-distance travel could be up to 20-feet-long with the edges built up for storage (Kroeber 1929, 1932).

Society and Religion

Social organization in the region tended to be on a small scale with the tribelet the broadest unit. Tribelet territory was generally not very extensive and included a relatively large main village that was permanently inhabited and also one or more satellite villages that could be temporarily inhabited. Among both Nisenan and Patwin, succession to chief was usually from father to son, with the new chief chosen while he was still young; on occasion, there could be two chiefs. Succession could, however, go to any eligible candidate including a brother, nephew or, if no other candidates available, then a widow, daughter, niece, or son-in-law. There was a feast or ceremony, which everyone contributed to, when a new chief was installed. In addition to chiefs, the Nisenan had three different kinds of spokesman or crier, each with a distinct area of concern (Beals 1933; Johnson 1978; Kroeber 1929). Among the Patwin, the chief's responsibilities included making economic and ceremonial decisions such as which families would focus on which resources, knowing who owned what resources, and deciding when and if certain ceremonies would be conducted (Johnson 1978). Nisenan chiefs apparently had less direct power, but had considerable influence (Kroeber 1929, 1932).

Organized war involving large groups was rare. Conflicts were usually caused by trespassing, poaching, or accusations of witchcraft, and could involve anything from a few families on poor terms to organized raids and surprise attacks. More organized warfare was conducted more often between valley and foothill groups. Slings and spears were used for war, though the bow and arrow was the principal weapon; clubs were used to kill the wounded, women, and children. War parties were led by the "bravest man," and not the chief. War parties were distinguished from trading parties by the color of the paint they wore. The war cry of the Valley Nisenan was a coyote cry. Surprise attacks on villages were exceptionally brutal and involved killing sleeping women and children and the destruction of homes and resources, though this could happen during any serious conflict. Most captives that were taken were killed for revenge though at times some women would be kept, a few eventually becoming part of the captor's family (Beals 1933; Kroeber 1929, 1932; Wilson and Towne 1978).

Both groups practiced versions of the Kuksu cult, though each had beliefs, ceremonies, and practices unique to each tribelet and unrelated to the Kuksu cult (Beals 1933; Kroeber 1929, 1932). The Kuksu cult generally refers to a system of ceremonies and dances performed by one or more secret societies revolving around god or spirit impersonation. The Kuksu cult may have originated with the Patwin because that group has the greatest elaboration of the cult. The Kuksu cult among the Nisenan only had two secret societies, the first of which was open to most men, and a second that was more limited in membership but could have men and women as members; the Patwin had a third society (Johnson 1978; Kroeber 1929, 1932; Wilson and Towne 1978). Among the Patwin, the most important of ceremonies could last 2 days to a week and include all spirit enactors. The Valley Nisenan, Patwin, and Maidu Tribes had the most elaboration of the Kuksu cult of anywhere in California (Kroeber 1929, 1932; Wilson and Towne 1978).

Historic Setting

Yolo County

Yolo County was one of California's original 27 counties. The City of Woodland became the permanent County seat in 1862, after the seat had moved several times (Hoover et.al. 1990:532–533). Early settlers in the County included William and John Reid Wolfskill, William Gordon, William Knight, Juan Manuel Vaca, and Juan Felipe Armijo Pena. Horse and cattle raising and the cultivation of grain and fruit orchards were common forms of livelihood during this period (Larkey and Walters 1987:19, 23).

The Gold Rush changed Yolo County from a rural farming community to a thriving agricultural area as disenchanted miners moved from the foothills to the Sacramento Valley to seek their fortune in ranching and farming. As more people arrived in the County, improvements were seen in local transportation. Roads were developed and rail lines were laid, including the Vaca Valley Railroad and Clear Lake Railroad (Larkey and Walters 1987:26, 32, 49, 50–51; Olney 1902:171).

Successful crops grown in Yolo County in the 19th century included hops, onions, beans, tomatoes, corn, sugar beets, flax, and grapes. Fruit trees such as almond, walnut, apple, orange, lemon, cherry, peach, and nectarine were also commonly grown (De Pue & Company 1879:36; Olney 1902:171–172). By the early 20th century, improvements in irrigation allowed for varied crops to be introduced, such as rice. Currently, major crops grown in the County include rice, wheat, barley, corn, alfalfa, sugar beets, sorghum grain, safflower, sunflowers, almonds, pistachios, and kiwi. Livestock raising also continues to be a major part of the local economy (Hart 1978:489).

Flood Management

The Sacramento River is known for its high-volume, fast-rising floodwaters resulting from a combination of Sierra Nevada snowmelt, a 5-month rainy season, and the steep incline of the upper watershed (Henley 2006:7; O'Neill 2006b:69). Land surrounding the lower river reaches supports abundant alluvial soil, which is excellent for agricultural pursuits and attracted settlers to the region in the early 1880s (O'Neill 2006a:77). However, the rich soil was often inundated by floodwaters. In response to the extensive flooding, private landowners constructed small levees—between 3 and 4 feet high—near their farms. These levees, however, proved ineffective and failed during the catastrophic floods from this early period (McGowan 1961:287; O'Neill 2006b:74). As the floods worsened, landowners attempted to build higher levees, but those too proved ineffective.

The California Legislature tried to coordinate a levee system and to control levee construction by creating the Swamp Land Commission in 1861. This gave California drainage districts the power to construct levees. It would become the responsibility of State engineers to design the levees for each district. The California Legislature enhanced the levee district powers in 1864, which spurred additional levee construction (O'Neill 2006b:81).

California's first State engineer, William Hammond Hall, and engineer Marsden Manson, conducted an intensive survey of the Sacramento River between 1878 and 1880. Part of what Hall was studying was the floods and impacts caused by hydraulic mining debris in the river. Hydraulic mining was first introduced in 1852. The process, which washed away entire hillsides, became the leading mining technique in California for the next 35 years (Kelly 1989:190; Starr 2005:89–90). Hall and Manson determined that 1.3 billion cubic yards (cy) of mining debris entered the tributaries of the Sacramento River through hydraulic mining, causing a considerable amount of debris to collect in the river (Kelly 1989:203; O'Neill 2006b:90). The result was a raised riverbed and increased frequency of seasonal flooding along the river. This adversely affected local farmers, because the flooding and debris made the land unsuitable for farming (O'Neill 2006a:85, 92).

In 1884, the case of *Edwards Woodruff v. North Bloomfield Gravel Mining Co., et. al.* was heard by Judge Lorenzo Sawyer. Known as the Sawyer Decision, Sawyer ruled that hydraulic mining destroyed the property of others and caused so much damage to the rivers that the court placed a Federal injunction against all mines that failed to build restraints to prevent the debris from entering the rivers. The Sawyer Decision essentially ended hydraulic mining by the end of the 1880s (Kelly 1989:217; O'Neill 2006b:90).

USACE's Captain Thomas Jackson came to California in 1905 and began studying the Sacramento River. He undertook a comprehensive flood management plan for the Sacramento Valley. In 1910, Jackson's report, known as the Jackson Report, became the foundation for the Sacramento River Flood Control Project (SRFCP). In 1911, the California Debris Commission designed a flood control plan that was more comprehensive than just constructing levees (O'Neill 2006b:114–115). Subsequent lobbying efforts resulted in the 1917 Federal Flood Control Act, which required USACE to work with State government and local levee districts and provided $5.6 million to construct flood control facilities on the Sacramento River (O'Neill 2006b). The SRFCP began in 1918, and marked the first expansive flood control efforts on the Sacramento River. It also was the first time Congress appropriated funds for the specific purpose of flood control (Arnold 1988:14). Most Sacramento River levees were improved to meet Federal design standards by 1925 (Kochis 1963:11).

The Flood Control Act of 1917 was modified and extended by the Flood Control Act of 1928, which was the largest public works project of its time with an authorized budget of $325 million dollars (more than the Panama Canal's construction cost). However, only a small percentage of the total was earmarked for the SRFCP (DWR 2014:4).

The 1936 Flood Control Act established the Federal government's responsibility for flood control and solidified USACE's authority (O'Neil 2006b:165–166). This act was modified again in 1941 to authorize Federal expenditures for completion of flood control projects including purchasing land, easements, and rights-of-way. The states in turn were to agree not to hold the Federal government liable for flood damages and to accept responsibility for all O&M in accordance with regulations prescribed by the Secretary of the Army (DWR 2014:4). By 1944, the SRFCP was nearly 90 percent complete and an estimated 980 miles of levees were constructed (Kelley 1989:309). By 1955, there were many miles of project levees along the Sacramento River that required work to bring the levees up to Federal standards (Kochis 1963).

Sacramento Bypass and Sacramento Weir

Construction of the Sacramento Bypass and Sacramento Weir began in 1916 and was completed in 1917 (Walters 1987:22). Rights-of-way to build the Sacramento Bypass cost approximately $1,355,000 (*The Sacramento Union* 1921:10). The Sacramento Weir is one of five weirs constructed as part of flood management efforts in the Sacramento Valley. Construction of the weir began in June 1916. The firm of Teichert & Ambrose was selected as the contractor with a winning bid of $336,640. The City of Sacramento assumed the construction costs for the project and the California Reclamation Board reimbursed the city (*The Sacramento Union* 1916:9). The Sacramento Weir is the only manually operated weir in the SRFCP system; all others overflow by gravity on their own. It is more than 1,900 feet long and has 48 gates. The weir was built to protect the City of Sacramento by diverting floodwaters from the Sacramento and American Rivers down the Sacramento Bypass and into the Yolo Bypass.

Each gate has 38 vertical wood plank "needles" that are hinged at the bottom and held at the top by a hollow metal beam. To open the gates, an operator manually releases the beam using a latch. DWR is the agency responsible for operating the Sacramento Weir while adhering to regulations the USACE established. Operators open the weir when the Sacramento River reaches 27.5 feet at the I Street Bridge gage and if there is a forecast for the water to continue rising. The National Weather Service and DWR's river forecasting team dictate the number of gates to be opened and one of two criteria must be met: 1) to prevent the stage at the I Street Bridge gage from exceeding 29 feet, or 2) hold the stage of the downstream end of the weir to 27.5 feet (Russo 2010:4–6).

4.8.2 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to cultural resources apply to the alternatives under consideration, as listed below.

- National Historic Preservation Act – Section 106 of the NHPA and its implementing regulations (36 Code of Federal Regulations [CFR] 800, as amended in 1999) require Federal agencies to consider the potential effects of their proposed undertakings, or those they fund or permit, on properties that may be eligible for listing, or that are listed in, the NRHP, and to allow the Advisory Council on Historic Preservation (ACHP) the opportunity to comment on the proposed undertaking. The project will require Section 408 permission by USACE, and a Department of the Army Clean Water Act permit, therefore, NHPA Section 106 compliance is required for the project.

National Register of Historic Places

A property may be listed in the NRHP if it meets criteria for evaluation as defined in 36 CFR 60.4 and as described below.

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and meets one or more of the following criteria:
>
> A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> B. That are associated with the lives of persons significant in our past; or
>
> C. That embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> D. That have yielded, or may be likely to yield, information important in prehistory or history.

State

The following State plans, policies, regulations, or laws related to cultural resources apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- California Environmental Quality Act – CEQA includes provisions that specifically address the consideration of cultural resources. CEQA states that if a project would have significant impacts on important cultural resources, then alternative plans or mitigation measures must be considered. However, only significant cultural resources (termed “historical resources”) need to be addressed. CEQA defines an historical resource as “a resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources [CRHR]” (California PRC Section 21084.1). Applies to the consideration of cultural resources in the project APE.

- California Register of Historical Resources – The CRHR includes resources listed in or formally determined eligible for listing in the NRHP, as well as some California Historical Landmarks and Points of Historical Interest. 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 (California PRC Section 5024.1, 14 California Code of Regulations [CCR] Section 4850). The eligibility criteria for listing in the CRHR are similar to those for NRHP listing but focus on importance of the resources to California history and heritage. A cultural resource may be eligible for listing on the CRHR if it:

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

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

    - contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information,
    - has a special and particular quality such as being the oldest of its type or the best available example of its type, or
    - is directly associated with a scientifically recognized important prehistoric or historic event or person.

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

Preservation [OHP] 1999). These regulations apply to the eligibility determination of cultural resources in the project APE.

- Native American Heritage Commission – California PRC Sections 5097.91–5097.94 created the nine-member Native American Heritage Commission (NAHC). NAHC identifies and catalogs places of special religious or social significance to Native Americans and known graves and cemeteries of Native Americans on private lands, and performs other duties regarding the preservation and accessibility of sacred sites and burials and the disposition of Native American human remains and burial items. Applies to the disposition of human remains encountered during work on the project. Additional State requirements concerning Native American Sacred Sites and human remains are in Appendix C, "Summaries of Applicable Laws, Regulations, Policies, and Plans."

- Assembly Bill 52 – Assembly Bill 52 (AB 52), effective on July 1, 2015, amends CEQA and adds new sections relating to Native American consultation and certain types of cultural resources, TCRs. TCRs are either (1) sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe that is either on or eligible for inclusion in the CRHR or a local historic register; or (2) the lead agency (in this case, DWR), at its discretion and supported by substantial evidence, chooses to treat the resource as a TCR. Additionally, a cultural landscape may also qualify as a TCR if it meets the criteria to be eligible for inclusion in the CRHR and is geographically defined in terms of the size and scope of the landscape. Other historical resources (as described in California PRC 21084.1), a unique archaeological resource (as defined in California PRC 21083.2[g]), or non-unique archaeological resources (as described in California PRC 21083.2[h]) may also be TCRs if they conform to the criteria to be eligible for inclusion in the CRHR.

  AB 52 provides that a project with an effect that may cause a substantial adverse change in the significance of a TCR may have a significant effect on the environment. AB 52 requires the lead agency (in this case, DWR) to begin consultation with a California Native American Tribe that is traditionally and culturally affiliated with the geographic area of the project if the tribe requests the lead agency, in writing, to be informed by the lead agency through formal notification of projects that are proposed in that geographic area and the tribe subsequently requests consultation. California PRC Section 21084.3 states that "public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource."

  AB 52 explicitly recognizes "that California Native American tribes may have expertise with regard to their tribal history and practices, which concern the tribal cultural resources with which they are traditionally and culturally affiliated. Because the California Environmental Quality Act calls for a sufficient degree of analysis, tribal knowledge about the land and tribal cultural resources at issue should be included in environmental assessments for projects that may have a significant impact on those resources." AB 52 therefore includes a requirement for meaningful consultation with culturally and geographically affiliated Tribes to identify TCRs and to develop avoidance or mitigation as appropriate.

  Effective March 8, 2016, DWR adopted the Tribal Engagement Policy to strengthen DWR's commitment to improving communication, collaboration, and consultation with California Native American Tribes (DWR 2016h). Consistent with Executive Order B-10-11, the California Natural Resources Agency Tribal Consultation Policy, and AB 52, the Tribal Engagement Policy includes the principles described below to achieve early and meaningful tribal engagement with California Native American Tribe.

- Establish meaningful dialogue between DWR and California Tribes early in planning for CEQA projects to ensure that DWR's Tribal outreach efforts are consistent with mandated Tribal consultation policies, and to ensure that California Tribes know how information from consultation affected DWR's decision-making process.
- Establish guidelines to share information between DWR and California Tribes, while protecting their confidential information to the fullest extent of the law.
- Consult with California Tribes to identify and protect TCRs where feasible, and to develop treatment and mitigation plans to mitigate for impacts on TCRs and cultural places.
- Develop criteria in communication plans and grant funding decisions for all applicable DWR programs that will facilitate Tribal participation.
- Provide cultural competency training for DWR executives, managers, supervisors, and staff on Tribal engagement and consultation practices to recognize that California Tribes have distinct cultural, spiritual, environmental, economic, public health interests, and traditional ecological knowledge about California's natural resources.
- Enable California Tribes to manage and act as caretakers of TCRs.

Under DWR's Tribal Engagement Policy, DWR recognizes that potential impacts that do not rise to the level of a significant impact under CEQA nonetheless may be important to Native American Tribes. DWR recognizes that various resources, including burials and associated materials and even resources lacking integrity, often represent important elements of Tribal heritage, and implementation of DWR's Tribal Engagement Policy includes efforts to identify and mitigation such impacts, even if not rising to the level of significant under CEQA.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to cultural resources are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County 2030 General Plan (County of Yolo 2009) – Several policies from the Yolo County General Plan regarding cultural resources are relevant to project design, construction, and/or the impact analysis of the project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

4.8.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

The effort to date to identify Historic Properties and potential Historic Properties in the APE (see Figure 4.8-1) included conducting records searches, archival research, an archaeological pedestrian survey, a built environment survey, consultation with historical societies and organizations, consultation with Native Americans, and a geoarchaeological desktop sensitivity study and investigation.

Records Search

In February 2016, DWR requested a records search from the Northwest Information Center for the project site and a 0.25-mile radius. The records search included the following sources:

- NRHP-listed properties (National Park Service [NPS] 1996) and updates
- California Inventory of Historic Resources (State of California 1976 and updates)
- California Points of Historical Interest (State of California 1992 and updates)
- Caltrans Bridge Inventory (California Department of Transportation 1989, 2000, and 2004)
- Historic Maps
- California Historical Landmarks (State of California 1996 and updates)
- Directory of Properties in the Historic Resources Inventory (State of California 2006)
- *Gold Districts of California* (Clark 1970)
- *California Gold Camps* (Gudde 1975)
- *California Place Names* (Gudde 1969)
- *Historic Spots in California* (Hoover et al. 1966, 1990)

Archival Research

GEI also conducted archival research at the California State Library, Sacramento, and the GEI cultural resources library to identify important historic people, events, and trends that may have been associated with the general project vicinity.

Field Surveys

Archaeological Survey

Two phases of archaeological pedestrian survey were conducted. The first phase was conducted to support planning for geotechnical studies of the levee setback alternative alignments and consisted of inspection of geotechnical investigation alignments only. The second phase consisted of inspection of the entire APE.

- **Phase 1 Survey.** An archaeological pedestrian survey of the geotechnical study area was conducted on May 7-9, 2016, by GEI archaeologists under the supervision of James Mayer, Ph.D., RPA. The survey was conducted to intensive standards (pedestrian transects spaced no more than 50 feet apart). A Trimble 7 Series GPS unit capable of sub-meter accuracy was carried to record the location of any identified resources. Aerial maps were used in the field to ensure adequate inspection of all portions of the proposed geotechnical study area. GEI surveyed 100 feet waterside (west/south) of each alignment centerline and 500 feet landside (east/north) of each alignment centerline. The survey consisted of visual inspection only, and no archaeological excavation or testing was carried out. GEI's archaeologists meet the Secretary of the Interior's Professional Qualifications Standards for archaeology.

- **Phase 2 Survey.** An archaeological pedestrian survey of all portions of the project APE not surveyed during the Phase 1 survey was conducted on December 21-22, 2016; January 5, 2017; May 4, 2017; and May 31, 2017 by GEI archaeologists under the supervision of James Mayer, Ph.D., RPA. The survey was conducted to intensive standards (pedestrian transects spaced no more than 15 meters apart). A Trimble 7 Series GPS unit capable of sub-meter accuracy was carried to record the location of any identified resources. Aerial maps were used in the field to ensure adequate inspection of all portions of the APE. Surface visibility was generally good, but varied between approximately 25 percent and >90 percent. GEI's archaeologists meet the Secretary of the Interior's Professional

Qualifications Standards for Archaeology. A representative of Yocha Dehe Wintun Nation was present during the surveys on December 21-22, 2016 and May 31, 2017. A representative of UAIC was present during the survey on May 31, 2017.

Approximately 99 percent of the project APE has been subjected to archaeological pedestrian survey. Only the existing Old Bryte Landfill property and an area south of the Sacramento Bypass Training Levee (approximately 20 acres of the 2,089-acre project APE) has not been surveyed because of private access issues.

Geoarchaeological Investigation

A geoarchaeological assessment of the project was undertaken to document the soils and geologic context of the APE, and to understand the sensitivity for deeply buried cultural resources in the project APE.

The geoarchaeological survey program began with a desktop geoarchaeological sensitivity study, which consisted of reviewing available soils, geologic, and historic topographic maps and indicated that the entire project APE is composed of recent relatively fine-grained deposits with a high potential for harboring buried and *in situ* cultural resources along most of this length.

A subsurface geoarchaeological field program consisted entirely of mechanical trenching. Trenching was carried out on November 16-18, December 1 and 2, and December 5 and 6, 2016. All trenches were excavated to a depth of 5 feet and were described by the geoarchaeologist. A total of 34 trenches were excavated. Trenches in potential borrow areas were extended to approximately 10 feet deep; however, observations were made from above, with the geoarchaeologist standing outside the trench. A Native American monitor from United Auburn Indian Community (UAIC) was present for all geoarchaeological trenching.

Trenching results were more or less similar across the APE, and typically encountered late Holocene clay-rich basin deposits that are locally buried by fill and or younger alluvium. No artifacts or archaeological features were encountered during the geoarchaeological trenching investigations.

Built Environment Survey

On December 12, 2016, GEI's architectural historians, who meet the Secretary of Interior's Professional Qualifications Standards for architectural history and history, conducted a survey of the built environment resources that are 45 years old or older. Those resources were recorded with digital photography and notes. Inventoried resources included: Levee Unit 122 (also known as the Yolo Bypass East Levee and Sacramento Bypass North Levee), the Yolo Bypass, the Sacramento Bypass and Sacramento Weir, the Lower Elkhorn Cross Levees, and four residences.

Native American Consultation

Native American consultation is being conducted by both USACE and DWR. Consultation by USACE is being conducted in compliance with Section 106 of the NHPA. Consultation by DWR is being conducted in compliance with CEQA requirements, including AB 52, and the California Natural Resources Agency Tribal Consultation Policy (California Natural Resources Agency 2012) and the DWR Tribal Engagement Policy. The California Natural Resources Agency Tribal Consultation Policy states, "The purpose of this policy is to ensure effective government-to-government consultation between the Natural Resources Agency, its Departments . . .and Indian Tribes. . .to provide meaningful input into the development of regulations, rules, policies, programs, projects, plans, property decisions, and activities that may affect tribal communities." (See Appendix F, "Native American Correspondence," for copies of correspondence between USACE, DWR, and Native American Tribes.)

U.S. Army Corps of Engineers, Sacramento District

The following summarizes consultation conducted to date by USACE.

- September 2, 2016: USACE sent a letter to the three Tribes identified by the NAHC for the project area (Cortina Band of Indians, UAIC, and Yocha Dehe Wintun Nation). The letter described the project and requested information on resources of importance to Native Americans.

- September 12, 2016: USACE sent an email to the three Tribes identified by the NAHC for the project area (Cortina Band of Indians, UAIC, and Yocha Dehe Wintun Nation) inviting them to attend a public scoping meeting for the project.

- September 14, 2016: UAIC contacted USACE and DWR by email requesting a joint meeting with DWR and USACE to discuss the project. This meeting was held at UAIC offices on October 19, 2016.

- September 14, 2016: UAIC sent USACE a letter requesting project cultural resources reports, Tribal monitoring, and stating that there are known cultural resources in and around the project APE. The letter also stated that UAIC would like to consult on the project.

- October 12, 2016: USACE responded to UAIC by email acknowledging receipt of the September 14, 2016 letter from UAIC and requesting information on the nature and location of any known cultural resources.

- October 19, 2016: USACE participated in a meeting with DWR at UAIC offices to discuss the project, Tribal monitoring, and confidential resource information.

- November 28, 2017: USACE sent letters to Cortina Band of Indians, UAIC, and Yocha Dehe Wintun Nation (continuing consultation); and to Ione Band of Miwok Indians, Shingle Springs Band of Miwok Indians and Wilton Rancheria (initiate consultation). The letter summarized efforts conducted to date to identify cultural resources, transmitted the cultural resources inventory and evaluation report, and requested information on any known cultural resources.

- December 14, 2017: UAIC responded by email to USACE and requested a project site visit to two locations of interest to UAIC. Numerous email correspondence occurred between USACE and UAIC between December 14, 2017 and February 7, 2018 in an effort to determine a date for a project site visit to the areas of interest identified by UAIC. Because DWR determined that access to the private parcels was not available, UAIC and USACE decided to have a conference call instead on February 13, 2018.

- January 19, 2018: Yocha Dehe sent a letter to USACE (in response to the November 28, 2017 USACE letter). The letter requested addition consultation, a project timeline, detailed project information, and identified a Yocha Dehe contact.

- February 13, 2018: UAIC, USACE and GEI participated in a conference call to discuss the areas of UAIC interest, possible future field visits, the status of Section 106 and CEQA compliance, the adequacy of inventory efforts and UAIC preferences for consideration of those locations. USACE requested information on those locations of interest to UAIC.

- February 14, 2018: USACE responded by email to Yoche Dehe, providing an update of the Section 106 compliance status and identifying a DWR contact who can provide detailed project information.
- February 26, 2018: USACE met with UAIC representatives as part of a general outreach meeting. UAIC reiterated their concerns with certain areas within the project area.

USACE is continuing to consult with interested Tribes in accordance with standard procedures implementing Section 106 of the NHPA (36 CFR Part 800).

California Department of Water Resources

The following summarizes consultation conducted to date by DWR. The first two contacts were with NAHC, which provided DWR with Native American Tribes that DWR contacted as listed below.

- February, 2016: DWR contacted the NAHC and requested a list of culturally affiliated Native American contacts for the Central Valley Flood Protection Plan (CVFPP) study area (of which the Lower Elkhorn Basin Levee Setback project is an early implementation phase of the CVFPP).
- May, 2016: DWR contacted the NAHC and requested a list of culturally affiliated Native American contacts for the project site and surroundings as well as a search of the NAHC's Sacred Lands File.
- May 20, 2016: DWR sent letters to all Native American contacts on the original NAHC list (Buena Vista Rancheria of Me-Wuk Indians, Cortina Band of Indians, Ione Band of Miwok Indians, Nashville Eldorado Miwok, Shingle Springs Band of Miwok Indians, Tsi-Akim Maidu, UAIC, Wilton Rancheria, and Yocha Dehe Wintun Nation) notifying the Tribes of project planning activities and requesting information on resources of importance to Native Americans. The letter notified Tribes than an environmental document may be prepared in compliance with CEQA and that if the Tribe has requested consultation under AB 52, then they will receive additional consultation notice for the project No responses were received.
- May 20, 2016: The NAHC responded that its search of the Sacred Land File for the project site had negative results. The NAHC response also provided Native American contacts for the project, including the Cortina Band of Indians, UAIC, and Yocha Dehe Wintun Nation.
- September 1, 2016 (letter dated August 31, 2016): DWR sent letters to all Native American contacts on the original NAHC list (Buena Vista Rancheria of Me-Wuk Indians, Cortina Band of Indians, Ione Band of Miwok Indians, Nashville Eldorado Miwok, Shingle Springs Band of Miwok Indians, Tsi-Akim Maidu, UAIC, Wilton Rancheria, and Yocha Dehe Wintun Nation) with separate letters for those Tribes that had requested consultation under AB 52 and for those Tribes on the NAHC list that had not requested consultation under AB 52 (to comply with the Natural Resources Agency's Tribal Policy). The letters notified Tribes that a geoarchaeological sensitivity assessment was being prepared and that DWR was planning to conduct a pedestrian archaeological survey.
- September 12, 2016: The NAHC sent a letter to DWR in response to the NOP received by the NAHC. The letter recommended consultation with California Culturally Affiliated Tribes, provided a summary of AB 52 requirements, and provided NAHC recommendations for cultural resources assessments.

- September 14, 2016: UAIC contacted DWR and USACE by email requesting a joint meeting with DWR and USACE to discuss the project. This meeting was held at UAIC offices on October 19, 2016.

- September 23, 2016: DWR sent all Native American contacts (Buena Vista Rancheria of Me-Wuk Indians, Cortina Band of Indians, Ione Band of Miwok Indians, Nashville Eldorado Miwok, Shingle Springs Band of Miwok Indians, Tsi-Akim Maidu, UAIC, Wilton Rancheria, and Yocha Dehe Wintun Nation) the desktop geoarchaeological sensitivity study and work plan for review.

- October 14, 2016: Ione Band of Miwok Indians contacted DWR by email and requested additional project information.

- October 20, 2016: Wilton Rancheria contacted DWR by email and requested additional project information.

- October 26, 2016: DWR contacted by email all Tribes which had not responded to the letters that had been sent. These Tribes included the Buena Vista Rancheria of Me-Wuk Indians, Cortina Band of Indians, Nashville Eldorado Miwok, Shingle Springs Band of Miwok Indians, Tsi-Akim Maidu, and Yocha Dehe Wintun Nation. The email included an invitation to consult and a statement that ground-disturbing activities would be soon initiated.

- November 3, 2016: Ione Band of Miwok Indians contacted DWR by email and requested to consult on the project.

- November 4, 2016: Shingle Springs Band of Miwok Indians contacted DWR by email and requested to be further consulted about the project and to have Tribal representatives on-site during ground-disturbing activities.

- November 7, 2016: Yocha Dehe Wintun Nation contacted DWR by email and requested consultation.

- November 10, 2016: UAIC sent a letter to DWR responding to a request for information by DWR during the October 19, 2016 meeting held at the UAIC office. The letter and attachments provided information about UAIC's Tribal Historic Resources Information System, UAIC compliance program, and a request to observe and participate in all cultural resource surveys.

- November 20, 2016: Wilton Rancheria contacted DWR by email and requested consultation.

- December 2016: DWR met with Yocha Dehe Wintun Nation on December 1, 2016; Ione Band of Miwok Indians on December 2, 2016; Wilton Rancheria on December 5, 2016; and Shingle Springs Band of Miwok Indians on December 12, 2016. Two of the Tribes identified ethnographic data indicating known resources within or close to the project APE.

- May 2017: DWR and GEI staff conducted telephone calls in which Mr. Randy Yonemura of the Ione Band of Miwok Indians requested a project field review. On May 12, 2017, DWR conducted a field review (observation of the project site by driving on existing roads) of the project site with Mr. Yonemura. Mr. Yonemura identified several general locations as areas that may be sensitive for the presence of TCRs. Mr. Yonemura also requested a follow-up project site field review and access to those areas that he identified as potentially sensitive.

DWR is continuing to consult with interested Tribes in accordance with AB 52 and Tribal Engagement Policies referenced above.

Additional Consultation

USACE initiated consultation with the California State Historic Preservation Officer (SHPO) in a letter received by SHPO on September 7, 2016. The USACE letter provided a project description and a description and map of the project APE, and requested concurrence with the delineation of the project APE. In a letter dated October 11, 2016, SHPO concurred with the delineation of the project APE.

USACE continued consultation with SHPO in a letter received by SHPO on November 30, 2017. USACE requested comments on an updated APE, inventory results and eligibility determinations. In a letter dated December 21, 2017, SHPO responded to USACE and concurred with the eligibility determinations, offered no comments on the APE or inventory efforts and requested to be informed about continuing Native American consultation and findings of effect.

On December 8, 2016, GEI sent letters to the Yolo County Historical Society and the Yolo County Archives asking for information about known cultural resources in the project APE. As of the date of this document, no responses have been received.

Identified Cultural Resources

Based on the results of the records search, archival research, archaeological and built environment surveys, Native American consultation, and geoarchaeological exploration, the resources described below have been reported within the project APE. NRHP eligibility recommendations presented in this document do not constitute NRHP eligibility determinations by USACE, and NHPA Section 106 consultation with SHPO concerning the NRHP eligibility of resources has not yet been initiated. Because USACE has not concluded determinations of NRHP eligibility that are recommended in this document and because NHPA Section 106 consultation with SHPO concerning NRHP eligibility of resources has not yet been conducted, the recommendations presented below do not reflect consensus findings under Section 106 of the NHPA. Under Section 106, determination of the adequacy of identification efforts and confirmation of NRHP eligibility determinations will be made through consultation between USACE, SHPO and other parties as appropriate.

Archaeological Resources

Based on the archaeological field survey (99 percent of the project APE has been subjected to archaeological pedestrian survey), records search, and geoarchaeological investigations, the archaeological resources described below have been identified in the project APE:

A concentration of oxidized and hardened clay fragments was observed on the ground surface in the northern part of the project APE. Subsequent geoarchaeological trenching at this location revealed that the clay fragments occur vertically from the surface to about 3 feet deep, and are considered to result from burning of tree roots. This material is not considered to be a cultural resource.

The Old Bryte Landfill (aka West Sacramento Landfill) is located immediately north of the Sacramento Bypass Levee. The landfill is on APN 042-280-111. It was used as landfill for the City of West Sacramento and the neighboring then-unincorporated communities of Bryte and Broderick (now part of present-day West Sacramento). It operated as a landfill from 1940 until 1974 (California Integrated Waste Management Board n.d.:11). During this period, Norma Hemm owned the parcel and leased it to

Albericci Garbage Service (AGS), a privately-owned garbage company in Bryte. Yolo County leased the land from Hemm between 1951 and 1969 and subleased it to AGS (California Department of Resources Recycling and Recovery 2017; California Integrated Waste Management n.d.:11). AGS used the landfill as a burn site and by the 1970s, the burning occurring at the landfill contributed to the poor air quality in the region. The landfill closed during this period (*The Sacramento Bee* 1971:B3). The old landfill does not meet the criteria of the NRHP or the CRHR because it is not known to be historically significant and does not represent an important example in engineering or design. In a letter dated December 21, 2017, SHPO concurred with this determination of non-eligibility. Therefore, it is not a historical resource for the purposes of CEQA or a Historic Property under Section 106 of the NHPA for the purposes of the impact assessment presented in this document.

The Old Bryte Landfill remediation, as described in Chapter 5, "Cumulative Impacts," is a separate project being undertaken by the Sacramento Area Flood Control Agency (SAFCA).

Emergency storm damage repair work unrelated to the LEBLS project within an existing levee in the LEBLS project area resulted in the discovery of a single Native American stone artifact. This artifact was found within the levee material and was apparently deposited there as part of fill material from an unknown place of origin. The artifact is an isolated find because no other archaeological materials such as other artifacts, midden soil or other remains were found in its vicinity despite detailed inspections and screening of soil samples by archaeologists and Native American monitors. Because this artifact was not found in association with other archaeological materials or remains and was an isolated find, it is not considered to be potentially eligible for the CRHR and is therefore not a Historical Resource under CEQA even though the artifact may be important to Native Americans. Because isolated artifacts are often found on the landscape not in proximity to Native American village sites or other archaeological sites, because the source material for the levee is unknown and because there is no evidence of a nearby archaeological site, this isolated find does not necessarily indicate that an archaeological site is nearby.

Native American–Identified Resources

Two of the Native American Tribes that DWR has consulted with have identified potential resources in or near the project APE based on their ethnographic sources. To date, these resources have not been confirmed through direct observation by project archaeologists despite intensive pedestrian survey and geoarchaeological trenching and are therefore being considered to be areas that are potentially sensitive for the presence of TCRs/TCPs for the purposes of this EIS/EIR. Due to the lack of cultural material or other data other than reported map locations, NRHP/CRHR evaluation of these locations has not been conducted.

Built Environment Resources

Seven historic-era built environment resources are in the project APE: Levee Unit 122, the Sacramento Bypass and Sacramento Weir, the Lower Elkhorn Cross Levees, and four residences. The resources were inventoried and evaluated for NRHP eligibility and were considered for potential historic significance under CEQA. The findings are summarized below.

- **Levee Unit 122 –** This levee unit is located north of the Sacramento Bypass within the Yolo Bypass. The levee unit is also known as the Yolo Bypass East Levee and Sacramento Bypass North Levee. It is one of several water control features that were constructed in the Sacramento Valley as part of flood management efforts in the early to mid-20th century. The development of the water control system allowed for the growth and development of the Sacramento region. The levee unit meets NRHP Criterion A for its association with flood management in the Sacramento Valley. In a letter dated December 21, 2017, SHPO concurred with this eligibility determination. Although this resource was not evaluated for CRHR eligibility, DWR is treating this resource as potentially historically significant for the purposes of the CEQA impact analysis in this document.

- **Sacramento Bypass and Sacramento Weir –** The Sacramento Bypass and Weir were constructed between 1916 and 1918 by the City of Sacramento. The Bypass is a diversion channel that is about 1,800 feet wide and travels roughly 2 miles west from the Sacramento Weir and is flanked on either side by earthen levees. The Sacramento Bypass South Levee and Sacramento Bypass Training Levee are considered part of the Sacramento Bypass. The Sacramento Bypass carries excess flood waters of the Sacramento River to the Yolo Bypass. In 1986, Les-Thomas Associates inventoried and evaluated the Sacramento Bypass and the Sacramento Weir. The Sacramento Bypass and Sacramento Weir were treated as one resource and it was recommended as eligible for the NRHP under Criterion A for the structures' association with flood control projects and the impact the structures had on the agricultural and economic development of Yolo County (Les-Thomas Associates 1986:2). The 1986 documentation incorrectly referred to the resource as the Sacramento Weir and Yolo Bypass. In 2007, Jones & Stokes (now ICF International, Inc. [ICF]) revisited the resource and updated the name of the resource to correctly identify it as the Sacramento Bypass and Sacramento Weir. That 2007 update did not identify any changes to the resource and concurred with the original 1986 evaluation (Jones & Stokes 2007:1). In 2009, ICF revisited the resource again and concurred with previous findings that the Sacramento Bypass and Sacramento Weir continued to convey its significance under NRHP Criterion A and CRHR Criterion 1 (ICF 2009:1). In 2011, as part of a USACE consultation, the SHPO concurred that the structures were eligible for the NRHP under Criterion A. However, the OHP did not update the Directory of Properties and it is still identified as the Sacramento Weir and Yolo Bypass (OHP 2012:15). The concurrence letter from 2011 was not included in the records search as part of this project. The SHPO's determination of eligibility automatically placed the resource on the CRHR making it a historical resource for the purposes of CEQA.

  As part of this project, GEI's architectural historians revisited the Sacramento Bypass and Sacramento Weir and did not identify any changes and concurs with the previous determinations that the Sacramento Bypass and Sacramento Weir are eligible for the NRHP.

- **Lower Elkhorn Cross Levees –**These are two earthen levees located in the Lower Elkhorn Basin. The first levee is in the northern section of the Basin and follows an east/west direction. The second levee was historically known as the Lovdal Levee. It is situated southeast of the first levee. The two cross levees were constructed in the early part of the 20th century to protect local agricultural fields as part of reclamation efforts. They are low, narrow earthen levees that appear to have been breached over time. Neither meets the criteria for the NRHP because of a lack of historical significance and integrity. In a letter dated December 21, 2017, SHPO concurred with this determination of non-eligibility. The resources also do not appear to be potentially historically significant under CEQA significance criteria.

- **Residences –** Four residences (18908 County Road 122; and 20150, 21719, and 21788 County Road 124) dating from early to mid-20th century are in the project site on Yolo County Roads 122 and 124. The residences vary in architectural style and include Ranch and Minimal Traditional styles. None of the residences are known to be historically significant and do not have distinctive features; therefore, they do not meet the criteria for the NRHP. In a letter dated December 21, 2017, SHPO concurred with this determination of non-eligibility. The resources also do not appear to be potentially historically significant under CEQA.

For those resources determined to be eligible for listing in the NRHP and found to be potentially historically significant under CEQA significance criteria (California Code of Regulations Section 15064.5), an analysis of the effects was conducted based on evaluating changes to the existing Historic Properties resulting from project implementation.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. The NAHC submitted a letter providing general information on compliance with AB 52 and Senate Bill (SB) 18 and recommendations for conducting cultural resource assessments. Comments from EPA requested that applicable Federal laws and regulations (EO 13007 and Section 106 of the NHPA) be addressed, the process and outcome of consultation between USACE and the Tribal governments be described, existence of Indian sacred sites and associated avoidance measures be described, and a summary of all coordination with Native American Tribes and the SHPO be provided. All applicable Federal and State laws and regulations are described above in Section 4.8.2, "Regulatory Setting," with additional information for State and local laws and regulations in Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans." SB 18 and EO 13007 are not applicable to the project because the project is not associated with any general or specific plan adoption or amendment, would not result in designation of land as open space, and would not affect any Federal lands. Consultation with Native American Tribes and the SHPO that has been conducted to date by USACE (in compliance with Section 106 of the NHPA) and by DWR (in compliance with CEQA, AB 52, and DWR's Tribal Engagement Policy) is also described; these consultations are on-going. The existence of resources identified by Native Americans is discussed above, and potential impacts and mitigation measures to avoid or minimize such impacts are discussed in the analysis below.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to cultural resources if they would do any of the following:

- cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5;
- cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5;
- disturb any human remains, including those interred outside of formal cemeteries; or
- result in a substantially adverse change in the significance of a TCR (as defined in California PRC Section 21074 and above) when compared against existing conditions. The significance of each effect was evaluated in terms of its potential effect on resources that are eligible or potentially eligible for listing on the NRHP. For the purposes of this analysis, effects on Historic Properties are considered significant if the alternatives under consideration would diminish the integrity of the

resource's location, design, setting, materials, workmanship, feeling, or association. Types of effects include physical destruction, damage, isolation, or alteration of the character of the setting; as well as introduction of elements that are out of character; neglect; and transfer, lease, or sale of the property out of Federal ownership or control.

Under Federal law, the *Criteria of Adverse Effect* are set forth by the Advisory Council on Historic Preservation in its implementing regulations, 36 CFR Part 800 (revised January 11, 2001). As codified in 36 CFR Part 800.4(d)(2), if there are historic properties that may be affected by a Federal undertaking, the agency official shall assess adverse effects, if any, in accordance with the *Criteria of Adverse Effect*. 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 alterations:

- 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 in 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.

Issues Not Discussed Further in this EIS/EIR

Cultural Resources Determined to be Ineligible for Listing in the NRHP and not Potentially Historically Significant Under CEQA —Assessments of effects for the purposes of this EIS/EIR are made only for those resources determined to be eligible for listing in the NRHP or that are listed in the NRHP, and that are eligible for or which have been determined by DWR to be potentially historically significant under CEQA significance criteria. Those resources which have been determined to be ineligible for the NRHP are not considered to be a Historic Property for the purposes of the impact assessment and an impact assessment on those resources is not presented below. Resources that have been recommended as ineligible for listing in the NRHP and do not have the potential to be historically significant under CEQA are not considered further in this EIS/EIR.

Impact Analysis

Table 4.8-1 provides a summary of cultural resource impacts and mitigation measures for all alternatives under consideration. USACE has concluded determinations of NRHP eligibility based on consultation with SHPO and concurrence by SHPO with the eligibility findings presented in this document, however consultation with SHPO concerning effects under Section 106 of the NHPA has not yet been conducted and therefore the impact analysis presented in Table 4.8-1 does not reflect consensus findings under Section 106 of the NHPA. Under Section 106, confirmation of findings of effect and appropriate mitigation will be made through consultation between USACE, SHPO and other parties as appropriate.

Table 4.8-1. Summary of Impacts and Mitigation Measures—Cultural Resources

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
CR-1: Damage to or Destruction of Built Environment Historic Properties	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	CR-1: Execute a Memorandum of Agreement with SHPO that specifies actions to mitigate impacts on Levee Unit 122.	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
CR-2: Damage to or Destruction of Known Prehistoric-period Archaeological Sites	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	NI	None	NI
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
CR-3: Potential Damage to or Destruction of Traditional Cultural Properties/Tribal Cultural Resources	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	CR-3a: Conduct Cultural Resource Awareness Sensitivity Training CR-3b: Conduct Monitoring at Locations Identified by Native American as Sensitive CR-3c: Implement Procedures to Evaluate Tribal Cultural Resources/Traditional Cultural Properties and Implement Avoidance and Minimization Measures to Avoid Significant Adverse Effects	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
CR-4: Damage to or Destruction of Known Historic-period Archaeological Sites	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	NI	None	NI
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
CR-5: Potential Damage to or Destruction of Previously	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	CR-5: Implement Procedures for Inadvertent Discovery of Cultural Material and Implement an Inadvertent Discovery Plan	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			

Table 4.8-1. Summary of Impacts and Mitigation Measures—Cultural Resources

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
Undiscovered Archaeological Sites	Alternative 5: 5-Mile Setback Full Degrade			
CR-6: Potential Damage to or Destruction of Human Remains during Construction	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	CR-6: Implement Procedures for Inadvertent Discovery of Human Remains	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact CR-1: Damage to or Destruction of Built Environment Historic Properties.

<u>Alternative 1 – No Action Alternative</u>

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no impact related to potential damage to or destruction of built environment resources.

<u>Alternatives 2 through 5: All Action Alternatives</u>

A total of seven historic-era built environment resources were identified in the project APE (Levee Unit 122, the Sacramento Bypass and Sacramento Weir, the Lower Elkhorn Cross Levees, and four residences). Levee Unit 122 (also known as Yolo Bypass East Levee and Sacramento Bypass North Levee), and the Sacramento Bypass and Sacramento Weir have been formally determined to be eligible for the NRHP and are recommended to be potentially historically significant under CEQA significance criteria. The Sacramento Bypass and Sacramento Weir were also formally determined eligible for the NRHP. The Sacramento Bypass and Sacramento Weir are significant for their association with flood management in California and are therefore historic properties. As described above, the Lower Elkhorn Cross Levees and the four residences, however, were determined to be ineligible for the NRHP and are therefore not historic properties.

Project-related activities associated with Alternative 2 would include levee degradation and construction of a new setback levee, grading, and use of staging areas. In addition, the Sacramento Bypass Training Levee would require engineering armoring (riprap or similar materials) for erosion control. Three of the residences would also require removal under Alternative 2. The project-related activities associated with Alternative 2 (levee degradation of most of Levee Unit 122 and construction of a new setback levee) would result in the damage and destruction of Levee Unit 122 as well as cause modifications within the Sacramento Bypass. The damage to Levee Unit 122 would affect the resource's ability to convey its historical significance.

Alternative 3 would entail the same types of construction activities as Alternative 2, but along a slightly different alignment in the southern portion of the project site. Also, Levee Unit 122 would be fully degraded. The four residences would require removal under this alternative.

Alternative 4 would entail the same construction activities as Alternative 2, but the Yolo Bypass East Levee setback would be shorter and farther to the east in the southern portion (like under Alternative 3). Under Alternative 4, most of Levee Unit 122 would be degraded. Two of the residences would require removal under this alternative. Alternative 5 would entail construction of the same types of facilities as

Alternative 2, but the Yolo Bypass East Levee setback would be shorter and Levee Unit 122 would be fully degraded. One of the residences would require removal under this alternative.

Levee Unit 122 would be partially or fully degraded under the four action alternatives and the modifications would affect resource's ability to convey its historical significance. Therefore, under all action alternatives, these project components would have a **significant** impact.

Mitigation Measure CR-1 described below, has been identified to address this significant impact.

Mitigation Measure CR-1: Prepare and Implement a Memorandum of Agreement and Historic Properties Treatment Plan to Eliminate Adverse Effects to the Levee Unit 122 Historic Property.

To mitigate adverse effects to Levee Unit 122 (also known as Yolo Bypass East Levee and Sacramento Bypass North Levee), which would be adversely affected under all action alternatives, USACE shall consult with the California SHPO and the ACHP under Section 106 of the NHPA to develop and execute a Memorandum of Agreement (MOA) pursuant to 36 CFR Part 800.6 (c) with an appended Historic Properties Treatment Plan (HPTP). The MOA shall stipulate agreed upon definitions, qualifications, and timing of implementation of agreed-upon mitigating measures. An HPTP shall be appended to the MOA and shall describe the measures that will be implemented to resolve the adverse effects to the Levee Unit 122 Historic Property. The performance standard is no adverse effects to the Levee Unit 122 Historic Property. Implementation of the provisions of the Section 106 MOA and the appended HPTP shall constitute mitigation under CEQA and NEPA for the adverse effects to this resource.

Timing: Prior to construction or ground-disturbing activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure CR-1 would not reduce the significant impact associated with damage to or destruction of Levee Unit 122 to a less-than-significant level because great portions of the resources will be damaged. There are no further available feasible mitigation measures to reduce this significant impact. Therefore, Impact CR-1 would be **significant and unavoidable**.

The erosion control measures for the Sacramento Bypass Training Levee (which is part of the Sacramento Bypass) would not affect the function or overall design of the Sacramento Bypass Training Levee or the Sacramento Bypass itself. The removal of most of an existing levee and construction of a new levee would alter the original plan and design of the Sacramento Bypass under all action alternatives. The alterations proposed by the project constitute a small percentage of the bypasses in the region. The Sacramento Bypass would continue to function as designed and retain its overall integrity and ability to convey its historical significance related to Sacramento Valley water management. Therefore, these project components under all action alternatives would have a **less-than-significant** impact on the Sacramento Bypass. **Mitigation Measure:** No compensatory mitigation measures were identified to further reduce this impact.

Impact CR-2: Damage to or Destruction of Known Prehistoric-period Archaeological Sites.

Alternative 1 – No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to damage to or destruction of known prehistoric-period archaeological sites.

Alternatives 2 through 5: All Action Alternatives

Project-related activities associated with Alternative 2 would require substantial ground-disturbance, including excavation, soil removal, trenching, grading, construction of earthen berms, levee degradation, construction of a new setback levee, and use of staging areas. These earth-moving activities could result in damage to or destruction of known prehistoric-period archaeological sites, if present in the construction area. However, based on the archaeological studies that have been conducted, there are no known prehistoric-period archaeological sites on the project site.

Alternatives 3, 4, and 5 would entail the same types of construction activities as Alternative 2, but the Yolo Bypass East Levee setback would be slightly farther east in the southern portion of the project site under Alternatives 3 and 4, and this setback levee would be shorter under Alternatives 4 and 5. The obsolete portion of the Yolo Bypass East Levee would be fully degraded under Alternatives 3 and 5 and partially degraded under Alternative 4. No known prehistoric-period archaeological sites are present within the project site under any of these alternatives.

Because no known prehistoric-period archaeological sites are present within the project site for any of the action alternatives, there would be no damage to or destruction of known prehistoric-period cultural resource locations during project construction under any action alternative. Therefore, there would be **no impact** on known prehistoric archaeological resources.

Mitigation Measure: No compensatory mitigation is required.

Impact CR-3: Potential Damage to or Destruction of Traditional Cultural Properties/Tribal Cultural Resources.

Alternative 1 – No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, “No Action/No Project Alternative,” under “Consequences of No Action.”

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to damage to or destruction of TCPs or TCRs.

Alternatives 2 through 5: All Action Alternatives

TCRs include sites, features, places, cultural landscapes, TCPs (of Native American origin), sacred places, and objects with cultural value to a California Native American Tribe. An historical resource as defined in California PRC 21084.1, a unique archaeological resource as defined in California PRC 21083.2, and a non-unique archaeological resource as defined in California PRC 21083.2 (h) may also all be TCRs. As a result of consultation with interested Native American Tribes (described under “Native American Consultation,” on pages 4.8-16 through 4.8-19), confidential locations (approximate locations) of areas considered to be potentially sensitive for the presence of TCRs within the project APE were identified on maps provided by consulting Tribes. The specific location, constituents, and condition of these resources were not specified by the Tribes. In an effort to confirm the presence of these potential resources, intensive pedestrian surveys under optimum survey conditions using industry standard archaeological survey protocols and methods, and extensive geoarchaeological testing with Native American monitors, was conducted (described under “Analysis Methodology,” on pages 4.8-15 through 4.8-16). Despite these efforts, no physical evidence of any Native American cultural resources was identified at or near the locations identified by consulting Tribes or in any other locations in the project APE. The information provided by consulting Native American Tribes has been considered in this impact analysis; however, there is insufficient evidence of the presence of Native American cultural resources in the APE to conclude that TCRs or TCPs would be directly or indirectly affected by project construction activities under any of the action alternatives. Because USACE has not concluded determinations of the adequacy of inventory efforts, or NRHP eligibility recommendations presented in this document, and because NHPA Section 106 consultation with SHPO concerning inventory efforts and NRHP eligibility of resources has not yet been conducted, the impact analysis presented below concerning TCPs does not reflect consensus findings under Section 106 of the NHPA. Under Section 106, confirmation of NRHP eligibility determinations, findings of effect and appropriate mitigation will be made through consultation between USACE, SHPO and other parties as appropriate. However, based on available information, this impact would be **less-than-significant** under all action alternatives. Although there is no substantial evidence of the presence of Native American cultural resources in the APE, it is nevertheless possible that such resources could be discovered during construction. In the event that TCRs or TCPs are discovered during construction, Mitigation Measure CR-3a, CR-3b and CR-3c, described below, shall be implemented.

Mitigation Measure CR-3a: Conduct Cultural Resource Awareness and Sensitivity Training.

DWR will hold a pre-construction training session for all construction personnel before the beginning of construction for each ground-disturbing project activity. All training sessions will be conducted in the field, in person, and in English. Participants will sign a form acknowledging that they have received the training and agree to keep resource locations confidential and to stop work within 100 feet of any unanticipated discovery. Topics to be addressed in training sessions will include but are not limited to: the purpose for monitoring (if being conducted); regulations protecting cultural resources, including TCRs; basic identification of archaeological resources and potential TCRs; and proper discovery protocols. Only personnel who have received cultural resource awareness and sensitivity training will be allowed to enter areas potentially containing TCPs, TCRs or prehistoric archaeological resources. Training, to be provided by DWR and a qualified archaeologist who meets the Secretary of the Interior's Standards for Archaeology (36 CFR Part 61), will include a presentation developed in coordination with culturally affiliated Tribal representatives. Topics will include the potential presence and type of Native American and non-Native American resources potentially found during construction or other activities, required procedures in the event of a discovery, proper behavior in the presence of sacred remains and human remains, and necessary reporting protocols. Written materials will be provided to trained personnel, as appropriate.

Timing:	Upon demonstrated need, prior to and during construction or ground-disturbing activities within the confidential locations identified by Native American Tribes.
Responsibility:	California Department of Water Resources.

Mitigation Measure CR-3b: Conduct Monitoring at Locations Identified by Native American as Sensitive.

For locations identified by interested Native Americans as sensitive areas, intermittent Native American and archaeological spot-check monitoring will be conducted to ensure that physical cultural resources are not present and are not being damaged during construction. Native American monitoring may be conducted at these locations under agreements between DWR and culturally affiliated Native American Tribes. If cultural materials are encountered during construction, Mitigation Measure CR-5 will be implemented.

Timing:	During construction or ground-disturbing activities.
Responsibility:	California Department of Water Resources.

Mitigation Measure CR-3c: In the Event that Tribal Cultural Resources or Traditional Cultural Properties are Discovered during Construction, Implement Procedures to Evaluate Tribal Cultural Resources/Traditional Cultural Properties and Implement Avoidance and Minimization Measures to Avoid Significant Adverse Effects.

California Native American Tribes that are traditionally and culturally affiliated with the geographic area in which the project is located may have expertise concerning their TCRs (California PRC Section 21080.3.1). A**s** was done during EIS/EIR preparation, culturally affiliated Tribes will be further consulted concerning TCRs and TCPs that may be impacted if these types of resources are discovered during construction. Further consultation with culturally affiliated Tribes will focus on identification of measures to avoid or minimize impacts on any such resources discovered during construction. Should TCRs or TCPs be identified in the project APE during construction, the following performance standards shall me met prior to continuance of construction and associated activities that may result in damage to or destruction of TCRs or TCPs:

- Each identified TCR/TCP will be evaluated for CRHR and NRHP eligibility through application of established eligibility criteria (California Code of Regulations 15064.636 and CFR Part 63 respectively), in consultation with interested Native American Tribes.

- If a TCR is determined to be eligible for listing on the NRHP, DWR will avoid damaging effects to the TCR/TCP in accordance with California PRC Section 21084.3, if feasible. If DWR determines that the project may cause a substantial adverse change to a TCR/TCP, and measures are not otherwise identified in the consultation process, the following are examples of mitigation capable of avoiding or substantially lessening potential significant impacts to a TCR/TCP or alternatives that would avoid significant impacts to a TCR/TCP. These measures may be considered to avoid or minimize significant adverse impacts and constitute the standard by which an impact conclusion of **less-than significant** may be reached:

    i. Avoid and preserve resources in place, including, but not limited to, planning construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

    ii. Treat the resource with culturally appropriate dignity taking into account the Tribal cultural values and meaning of the resource, including, but not limited to, the following:

    iii. Protect the cultural character and integrity of the resource.

    iv. Protect the traditional use of the resource.

    v. Protect the confidentiality of the resource.

    vi. Establish permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or using the resources or places.

    vii. Protect the resource.

If a TCP is determined to be eligible for listing in the NRHP, then the procedures for determination of effect and, if adverse, treatment of the resource to resolve adverse effect will be conducted in accordance with the procedures required for compliance with Section 106 of the NHPA (36 CFR Parts 800 .5 – 800.6).

Timing: Prior to and during construction or ground-disturbing activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measures CR-3a, CR-3b, and CR-3c would reduce the potentially significant impact under all action alternatives associated with inadvertent damage to or destruction of a TCR/TCP which may be discovered prior to or during construction to a **less-than-significant** level because it requires additional Native American consultation; CRHR and NRHP evaluation of areas identified by interested Native Americans as sensitive; additional consultation to determine the best method to avoid or treat the resources if they are determined to be eligible for listing in the CRHR/NRHP; monitoring at the identified sensitive areas where TCPs or TCRs are likely to be present; and implementation of discovery, protection, and treatment protocols (Mitigation Measure CR-5, described below under Impact CR-5) if cultural resources are discovered during project-related construction activities, and cultural resource awareness and sensitive training of construction personnel.

Impact CR-4: Potential Damage to or Destruction of Known Historic-period Archaeological Sites.

Alternative 1 – No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to damage to or destruction of known historic-period archaeological sites.

Alternatives 2 through 5: All Action Alternatives

Project-related activities associated with the action alternatives would require substantial ground-disturbance, including excavation, soil removal, trenching, construction of earthen berms, levee degradation, construction of a new setback levee, grading, and use of staging and borrow areas. In addition, areas currently landside of the existing levees would become part of the expanded Yolo and Sacramento Bypasses and exposed to seasonal inundation. These actions could result in damage to or destruction of known historic-period archaeological sites. Based on the information available, one known historic-period archaeological site, the Old Bryte Landfill, is in the project site for all action alternatives. This site has been evaluated for NRHP and CRHR eligibility and has been determined to be ineligible. Cultural resources determined to be ineligible for the NRHP are not considered to be a Historic Property for the purposes of the impact assessment and therefore an impact assessment on the Old Bryte Landfill is not presented below. NRHP eligibility recommendations presented in this document do not constitute Because this resource was determined to be ineligible, it is not considered a Historic Property for the purposes of this impact assessment or a Historical Resource under CEQA and, therefore, all action alternatives would result in **no impact** on known historic-period archaeological resources.

Impact CR-5: Potential Damage to or Destruction of Previously Undiscovered Archaeological Sites

Alternative 1 – No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to damage to or destruction of previously undiscovered archaeological sites.

Alternatives 2 through 5: All Action Alternatives

Project-related activities associated with the action alternatives would require substantial ground-disturbance, including excavation, soil removal, trenching, construction of earthen berms, levee degradation, construction of a new setback levee, grading, and use of staging and borrow areas. These earth-moving activities could result in damage to or destruction of previously unidentified prehistoric and historic-period archaeological sites, which could be present within the project site for any of the action alternatives. There is no evidence of the presence of buried archaeological sites in the APE and, therefore, this impact would be **less than significant** under all action alternatives. It is nevertheless possible that archaeological resources could be discovered during construction. In the event that archaeological resources are discovered during construction, Mitigation Measure CR-5, described below, shall be implemented.

> **Mitigation Measure CR-5: Implement Procedures for Inadvertent Discovery of Cultural Material and Implement an Inadvertent Discovery Plan.**
>
> If an inadvertent discovery of archaeological cultural materials (e.g., unusual amounts of shell, animal bone, any human remains, bottle glass, ceramics, building remains) is made at any other time during project-related construction activities or project planning, DWR, in consultation with USACE and other interested parties, will develop and implement appropriate protection and, avoidance measures where feasible.
>
> These procedures will be developed in accordance with 36 CFR 800.13 which specifies procedures for post-review discoveries. Additional measures, such as development of a Memorandum of Agreement and a Historic Property Treatment Plan, may be necessary if avoidance or protection is not possible. All the steps identified above will be detailed in an accidental-discovery plan developed before construction so that all parties are aware of the process that must be implemented should buried archaeological resources be uncovered during construction.

Timing: During construction or ground-disturbing activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementing Mitigation Measure CR-5 would reduce the potential for a significant effect under all action alternatives resulting from inadvertent damage to or destruction of presently undocumented cultural resources to a **less-than-significant** level because it requires that if cultural resources are discovered during project-related construction activities, disturbances in the area of the find must be halted and appropriate treatment and protection measures must be implemented.

Impact CR-6: Potential Damage to or Destruction of Human Remains during Construction.

Alternative 1 – No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to damage to or destruction of human remains.

Alternatives 2 through 5: All Action Alternatives

Project-related activities associated with all action alternatives would require substantial ground-disturbance, including excavation, soil removal, trenching, construction of earthen berms, levee degradation, construction of a new setback levee, grading, and use of staging and borrow areas. These earth-moving activities could result in damage to or destruction of previously unidentified human remains, which could be present within the project site for any of the action alternatives. There is no evidence of the presence of human remains in the APE and, therefore, this impact would be **less than significant** under all action alternatives. It is nevertheless possible that human remains could be discovered during construction. In the event that human remains are discovered during construction, Mitigation Measure CR-6, described below, shall be implemented.

Mitigation Measure CR-6: Implement Procedures for Inadvertent Discovery of Human Remains.

If an inadvertent discovery of human remains is made at any other time during project-related construction activities or project planning, DWR will implement the procedures listed below. Should human remains be identified in the project APE, the following performance standards shall me met prior to implementing or continuing actions such as construction, that may result in damage to or destruction of human remains. Avoiding or substantially lessening potential significant impacts to human remains or implementation of the procedures described below may be considered to avoid or minimize significant adverse impacts and constitute the standard by which an impact conclusion of **less than significant** may be reached:

- In accordance with the California Health and Safety Code, if human remains are uncovered during ground-disturbing activities, DWR will immediately halt potentially damaging excavation in the area of the burial and notify the Yolo County Coroner and a professional archaeologist to determine the nature of the remains. The Coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or State lands (California Health and Safety Code Section 7050.5[b]). If the Coroner determines that the remains are those of a Native American, he or she must contact the NAHC by phone within 24 hours of making that determination (California Health and Safety Code Section 7050[c]). After the Coroner's findings have been made, the archaeologist and the NAHC-designated Most Likely Descendant (MLD), in consultation with the landowner, shall determine the ultimate treatment and disposition of the remains. The responsibilities of DWR for acting upon notification of a discovery of Native American human remains are identified in California PRC Section 5097.9 et seq.

  1. Upon the discovery of Native American human remains, DWR will require that all construction work must stop within 100 feet of the discovery until consultation with the MLD has taken place. The MLD will have 48 hours to complete a site inspection and make recommendations to the landowner after being granted access to the site. A range of possible treatments for the remains, including nondestructive removal, preservation in place, relinquishment of the remains and associated items to the descendants, or other culturally appropriate treatment may be discussed. California PRC Section 5097.98(b)(2) suggests that the concerned parties may mutually agree to extend discussions beyond the initial 48 hours to allow for the discovery of additional remains. Site-protection measures that DWR will employ are as follows:

  2. record the site with the NAHC or the appropriate Information Center, and

  3. record a document with the County in which the property is located.

  4. If agreed to by the MLD and the landowner, DWR or DWR's authorized representative will rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance if the NAHC is unable to identify an MLD, or if the MLD fails to make a recommendation within 48 hours after being granted access to the site. DWR or DWR's authorized representative may also reinter the remains in a location not subject to further disturbance if he or she rejects the recommendation of the MLD and mediation by the NAHC fails to provide measures acceptable to DWR. DWR will implement mitigation to protect the burial remains. Construction work in the vicinity of the burials shall not resume until the mitigation is completed.

If the human remains are of historic age and are determined to be not of Native American origin, DWR will follow the provisions of the California Health and Safety Code Section 7000 (et seq.) regarding the disinterment and removal of non-Native American human remains.

Timing: During construction or ground-disturbing activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementing Mitigation Measure CR-6 would reduce the potential for a significant impact under all action alternative resulting from inadvertent damage to or destruction of presently undocumented human remains to a **less-than-significant** level because it requires that if human remains are discovered during project-related construction activities, disturbances in the area of the find must be halted and appropriate treatment and protection measures must be implemented, all in consultation with the California NAHC, the MLD, and landowners in compliance with California Health and Safety Code Section 7050 et seq. and California PRC Section 5097.9 et seq.

Residual Significant Impacts

Impacts related to damage to or destruction of built environment Historic Properties would be significant and unavoidable. Implementation of Mitigation Measure CR-1 would reduce this impact, but not to a less-than-significant level because the physical damage to Levee Unit 122 would result in irreparable loss of qualities that make the resource eligible for the NRHP and potentially historically significant under CEQA significance criteria. Therefore, a residual significant and unavoidable impact would occur. There are no other feasible alternatives or mitigation measures available to further reduce this impact. The levees must be physically modified to meet the project purpose and objectives.

Impacts related to potential damage to or destruction of TCR/TCPs are less than significant. Implementation of Mitigation Measures CR-3a, CR-3b, and CR-3c, require resource evaluation in consultation with interested Native Americans, avoidance or minimization efforts, monitoring, and construction personnel training in the event a resource of this type is discovered during construction activities. Therefore, no residual significant impacts would occur.

Impacts related to the potential damage to or destruction of previously undiscovered archaeological sites are less than significant. Implementation of Mitigation Measure CR-5 requires procedures to be followed in the event of a discovery of archaeological resources during construction activities. Therefore, no residual significant impacts would occur.

Impacts related to damage to or destruction of human remains are less than significant. Implementation of Mitigation Measure CR-6requires procedures to be followed in the event of a discovery of human remains during construction activities. Therefore, no residual significant impacts would occur.

4.9 Energy

4.9.1 Environmental Setting

Energy Sources

Natural gas and electric power in Yolo County are supplied by PG&E. PG&E's power mix in 2015 included renewable (30 percent), natural gas (25 percent), nuclear (23 percent), and large hydroelectric (6 percent). (PG&E 2017.) Yolo County consumed approximately 1,691 million kilowatt hours (kWh) of electricity in 2015 (California Energy Commission [CEC] 2017).

4.9.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to energy apply to the alternatives under consideration.

State

No State plans, policies, regulations, or laws related to energy apply to the alternatives under consideration.

Regional and Local

No regional or local plans, policies, regulations, or ordinances related to energy are relevant to the analysis of the alternatives under consideration.

4.9.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

Methodology

Energy-related impacts associated with the alternatives under consideration were addressed qualitatively as part of this analysis. The analysis below uses guidance from the State CEQA Guidelines Appendix F.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. No comments related to energy were received.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on Appendix F and Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to energy if they would do any of the following:

- require or result in the construction of new electrical power generation facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; or

- develop land uses and patterns that cause substantial wasteful, inefficient, and unnecessary consumption of energy.

Appendix F of the State CEQA Guidelines also states that the goal of conserving energy should be met through decreasing overall per capita energy consumption; decreasing reliance on fossil fuels such as coal, natural gas, and oil; and increasing reliance and use of renewable energy sources. Projects that are consistent with these strategies would be considered to meet the Statewide goal of conserving energy.

Based on a screening comparison of the project's potential impacts to the thresholds, no detailed analysis of energy impacts was conducted. The following discussion summarizes the screening evaluation.

Issues Not Discussed Further in this EIS/EIR

Require New or Expanded Electrical Power Generation Facilities—The project would consume energy during the construction phase, largely due to large volumes of soil being moved to construct the setback levee. However, most of this energy use would be through operation of construction vehicles rather than electric use. Once constructed, the project's energy use for O&M would be marginal or even a decrease from existing conditions, since two or three existing drainage pump stations, depending on the action alternative, would be reduced to a single pump station, with newer and likely more energy-efficient pumping equipment. Because implementing the project would result in negligible use of electrical or natural gas energy, and any impacts would be clearly less than significant, this issue is not addressed further in this EIS/EIR.

Develop Land Uses and Patterns that Cause Substantial Wasteful, Inefficient, and Unnecessary Consumption of Energy—The project would include changes in agricultural crop types and creation of new habitat within the footprint of the existing levees and along the toe of the Sacramento Bypass North Levee setback, as described in Section 4.10, "Land Use and Planning, and Agricultural and Forestry Resources." Because implementing the project would not result in any developed land uses, there would be no impact from the project and this issue is not addressed further in this EIS/EIR.

Residual Significant Impacts

As described above, energy impacts were screened from detailed analysis because of the negligible, less-than-significant impacts that would result from project implementation. There would be no residual significant energy impacts.

4.10 Environmental Justice

4.10.1 Environmental Setting

The concept of environmental justice embraces the principles of fair treatment of all people regardless of race, color, nation of origin, or income and meaningful involvement of people within communities. Environmental justice communities are commonly identified as those where residents are: (1) predominantly minorities or low-income; (2) excluded from the environmental policy setting or decision making process; (3) subject to a disproportionate impact from one or more environmental hazards; and (4) subject to disparate implementation of environmental regulations, requirements, practices, and activities. Environmental justice efforts attempt to address the inequities of environmental protection within these communities. Legal authorities to support these efforts include both statutory and common-law protections. Both the Federal government and the State of California have taken formal steps in recent years to address this issue. Environmental justice considerations associated with the project are presented below. Potential effects related to growth-inducement are discussed in Chapter 6, "Other Statutory Requirements."

Under NEPA, an analysis of Federal actions that have the potential to result in disproportionately high and adverse effects on minority and low-income populations is required pursuant to Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 *Federal Register* 8 [FR] 7629). Under EO 12898, demographic information is used to determine whether minority populations or low-income populations are present in the areas potentially affected by the project. If so, a determination must be made as to whether implementation of the project may cause disproportionately high and adverse human health or environmental effects on those populations.

The affected environment for environmental justice includes discussion of race, ethnic origin, and economic status of affected groups. For purposes of this analysis, the definitions of minority individuals and minority and low-income populations from the Council on Environmental Quality's (CEQ's) *Environmental Justice: Guidance under the National Environmental Policy Act* (CEQ 1997) have been used. Substantial concentrations of minority or low-income individuals are sometimes referred to as environmental justice populations. Historically, minority and low-income populations have suffered a greater share of the adverse environmental and health effects of industry and development relative to the benefits.

A minority population is present within a project study area under either of the conditions listed below.

- The minority population percentage of the study area is meaningfully greater than the affected area's general population.

- The minority population percentage of the affected area exceeds 50 percent.

The CEQ defines minority individuals as persons from any of the following U.S. Census categories for race: Black/African American, Asian, Native Hawaiian or Other Pacific Islander, and American Indian or Alaska Native. Additionally, for the purposes of this analysis, minority individuals also include all other nonwhite racial categories that were added in the most recent census, such as "some other race" and "two or more races." The CEQ also mandates that persons identified through the U.S. Census as ethnically Hispanic, regardless of race, should be included in minority counts (CEQ 1997).

Low-income populations are identified based upon statistical poverty thresholds established by the U.S. Census Bureau and are identified in one of the ways listed below (CEQ 1997).

- The population percentage below the poverty level is meaningfully greater than that of the population percentage in the general population.
- The population percentage below the poverty level in the affected area exceeds 50 percent.

Project-related construction and operations would occur in the Lower Elkhorn Basin. To characterize the environmental setting for environmental justice, data were evaluated to determine the geographic extent in which project-specific effects on proximate and adjacent minority and low-income populations could occur. The project site is located within U.S. Census Bureau Census Tract (CT) 101.02, which is composed of the Upper and Lower Elkhorn Basins, and a small area within the northern portion of the City of West Sacramento. By evaluating CT 101.02, the environmental justice analysis focuses on the smallest geographic area where U.S. Census data are available and has been applied to assess the effects specific to the populations in the vicinity of the project site. In addition, to provide a basis for comparing the localized study areas, environmental justice demographic data were evaluated for Yolo County and the State of California.

CT 101.02 is located entirely within Yolo County. Of the approximately 25 square miles (estimated 16,000 acres) of land area contained in CT 101.02, approximately 22.5 square miles (97.5 percent) is comprised of rural agricultural land. The remaining approximately 2.5 square miles (2.5 percent) are located in the northern portion of the City of West Sacramento, and include the CHP Academy; the business park between the CHP Academy and Harbor Boulevard (north of the Union Pacific Railroad tracks); and residential housing between Harbor Boulevard and Kegle Drive (north of the Union Pacific Railroad tracks). Most of the population within CT 101.02 resides in an approximately 0.85-square-mile area (475 acres) in the City of West Sacramento.

Minority Populations

Table 4.10-1 presents racial and ethnic characteristics for CT 101.02, Yolo County, and the State as a whole.

Table 4.10-1. Racial Composition and Ethnicity in the Affected Area, 2014

	Number of People (Percentage of the Total Population in Parentheses)								
Geographic Area	White	Black/ African American	American Indian and Alaska Native	Asian	Native Hawaiian/ Pacific Islander	Some Other Race	Two or More Races	Hispanic (any race)	Total
CT 101.02	3,480 (50.4)	240 (3.4)	0 (0.0)	365 (5.3)	139 (2.0)	0 (0.0)	280 (4.0)	2,395 (34.7)	6,899
Yolo County	99,540 (48.7)	4,605 (2.2)	963 (0.4)	26,535 (13.0)	1,023 (0.5)	432 (0.2)	7,815 (3.8)	63,249 (30.9)	204,162
State of California	14,905,601 (39.1)	2,155,929 (5.6)	145,736 (0.4)	5,062,736 (13.2)	136,464 (0.4)	81,869 (0.2)	1,044,136 (2.7)	14,534,449 (38.1)	38,066,920

Notes: CT = Census Tract; CDP = Census Designated Place
Source: U.S. Census Bureau 2015a

As shown in Table 4.10-1, no minority populations in CT 101.02 are greater than 50 percent of the total population or are meaningfully larger than Yolo County or the State.

Low-income Populations

Persons living with income below the poverty level are identified as "low-income" according to the annual statistical poverty thresholds established by the U.S. Census Bureau. Income thresholds vary by family size and composition to determine which families are living in poverty. Poverty thresholds do not vary geographically but are updated annually for inflation using the Consumer Price Index. Table 4.10-2 presents the median household income, per-capita income, and proportion of individuals living below the poverty threshold for CT 101.02, Yolo County, and the State as a whole.

Table 4.10-2. Median Household Income, Per-Capita Income, and Poverty Levels for the Affected Area, 2014

Geographic Area	Median Household Income	Per-Capita Income	Percent of Population Below Poverty Level
CT 101.02	$39,748	$17,660	23.9
Yolo County	$55,508	$28,080	20.0
State of California	$61,489	$29,906	16.4

Notes: CT = Census Tract; CDP = Census Designated Place
Source: U.S. Census Bureau 2015b

According to the U.S. Census Bureau, the poverty threshold in 2014 was $12,071 for an individual and $24,230 for a family of four (U.S. Census Bureau 2015c). The median household income in CT 101.02, and Yolo County, and the State as a whole is greater than the poverty threshold (Table 4.10-2).

As shown in Table 4.10-2, the median household income and per capita income in CT 101.02 and Yolo County are lower than the Statewide median household income and per-capita income. The percentage of populations of CT 101.02 and Yolo County at income levels below the poverty threshold were greater than the Statewide average.

For the purposes of this analysis, areas where poverty levels are 50 percent greater than the State average of 16.4 percent (i.e., 32.8 percent or more of the population) would be considered meaningfully greater. Therefore, the percentages of the population below the poverty level in CT 101.02 and Yolo County are not meaningfully greater than the percentage of the general population in the State living in poverty.

4.10.2 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to environmental justice apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Executive Order 12898 – Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires that each Federal agency, to the greatest extent practical and permitted by law, 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 in the United States and its territories and possessions…" Thus, federal agencies are to ensure that their actions do not result directly or indirectly in discrimination on the basis of color, race, or national origin, and that potential impacts on minority or low-income populations be taken into account during preparation of environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by Federal agencies. Applies to the impact analysis.

State

The following State plans, policies, regulations, or laws related to environmental justice apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- California Government Code Section 65040.12 – California Government Code, Section 65040.12(e), defines environmental justice as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation and enforcement of environmental laws, regulations, and policies." California Government Code, Section 65040.12(a) designates the Governor's Office of Planning and Research (OPR) as the coordinating agency in State government for environmental justice programs, and requires OPR to develop guidelines for incorporating environmental justice into general plans. Applies to the impact analysis.

- Title 14 California Code of Regulations (CCR) Section 15131 Title 14, CCR Section 15131 – Title 14, CCR Section 15131 provides that economic or social information may be included in an EIR, but those economic or social effects shall not be considered as significant effects on the environment. In an EIR, the lead agency can trace the chain of cause and effect from the proposed decision on the project through anticipated economic or social changes resulting from the project that, in turn, lead to physical changes in the environment. Identified potential economic/social changes also can be used to determine the significance of the physical changes on the environment. Applies to the impact analysis.

- Senate Bill 115 – Applies to the impact analysis.

- Senate Bill 89 – Applies to the impact analysis.

Regional and Local

There are no regional or local plans, policies, regulations, or ordinances related to environmental justice that would be relevant to the analysis of the alternatives under consideration.

4.10.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

According to CEQ (1997) and the U.S. Environmental Protection Agency (EPA) (1998) guidelines, the first step in conducting an environmental justice analysis is to define minority and low-income populations. Based on these guidelines, a minority population is present if (1) the minority population of the affected area exceeds 50 percent, or (2) if the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. By the same rule, a low-income population exists if (1) the population percentage below the poverty level in the affected area exceeds 50 percent, as defined by the U.S. Census Bureau, or (2) if the percentage of people living in households below the poverty threshold in the affected area is substantially greater than the poverty percentage of the general population or other appropriate unit of geographic analysis. For the purposes of this environmental justice screening, racial, ethnic, income, and poverty statistics were obtained from the U.S. Census Bureau.

The second step of an environmental justice analysis requires that a determination be made as to whether a "high and adverse" effect would occur. The CEQ guidance indicates that when determining whether the effects are high and adverse, agencies are to consider whether the risks or rates of effect "are significant (as that term is defined by the NEPA lead agency) or above generally accepted norms." The final step requires a determination as to whether the effect on the minority or low-income population would be "disproportionately high and adverse." Although none of the published guidelines define the term "disproportionately high and adverse," CEQ includes a non-quantitative definition stating that an effect is disproportionate if it appreciably exceeds the risk to the general population.

Identification of an area that is potentially affected by the project and contains a disproportionate amount of low-income or minority residents does not, by itself, constitute an environmental justice effect. Rather, an environmental justice effect would occur if the project would disproportionately affect a population that is made up of 50 percent or greater of either the minority or low-income categories. If the jurisdiction has a population of 50 percent or greater for either the minority or low-income categories or has a population meaningfully greater (50 percent or greater) than the minority or low-income population percentage in the general population of the regional area, it is identified for more detailed analysis.

Although the environmental justice approaches contained within Executive Order 12898 and California Government Code Section 65040.12 differ, the underlying intention of both regulations is the fair and equal treatment of all races, cultures, and incomes. In addition, the State CEQA Guidelines, Section 15131, provide guidance in determining potential environmental justice impacts, and although the State CEQA Guidelines do not recognize an economic or social change as a significant impact, social change may be considered as it relates to determining the significance of a physical change on the environment. The analysis of environmental justice impacts examines the extent to which each action alternative would affect a local economy and the different socioeconomic groups participating in the local economy. For the purposes of this section, qualitative methods were used to evaluate whether the project would result in fair and equal treatment of minorities and low-income persons in the project vicinity.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. One comment was received from EPA indicating that the EIS/EIR should include an evaluation of environmental justice populations within the geographic scope of the project. The comment further requested that if such populations exist, the DEIS should address the potential for disproportionate adverse impacts to minority and low-income populations, and the approaches used to foster public participation by these populations. This comment is addressed in the impact analyses below.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to environmental justice if they would do any of the following:

- a disproportionately high and adverse effect would likely fall on a minority or low-income population.

To make a finding that disproportionately high and adverse effects would likely fall on a minority or low-income population, the following three conditions must be met simultaneously:

- a minority or low-income population must reside in the affected area,
- a high and adverse effect must exist, and
- the effect on the minority or low-income population must be disproportionately high and adverse. concerns associated with environmental justice relate to minority and low-income populations that could be disproportionately affected by implementation of a project.

Environmental justice impacts would be considered potentially significant if implementation of the action alternatives would result in direct or cumulative impacts on the natural or physical environment that would result in a disproportionately high or adverse impact on a minority or low-income population, considering the population levels or income levels of all affected groups.

Impact Analysis

Table 4.10-3 provides a summary of environmental justice impacts and mitigation measures for all alternatives under consideration.

Table 4.10-3. Summary of Impacts and Mitigation Measures—Environmental Justice

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
EJ-1: Potential for Disproportionately High and Adverse Effects on Minority and Low-income Populations in Census Tract 101.02	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	NI	None	NI
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
NI = no impact
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact EJ-1: Potential for Disproportionately High and Adverse Effects on Minority and Low-income Populations in Census Tract 101.02.

The project site is located within CT 101.02. Based on CEQ (1997), EPA (1998), State CEQA Guidelines, and data shown in Table 4.10-1, there are no minority populations within CT 101.02 that are meaningfully greater than that of the percentage in the general population. (For purposes of this analysis, “meaningfully greater” means at least 50 percent greater than the State average.)

As shown in Table 4.10-2, the median household income and per-capita income in CT 101.02 and Yolo County are lower than the Statewide median household income and per-capita income. The percentage of populations of CT 101.02 and Yolo County at income levels below the poverty threshold were greater than the Statewide average. However, for purposes of this analysis, “meaningfully greater” means areas where poverty levels are 50 percent greater than the State average of 16.4 percent (i.e., 32.8 percent or more of the population). Therefore, the percentages of the population below the poverty level in CT 101.02 and Yolo County are not meaningfully greater than the percentage of the general population in the State living in poverty.

Therefore, **no disproportionately high and adverse effects** on minority populations or low-income populations in CT 101.02 would occur.

Mitigation Measure: No compensatory mitigation is required.

Residual Significant Impacts

There would be no impacts related to environmental justice. Therefore, no residual significant impacts would occur.

4.11 Geology, Soils, and Paleontological Resources

4.11.1 Environmental Setting

Geology

The project site lies in the Sacramento Valley portion of the Great Valley Geomorphic Province. The sediments in the Great Valley vary between 3 and 6 miles in thickness and were derived primarily from erosion of the Sierra Nevada to the east, with lesser material from the Coast Ranges to the west.

Alluvial deposits of Pleistocene (2.6 million years Before Present [B.P.] to 11,700 years B.P.) and Holocene (11,700 years B.P. and younger) age overlie the thick sequence of sedimentary rock units that form the deeply buried bedrock units in the mid-basin areas of the valley. These alluvial deposits consist of reworked fan and stream materials that were deposited by streams prior to the construction of the existing flood control systems. The youngest geomorphic features in the project site and vicinity are low floodplains, which are found primarily along the Sacramento River. These major drainage ways were originally confined within broad natural levees sloping away from the rivers and streams. The natural levees formed through the deposition of alluvial materials during periods of flooding. As flood waters lost energy, the coarser materials settled out nearest the rivers and streams, forming the natural levees and sand bars in the vicinity of the river channel. The finer material was carried in suspension farther from the rivers or streams, and settled out in quiet water areas such as swales, abandoned meander channels, and lakes. (The geomorphology of the Sacramento River is addressed in Section 4.14, "Hydrology, Hydraulics, and Flood Risk Management.")

Based on a review of regional geologic mapping prepared by Gutierrez (2011), surficial deposits at the project site consist of Holocene Alluvium and Holocene Basin deposits, which are underlain by the Pleistocene-age Riverbank Formation. Figure 4.11-1 shows the surficial geologic formations at the project site and in the project vicinity.

Seismicity

The Sacramento Valley has experienced relatively low seismic activity in the past and does not contain any Alquist-Priolo Earthquake Fault Zones (California Geological Survey 2016). The nearest known active (Holocene or Historic) fault trace to the project site is located north of Esparto near Dunnigan Hills, approximately 17 miles to the northwest (Jennings and Bryant 2010).

Regionally active faults, the approximate distance from the project site, projected maximum moment magnitude, and slip rate are identified in Table 4.11-1.

Potential seismic hazards resulting from a nearby moderate to a major earthquake can generally be classified as primary and secondary. The primary effect is fault ground-rupture, also called surface faulting. Because there are no active faults mapped across the project site or in the project vicinity by California Geologic Survey or the U.S. Geological Survey, and the project site is not located within or adjacent to an Alquist-Priolo Earthquake Fault Zone, fault ground rupture is unlikely. Common secondary seismic hazards include ground-shaking, liquefaction, subsidence, and seiches, as described below.

Table 4.11-1. Active Regional Faults

Fault Name	Approximate Distance from Project Site (miles)	Regional Location	Maximum Moment Magnitude	Slip Rate (mm/yr)
Dunnigan Hills Fault	17	Sacramento Valley (Dunnigan Hills)	N/A	N/A
Great Valley Fault Zone Segment 4	20	Margin between Sacramento Valley and Coast Range	6.6	1.25
Great Valley Fault Zone Segment 3	22.5	Margin between Sacramento Valley and Coast Range	7.1	1.25
Great Valley Fault Zone Segment 5	29	Margin between Sacramento Valley and Coast Range	6.7	1.5
Green Valley-Concord Fault Zone (includes Cordelia Fault)	37	Coast Range	6.8	5.0
Hunting Creek-Berryessa Fault Zone	38.5	Coast Range	7.1	6.0
West Napa Fault	45	Coast Range	6.7	1.0
Greenville Fault Zone (includes Clayton and Marsh Creek Sections)	48	Coast Range	7.0	2.0

Notes: mm/yr = millimeters per year; N/A = not available
Sources: Jennings and Bryant 2010, Working Group on California Earthquake Probabilities 2008

- **Ground-shaking.** Seismic ground-shaking refers to ground motion that results from the release of stored energy during an earthquake. The intensity of ground-shaking depends on the distance from the earthquake epicenter to the site, the magnitude and depth of the earthquake, and site geologic conditions.

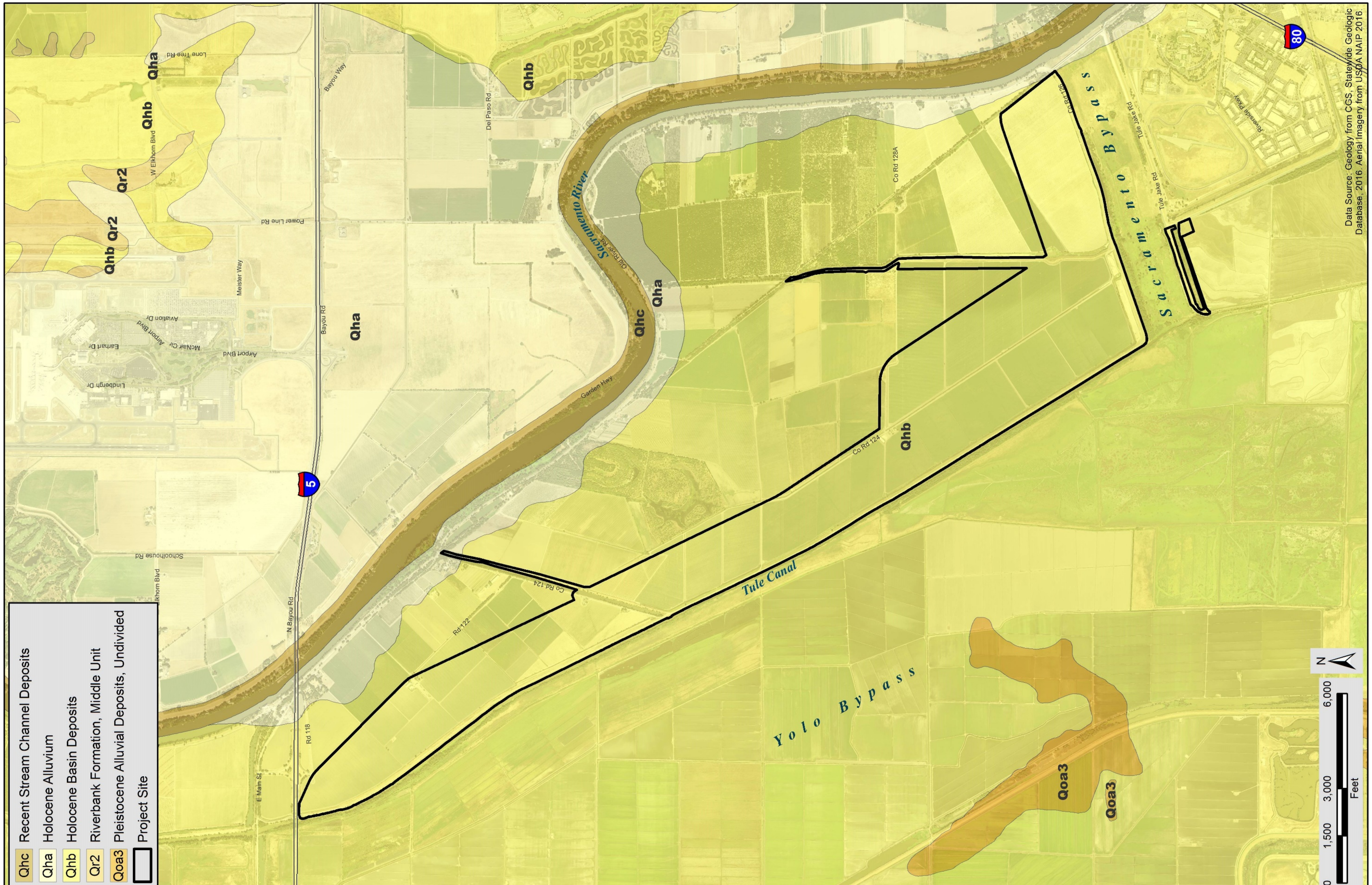
- **Ground failure/liquefaction.** Liquefaction is a process by which water-saturated materials lose strength and may fail during strong ground-shaking, when granular materials are transformed from a solid state into a liquefied state as a result of increased pore-water pressure. Structures on soil that undergoes liquefaction may settle or suffer major structural damage. Liquefaction is most likely to occur in low-lying areas where the substrate consists of poorly consolidated to unconsolidated water-saturated sediments, recent Holocene-age sediments, or deposits of artificial fill.

- **Subsidence and settlement.** Subsidence is the gradual settling or sudden sinking of the ground surface resulting from subsurface movement of earth materials. Seismically induced settlement refers to the compaction of soils and alluvium caused by ground-shaking. Fine-grained soils are subject to seismic settlement and differential settlement. A potential for differential settlement exists where low-density and unconsolidated material is encountered, such as overbank river deposits (present day and historical) common along the Sacramento River. Subsidence and settlement may also occur from levee construction (separate from liquefaction or densification) due to both immediate settlements in granular soils and the consolidation of fine grained soils.

Soils

Figure 4.11-2 shows the locations of each soil type at the project site. Table 4.11-2 summarizes several relevant characteristics of soils at the project site based on the Yolo County Soil Survey (U.S. Natural Resources Conservation Service [NRCS] 2016a). Five out of the seven soil types have a moderate to high shrink-swell potential. The water erosion hazard is moderate and two of the soils have a moderately high wind erosion hazard. Five of the seven soil types are rated by NRCS as very limited for use in levees.

Figure 4.11-1. Geologic Formations in the Project Site and Vicinity



Source: Gutierrez 2011

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Table 4.11-2. Project Site Soil Types and Characteristics

Soil Map Unit Name	Shrink-Swell Potential[1]	Drainage Class	Permeability[2]	Wind Erosion Hazard[3]	Water Erosion Hazard[4]	NRCS Soil Limitations for Levees
Lang sandy loam, deep	Low	Somewhat poorly drained	High	3	Moderate	Very limited: soil piping, shallow depth to saturated zone
Sacramento silty clay loam, drained	High	Poorly drained	Moderately high	6	Moderate	Very limited: hard to pack, dusty
Sacramento clay, drained	High	Poorly drained	Moderately low	4	Low	Very limited: hard to pack, dusty
Sacramento soils, flooded	High	Poorly drained	Moderately high	6	Moderate	Very limited: hard to pack, dusty, shallow depth to saturated zone
Sycamore silty clay loam	Moderate	Somewhat poorly drained	Moderately high	6	Moderate	Somewhat limited: dusty, shallow depth to saturated zone
Sycamore complex, drained	Moderate	Somewhat poorly drained	Moderately high	6	Moderate	Somewhat limited: dusty, shallow depth to saturated zone
Tyndall very fine sandy loam, deep	Low	Somewhat poorly drained	High	3	Moderate	Very limited: soil piping, dusty, shallow depth to saturated zone

Notes: NRCS = Natural Resources Conservation Service

1 Based on percentage of linear extensibility, shrink-swell potential ratings of “moderate” to “very high” can result in damage to buildings, roads, and other structures.

2 Based on standard NRCS saturated hydraulic conductivity (Ksat) class limits. Ksat refers to the ease with which pores in a saturated soil transmit water.

3 Soils assigned to wind erodibility group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

4 Based on the erosion factor “Kw whole soil,” which is a measurement of relative soil susceptibility to sheet and rill erosion by water.

Source: Natural Resource Conservation Service 2016a

Paleontological Resources

In addition to a review of published geologic maps and paleontological literature, a records search was performed at the University of California, Berkeley Museum of Paleontology (UCMP) on July 27, 2016. A paleontologically sensitive rock formation is one that is rated high for potential paleontological productivity and is known to have produced unique, scientifically important fossils. The potential paleontological productivity rating of a rock formation exposed in a project site refers to the recorded abundance and types of fossil specimens, and the number of previously recorded fossil sites. Exposures of a specific rock formation at any given project site are most likely to yield fossil remains representing particular species or quantities similar to those previously recorded from the rock formation in other locations. Therefore, the paleontological sensitivity determination of a rock formation is based primarily on the types and numbers of fossils that have been previously recorded from that rock unit (i.e., the paleontological productivity).

The results of the literature and records search, and the paleontological resource sensitivity assessment, are summarized in Table 4.11-3.

Table 4.11-3. Paleontological Resource Sensitivity Assessment

Geologic Formation Name	Geologic Formation Age and Description	Summary Results of Literature and Records Search	Paleonto-logical Resource Sensitivity Rating
Alluvium and Basin Deposits	Holocene age (11,700 years B.P. to Present Day). Fine-grained deposits of silt and clay in flood basins between modern watercourses.	By definition, to be considered a unique paleontological resource, a fossil must be more than 11,700 years old. Holocene deposits contain only the remains of extant, modern taxa (if any resources are present), which are not considered "unique" paleontological resources.	Low
Riverbank Formation	Pleistocene age (130,000 to 450,000 years B.P.). Weathered reddish gravel, sand, and silt-forming alluvial terraces and fans of major rivers such as the Sacramento and American.	Nine recorded vertebrate fossil localities in the Sacramento area southeast of the project site yielded remains of mammoth, bison, camel, coyote, horse, Harlan's ground sloth, mammoth, antelope, deer, rabbit, woodrat, fish, mole, mice, squirrel, snake, and gophers, dire wolf, frog, Pacific pond turtle, and the family Anatidae (ducks, geese, and swans). Several recorded vertebrate fossil localities near Davis and Woodland yielded remains of rodents, snakes, horses, antelope, Harlan's ground sloth, mammoth, and saber-toothed tiger. Vertebrate fossil specimens from the Riverbank Formation have been reported near its type locality in the City of Riverbank. UCMP search results indicate there are several vertebrate fossil localities from the Riverbank Formation in Merced, Stanislaus, Fresno, and Madera Counties, in addition to Sacramento County.	High

Notes: B.P. = Before Present; UCMP = University of California Museum of Paleontology
Sources: Helley and Harwood 1985; Hilton et al. 2000; Jefferson 1991a and 1991b; Kolber 2004; Marchand and Allwardt 1981; University of California, Berkeley Museum of Paleontology 2016

4.11.2 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to geology, soils, and paleontological resources apply to the alternatives under consideration, as listed below project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- U.S. Army Corps of Engineers' Engineering Criteria (EM), Technical Letters, and Engineering Regulations (USACE 1997, 2000, 2003, 2005, 2016) – Applies to project design, construction, and the impact analysis.

- Federal Emergency Management Agency and 44 Code of Federal Regulations (CFR) Section 65.10 (National Flood Insurance Program Regulations related to levees) – Applies to project design and the impact analysis.

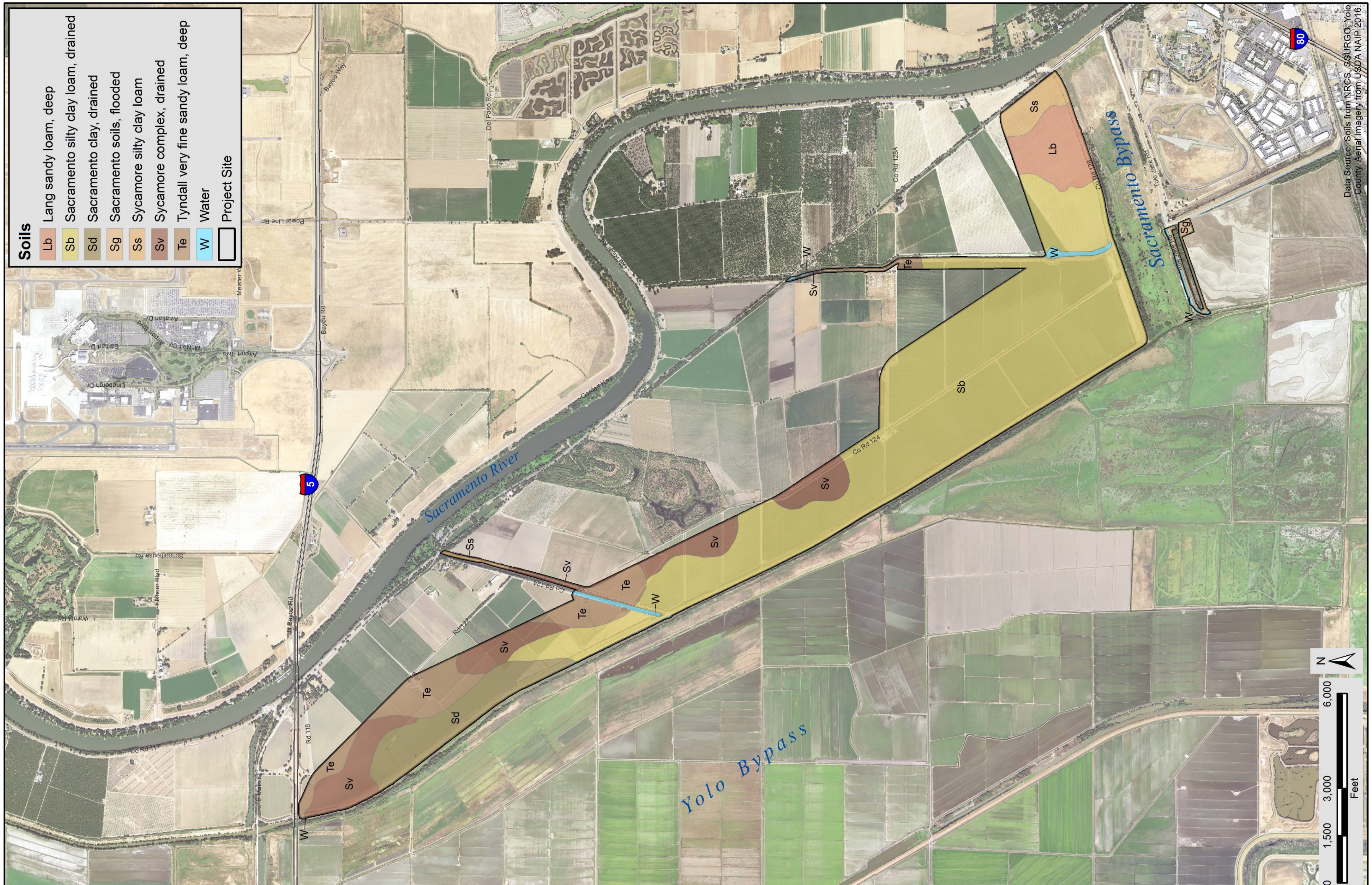
- Earthquake Hazards Reduction Act – Applies to project design and the impact analysis.

State

The following State plans, policies, regulations, or laws related to geology, soils, and paleontological resources apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Alquist-Priolo Earthquake Fault Zoning Act – Applies to the impact analysis.

Figure 4.11-2. Project Site Soils



Source: Natural Resource Conservation Service 2016b

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- Seismic Hazards Mapping Act – Applies to the impact analysis.
- National Pollutant Discharge Elimination System (NPDES) and Storm Water Pollution Prevention Plans (SWPPPs) – Applies to the impact analysis.
- Central Valley Flood Protection Board (CVFPB) Levee Standards (California Code of Regulations [CCR] Title 23, Division 1, Article 8, Sections 111–137) – Applies to project design and the impact analysis.
- Urban Levee Design Criteria (DWR 2012) – Applies to project design, construction, and the impact analysis.

Regional and Local

The following regional and local plans, policies, regulations, and ordinances related to geology, soils, and paleontological resources are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding geology, soils, and paleontological resources are relevant to project design, construction, and/or the impact analysis of the project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).
- County of Yolo Improvement Standards (Yolo County 2013) – Relevant to project design and the impact analysis.
- Professional Paleontological Standards – Relevant to the paleontological sensitivity determination, significance thresholds, and impact analysis.

4.11.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

The evaluation of potential impacts relied on a review of published geological and paleontological literature and maps, NRCS soil survey data for Yolo County, and a paleontological records search at the UCMP.

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

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. No comments related to geology, soils, seismicity, or paleontological resources were received.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to geology and soils if they would do any of the following:

- expose people or structures to potential substantial adverse impacts, including risk of loss, injury, or death through the rupture of a known earthquake fault, strong seismic shaking, seismic-related ground failure, soil liquefaction, or landslides;
- locate project facilities on a geologic unit that is unstable, or that would become unstable as a result of the project, and potentially result in on-site or off-site landslide, lateral spreading, subsidence, liquefaction or collapse;
- locate project facilities on expansive soil, creating substantial risks to property;
- result in substantial soil erosion or the loss of topsoil;
- have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; or
- create a substantial flooding risk as a result of a seismic seiche.

In addition to the thresholds listed above, the alternatives under consideration would have a significant impact on paleontological resources if they would:

- directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

For the purposes of this analysis, a unique resource or site is one that is considered significant under the following professional paleontological standards. An individual vertebrate fossil specimen may be considered unique or significant if it is identifiable and well preserved, and it meets one of the following criteria:

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

- a complete specimen (i.e., all or substantially all of the entire skeleton is present).

The value or importance of different fossil groups varies depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions (such as for a research project). Marine invertebrates are generally common; the fossil record is well developed and well documented, and they would generally not be considered a unique paleontological resource. Identifiable vertebrate marine and terrestrial fossils are generally considered scientifically important because they are relatively rare.

Issues Not Discussed Further in this EIS/EIR

Surface Fault Rupture—Because the project site is not located within an Alquist-Priolo Earthquake Fault Zone and there are no known active faults within or adjacent to the project site, fault ground rupture is unlikely, and therefore this issue is not addressed further in this EIS/EIR.

Landslides—Because the project site is located in an area with flat topography, there would be no adverse impacts related to landslides, and this issue is not addressed further in this EIS/EIR.

Soil Suitability for Septic Systems—Because the project would not include the use of wastewater disposal systems of any kind, there would be no impact related to the ability of project site soils to support the use of septic systems. Therefore, this issue is not addressed further in this EIS/EIR. Potential effects from damage to existing septic systems are addressed in Impact HAZ-2 in Section 4.13, “Hazards and Hazardous Materials.”

Unique Geologic Feature—A unique geologic feature consists of a major natural element that stands out in the landscape such as a large and scenic river, gorge, waterfall, volcanic cinder cone, lava field, or glacier. The Sacramento River near the project site could be considered a unique geologic feature. However, project-related activities would not result in damage to or destruction of any unique qualities of this river. Therefore, this issue is not addressed further in this EIS/EIR. (Potential project-related effects on the scenic qualities associated with the Sacramento River are evaluated in Section 4.2, “Aesthetics,” and potential effects on recreational opportunities associated with the river are evaluated in Section 4.18, “Recreation.”)

Impact Analysis

Table 4.11-4 provides a summary of geology, soils, and paleontological resources impacts and mitigation measures for all alternatives under consideration.

Table 4.11-4. Summary of Impacts and Mitigation Measures—Geology, Soils, and Paleontological Resources

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
GEO-1: Damage to Flood Facilities from Seismic and Geologic Hazards	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
GEO-2: Potential Temporary, Short-term Construction-related Erosion	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	GEO-2: Acquire Appropriate Regulatory Permits, Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices, and Comply with Yolo County Improvement Standards for Grading and Erosion Control	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
GEO-3: Potential Damage to or Destruction of Unique Paleontological Resources	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	GEO-3: Conduct Construction Personnel Education, Stop Work if Paleontological Resources are Discovered, Assess the Significance of the Find, and Prepare and Implement a Recovery Plan, as Required	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact GEO-1: Damage to Flood Facilities from Seismic and Geologic Hazards.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to the potential for damage to flood facilities from seismic and geologic hazards.

Alternatives 2 through 5: All Action Alternative

The Sacramento Valley has historically experienced very low levels of seismic activity. Known active faults that pose a hazard for strong seismic ground-shaking are located along the margin between the western Sacramento Valley and the eastern Coast Ranges, and within the Coast Ranges itself (Table 4.11-1). These faults are located approximately 17–48 miles west of the Lower Elkhorn Basin.

Some of the native soils on the project site contain sand layers with low relative densities coinciding with a relatively high water table; thus, these soils generally have a high liquefaction potential. Furthermore, some of the proposed facilities would be constructed in areas containing low-density silts and clays associated with a fluvial depositional environment. These soils would also be susceptible to seismically induced settlement. In addition, a potential for differential settlement exists where low-density and unconsolidated material is encountered, such as overbank river deposits (present day and historical), that are common along the Sacramento River. Finally, the project site soils are poorly to somewhat poorly drained and have a moderate to high shrink-swell potential (Table 4.11-2).

Therefore, construction of all of the proposed facilities could be subject to hazards from liquefaction and settlement, as well as hazards from construction in unstable and expansive soils.

However, all flood risk reduction facility construction or modification conducted as part of the proposed improvements would be designed based on the results of detailed geotechnical engineering studies currently underway by DWR and would be required to comply with standard engineering practices for levee design. DWR's Urban Levee Design Criteria are the primary State standards applicable to the proposed levee improvements (DWR 2012). In addition, CVFPB standards also apply to the proposed levee improvements (CCR Title 23, Division 1, Article 8, Sections 111–137). CVFPB standards direct that levee design and construction be in accordance with EM 1110-2-1913 *Engineering Design and Construction of Levees* (USACE 2000), the primary Federal standards applicable to levee improvements. Because the design, construction, and maintenance of levee improvements must comply with the regulatory standards of USACE, DWR, and CVFPB, the design and construction of all levee modifications would meet or exceed applicable design standards for static and dynamic stability, seismic ground-shaking, liquefaction, subsidence, and seepage.

Furthermore, Yolo County requires appropriate design and construction methodologies to be used for roadway construction (including preparation of soils and geotechnical engineering studies to inform design and construction, and compliance with the *County of Yolo Improvement Standards* [Yolo County 2013]). Because the relocated County Roads 124 and 126 would be turned over to Yolo County for future maintenance, the design and construction of the relocated County Roads 124 and 126 would meet or exceed applicable design standards for stability, seismic ground-shaking, liquefaction, and subsidence.

All of the action alternatives would entail construction of the same types of facilities but with different configurations of the setback levees and associated features. However, because all the action alternatives would be constructed in the same overall project site and vicinity, they would be subject to the same seismic and geologic hazards. This, for the reasons stated above, all action alternatives would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Impact GEO-2: Potential Temporary, Short-term Construction-Related Erosion.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no impact related to potential temporary, short-term construction-related erosion.

Alternatives 2 through 5: All Action Alternatives

Project implementation would include substantial construction activity over a large area, and would include soil removal for borrow and trenching; construction of the new setback levees, seepage berms, relief wells, and cutoff walls; and grading for the relocated Yolo County Roads 124 and 126, horizontal directional drilling (HDD) for utility relocation, and other ground-disturbing activities. NRCS (2016a) has rated the project site soils as moderately susceptible to wind and water erosion (Table 4.11-2). Project-related earth-moving activities would result in the temporary and short-term disturbance of soil and could expose disturbed areas to winter storm events. Rainfall of sufficient intensity could dislodge soil particles from the soil surface. Once particles are dislodged and the storm is large enough to generate runoff, substantial localized erosion could occur. In addition, soil disturbance during summer could result in substantial loss of topsoil because of wind erosion. All of the action alternatives would entail construction of the same types of facilities but with different configurations of the setback levees and associated features. In addition, the RD 784 Cross Levee would not be used as a source of borrow materials under Alternatives 4 and 5. Despite these differences, construction activities under all the action alternatives would occur in the same soil types, which would be subject to erosion. Therefore, all action alternatives would have a temporary and short-term direct **potentially significant** impact. (Indirect short-term impacts to water quality, and direct and indirect long-term impacts to water quality from project operation, are evaluated in Section 4.12, “Groundwater Resources,” and Section 4.22, “Water Quality.”) Mitigation Measure GEO-2, described below, has been identified to address this impact.

Mitigation Measure GEO-2: Acquire Appropriate Regulatory Permits, Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices, and Comply with Yolo County Improvement Standards for Grading and Erosion Control.

Prior to the start of earth-moving activities, DWR will obtain coverage under the State Water Resources Control Board’s NPDES stormwater permit for general construction activity (Order 2009-0009-DWQ as amended by Order 2012-006-DWQ), including preparation and submittal of a Notice of Intent (NOI) to discharge with the Central Valley Regional Water Quality Control Board (CVRWQCB). The contractor shall be required to prepare a SWPPP and comply with the conditions of the NPDES general stormwater permit for construction activity. For work conducted under NPDES authorization, the SWPPP shall describe the construction activities to be conducted, Best Management Practices (BMPs) that will be implemented to prevent contaminated stormwater discharges into waterways, and inspection and monitoring activities that will be conducted. Construction and postconstruction monitoring shall be conducted to ensure that all erosion-control efforts are performing as designed.

Final design and construction plans will require the implementation of standard erosion, siltation, and good housekeeping BMPs. BMPs will include pollution prevention measures (erosion and sediment control measures and measures to control nonstormwater discharges and hazardous spills), demonstration of compliance with all applicable CVRWQCB and other applicable water quality standards, local Yolo County erosion and sediment control standards (because the relocated County Roads 124 and 126 would be turned over to Yolo County for future maintenance), identification of responsible parties, detailed construction timelines, and a BMP monitoring and maintenance schedule. BMPs will be applied to meet the maximum extent practicable and best conventional technology/best available technology requirements and to address compliance with water quality standards. A construction and postconstruction monitoring program will be implemented to ensure compliance and effectiveness of BMPs.

Timing:	Prior to, during, and after construction activities.
Responsibility:	California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure GEO-2 would reduce the potentially significant impact associated with temporary and short-term construction-related erosion under Alternatives 2 through 5 to a **less-than-significant** level because a SWPPP and BMPs specifically designed to control erosion will be implemented.

Impact GEO-3: Potential Damage to or Destruction of Unique Paleontological Resources.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to potential damage to or destruction of unique paleontological resources.

Alternatives 2 through 5: All Action Alternatives

The Alluvium and Basin Deposits at the project site are of Holocene age. By definition, to be considered a unique paleontological resource, a fossil must be more than 11,700 years old. Holocene deposits contain only the remains of extant, modern taxa (if any resources are present), which are not considered "unique" paleontological resources. Therefore, these formations are considered to be of low paleontological sensitivity, and earth-moving activities consisting of road construction, the new drainage canal on the east side of the Yolo Bypass East Levee setback, and riparian plantings would result in **no impact** to unique paleontological resources because of the relatively shallow depth of construction.

Mitigation Measure: No compensatory mitigation is required.

However, the discovery of numerous vertebrate fossil remains in sediments referable to the Riverbank Formation in Yolo and Sacramento Counties, as well as other areas throughout the Central Valley, indicates that this formation is paleontologically sensitive. The Riverbank Formation underlies the Holocene-age Alluvium and Basin Deposits throughout the project site. Geoarchaeological trenching activities conducted by GEI Consultants, Inc. in 2016 indicated that Holocene-age deposits are present to a depth of at least 13 feet below the ground surface. Therefore, depending on the depth of excavation for seepage berms, levee cutoff walls, relief wells, HDD for the Sacramento International Airport pipeline relocation, and borrow materials, this paleontologically sensitive rock formation could be encountered. Because the same rock formations are present in all of the alternative project sites, there is a potential under all action alternatives to encounter and possibly damage or destroy unique paleontological resources during construction-related excavation. Therefore, these project components would have a **potentially significant** impact. Mitigation Measure GEO-3, described below, has been identified to address this impact.

Mitigation Measure GEO-3: Conduct Construction Personnel Education, Stop Work if Paleontological Resources are Discovered, Assess the Significance of the Find, and Prepare and Implement a Recovery Plan, as Required.

To minimize the potential for destruction of or damage to potentially unique, scientifically important paleontological resources during earth-moving activities, DWR will implement the measures described below.

- Before the start of construction activities at the project site, construction personnel involved with earth-moving activities (including the site superintendent) will be informed of the possibility of encountering fossils, the appearance and types of fossils likely to be seen during construction activities, and proper notification procedures should fossils be encountered. This worker training may either be prepared and presented by an experienced field archaeologist at the same time as construction worker education on cultural resources or prepared and presented separately by a qualified paleontologist.

- If paleontological resources are discovered during earth-moving activities, the construction crew will notify DWR and will immediately cease work in the vicinity of the find. DWR will retain a qualified paleontologist to evaluate the resource and prepare a recovery plan in accordance with SVP Guidelines (1996). The recovery plan may include, but is not limited to, a field survey, construction monitoring, sampling and data recovery procedures, museum storage coordination for any specimen recovered, and a report of findings. Recommendations in the recovery plan that are determined by DWR to be necessary and feasible will be implemented before construction activities can resume at the site where the paleontological resources were discovered.

Timing: Before and during construction activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementing Mitigation Measure GEO-3 would reduce the potentially significant impact from the possible destruction of or damage to a unique paleontological resource under Alternatives 2 through 5 to a **less-than-significant** level because construction workers will be alerted to the possibility of encountering paleontological resources and, in the event that resources were discovered, fossil specimens will be recovered and recorded and will undergo appropriate curation.

Residual Significant Impacts

The impacts from damage to new facilities from seismic and geologic hazards (Impact GEO-1) would be less than significant. Therefore, no residual significant impacts would occur.

The impacts from possible temporary and short-term construction-related erosion (Impact GEO-2) and potential damage to or destruction of unique paleontological resources (Impact GEO-3) would be potentially significant. However, these impacts would be reduced to a less-than-significant level following implementation of Mitigation Measures GEO-2 and GEO-3. Therefore, no residual significant impacts would occur.

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4.12 Groundwater Resources

4.12.1 Environmental Setting

Hydrogeology

The groundwater basin underlying the project site is designated by DWR's Bulletin 118 (DWR 2003) as the Yolo Subbasin (Basin Number 5-21.67) of the Sacramento Valley Groundwater Subbasin. The Yolo Subbasin boundaries have recently been modified (DWR 2016h), but updated descriptions of the hydrogeology of the new basin extents have not been published. This document uses the most recent descriptions in the 2003 Bulletin 118 publication covering the project site.

The Yolo Subbasin is located in the southern portion of the Sacramento Valley Basin primarily within Yolo County. It is bounded on the east by the Sacramento River, on the west by the Coast Range, on the north by Cache Creek, and on the south by Putah Creek. The basin is roughly bisected by an anticlinal structure, but otherwise is gently sloping from west to east with elevations ranging from approximately 400 feet at the base of the Coast Range to the west to nearly sea level in the eastern areas. Precipitation averages approximately 20 to 24 inches per year in the western portion of the Subbasin, and approximately 18 to 20 inches per year in the eastern portion of the Subbasin (DWR 2003).

The project site also lies within a Subbasin defined by the Yolo County Flood Control and Water Conservation District (YCFCWCD), as the Southern Sacramento River Subbasin in its Groundwater Management Plan (YCFCWCD 2006). This Subbasin designation differs from the boundaries used in DWR's Bulletin 118, and encompasses the eastern part of Yolo County along the Sacramento River and its historic floodplain, including the Yolo Bypass.

The project site is underlain primarily by: (1) younger sediments of the Red Bluff Formation, floodplain deposits, and stream channel deposits that overlie the Tehama Formation, and (2) older thick alluvial and river sediments of the Tehama Formation. Formations discussed in this section differs from Section 4.11, "Geology, Soils, and Paleontological Resources," since the groundwater chapter discussion refers to the specific physical characteristics of water-bearing formations underlying the project site rather than the broader geologic context of the region.

Recent stream channel deposits consist of unconsolidated silt, fine- to medium-grained sand, gravel, and occasionally cobbles deposited in and adjacent to active streams in the Subbasin. Floodplain deposits occur along the eastern margin of the Subbasin in the Yolo Bypass area. They consist primarily of silts and clays, but may be locally interbedded with stream channel deposits of the Sacramento River. Thickness of the younger alluvium ranges from 0 to 150 feet. The younger alluvium varies from moderately to highly permeable, but often lies above the saturated zone. The saturated zone is the area in an aquifer, below the water table, in which relatively all pores and fractures are saturated with water Where saturated, the younger alluvium yields significant quantities of water to wells. Adjacent to the Sacramento River, wells completed in ancestral Sacramento River stream channel deposits yield up to 4,000 gallons per minute (gpm).

The Tehama Formation is the thickest water-bearing unit underlying the Yolo Subbasin, ranging in thickness from 1,500 to 2,500 feet. Surface exposures of the Tehama Formation are limited mainly to the Coast Range foothills along the western margin of the Basin, as well as in the Plainfield Ridge. The Tehama Formation consists of moderately compacted silt, clay, and silty fine sand enclosing lenses of sand and gravel, silt and gravel, and cemented conglomerate. Permeability of the Tehama Formation is variable, but generally less than the younger units. Because of its relatively greater thickness, however, wells completed in the unit can yield up to several thousand gpm (Yolo County 2005).

Groundwater Movement

Aquifers are unconfined near the surface and become increasingly confined with depth. There are no regionally continuous barriers to vertical flow, but inter-bedded clays and silts create a cumulative impediment to vertical groundwater flow with increasing depth. Older, deeper sediments also tend to be more compact and therefore less permeable than younger, shallower sediments (DWR 2003).

Underlying the Tehama Formation are brackish to saline water-bearing sedimentary units, including brackish sedimentary rocks of volcanic origin underlain by marine sedimentary rocks which are typically of low permeability and contain connate water. The upper contact of these units generally coincides with the fresh/saline water boundary. The contact is found near the Coast Range at depths as shallow as a few hundred feet. Near the eastern margin of the basin it reaches depths of nearly 3,000 feet.

Groundwater-level Trends

Groundwater levels in the Yolo Subbasin are impacted by periods of drought due to increased groundwater pumping and less surface water recharge (e.g., in the late 1970s and early 1990s), but recover quickly in “wet” years. Long-term trends do not indicate any significant decline in water levels, with the exception of localized pumping depressions in the vicinity of the Davis, Woodland, and Dunnigan/Zamora areas. Past studies have concluded that the Yolo Subbasin is subject to overdraft; however, the completion of Indian Valley Reservoir in 1976 provided significant relief in the form of additional available surface water. Developing surface water storage has relieved much of the stress on aquifers beneath Yolo County. Localized groundwater effects are still evident beneath areas dependent on groundwater as a primary water supply. These effects are found beneath the City of Woodland, City of Davis, the UC Davis area, and the Yolo-Zamora Water District, but not in the project vicinity (YCFCWCD 2006). It is estimated that the area underlying the Yolo Bypass contains over 4 million acre-feet of groundwater in storage (DWR 2003).

Groundwater Quality

Groundwater quality is monitored at over 20 wells in Yolo County (YCFCWCD 2006). Groundwater in the Yolo Subbasin of the Sacramento Valley Basin is characterized by presence of sodium magnesium, calcium magnesium, or magnesium bicarbonate. The quality is generally good for agricultural and municipal uses, though it is “hard” to “very hard” overall. Hardness values exceeding 180 part per million (ppm) calcium carbonate ($CaCO_{3)}$ have been detected in Yolo County groundwater (DWR 2003).

Total Dissolved Solids

Total dissolved solids (TDS) concentrations give a general sense of water quality. TDS is regulated under a secondary maximum contaminant level (mcl) of 500 milligrams/liter which is enforceable for delivery to community water systems. Concentrations exceeding 500 ppm have been detected in the Southern Sacramento River Subbasin (Yolo County 2005). Note: MCL and ppm are functionally equivalent measures of water quality constituents.

Nitrates

In general, nitrate concentrations in Yolo County groundwater are less than the CalEPA mcl of 45 ppm. The shallower aquifers in eastern Yolo County have higher nitrate concentrations relative to other locations. Nitrate concentrations averaging over 40 ppm are found in shallower wells located in the Southern Sacramento River Subbasin.

Electrical Conductivity

Electrical Conductivity (EC) is generally related to TDS and indicates the amount of dissolved ions within the water. EC averages in the shallow aquifer zone are 1,470 micromhos/centimeter (µmoh/cm). EC averages in the intermediate zone are approximately 1,200 µmoh/cm in the Southern Sacramento River Subbasin. EC values decline with depth in this basin (YCFCWCD 2006).

Manganese

Manganese is a naturally occurring constituent in groundwater and has a secondary mcl of 50 parts per billion (ppb). Within most of Yolo County, manganese concentrations in groundwater are generally below the mcl. Manganese concentrations above 100 ppb have been detected in groundwater on the eastern edge of the County, in the Southern Sacramento River Groundwater Subbasin.

Iron and Boron

Iron and boron are naturally occurring constituents in groundwater, but boron concentrations can be increased due from wastewater, fertilizers, and pesticides. Iron has a secondary mcl of 0.3 ppm for public drinking water systems. Boron is not regulated but is a constituent of concern in agriculture due to its toxicity to plants at relatively low concentrations. Iron concentrations have exceeded the mcl in some of the groundwater samples taken from wells in the Basin. Notable differences in boron concentrations between zones are also present in the basin, where boron values decline with depth.

4.12.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to groundwater resources apply to the alternatives under consideration.

State

The following State plans, policies, regulations, or laws related to groundwater resources apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Porter-Cologne Water Quality Control Act – Requires the Regional Water Quality Control Boards (RWQCBs) to develop basin plans and water quality objectives.
- Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan) – Describes official designated beneficial uses for specific surface water and groundwater resources.
- Groundwater Management Act, as amended – Requires local agencies to develop a groundwater management plan for basins as defined in DWR Bulletin 118.

- Sustainable Groundwater Management Act – Provides a framework for long-term sustainable groundwater management and mandates the formation of Groundwater Sustainability Agencies (GSAs) and Groundwater Sustainability Plans (GSPs).

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to groundwater resources are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County 2030 General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding groundwater are relevant to project design, construction, and/or impact analysis (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

- Yolo County Integrated Regional Water Management Plan (IRWMP) – Portions of the IRWMP regarding groundwater are relevant to the project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

4.12.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

This evaluation of groundwater resources 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 and the magnitude, context, intensity, severity, and duration of activities related to the construction and operation of this project.

There were no comments regarding groundwater resources received in response to the NOP/NOI or during the scoping period for this project. Other sections, including Section 4.13, "Hazards and Hazardous Materials," Section 4.14, "Hydrology, Hydraulics, and Flood Risk Management," and Section 4.22, "Water Quality," complement the information provided herein and provide additional discussion.

Basis of Significance

The threshold for determining the significance of impacts for this analysis is based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to groundwater resources if they would:

- 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 preexisting nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted.

Issues Not Discussed Further in this EIS/EIR

Groundwater Sustainability—The Yolo Subbasin is listed as a high-priority basin according to the Final Statewide Basin Prioritization (DWR 2016i). Under the Sustainable Groundwater Management Act, basins listed as high- or medium-priority must establish GSAs by June 30, 2017. The Subbasin will be reprioritized in 2017 based on the updated Basin boundaries approved in 2016. The Subbasin will likely continue to be either medium- or high-priority.

The GSAs, made up of one or more local agencies overlying a groundwater basin, will be required to develop GSPs. GSAs responsible for high- and medium-priority basins must adopt GSPs within 5 to 7 years, depending on whether the basin is in critical overdraft. The Yolo Subbasin is not listed as a critically overdrafted basin by DWR (DWR 2016i) thus, a GSP is not required until January 31, 2022. The GSA structure for the Subbasin has not yet been established and therefore is not discussed further in this EIS/EIR.

Impact Analysis

Table 4.12-1 provides a summary of groundwater resource impacts and mitigation measures for all alternatives under consideration.

Table 4.12-1. Summary of Impacts and Mitigation Measures—Groundwater Resources

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
GW-1: Possible Long-term Effects on Groundwater Levels Resulting from Installation of Slurry Cutoff Walls	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
LTS = less than significant
NI = no impact
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact GW-1: **Possible Long-term Effects on Groundwater Levels Resulting from Installation of Slurry Cutoff Walls.**

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to the installation of cutoff walls.

Alternatives 2 through 5 – All Action Alternatives

Groundwater Levels and Groundwater-dependent Wetlands

Groundwater levels in the project site and vicinity vary seasonally and are highly influenced by precipitation, drainage, soil texture, and profile; proximity to the Sacramento River and Tule Canal; and surface water levels. The action alternatives include construction of new levee structures which may include cutoff walls extending to a depth of up to 120 feet below ground surface. After construction, these cutoff walls have the potential to affect groundwater level conditions in the project site and vicinity. Historic groundwater and river stage data were used to analyze the nature of groundwater levels and flow under existing conditions, describe the nature of potential changes to groundwater levels and flow under project conditions, and analyze whether these changes could cause a significant impact to groundwater resources in the project site and vicinity.

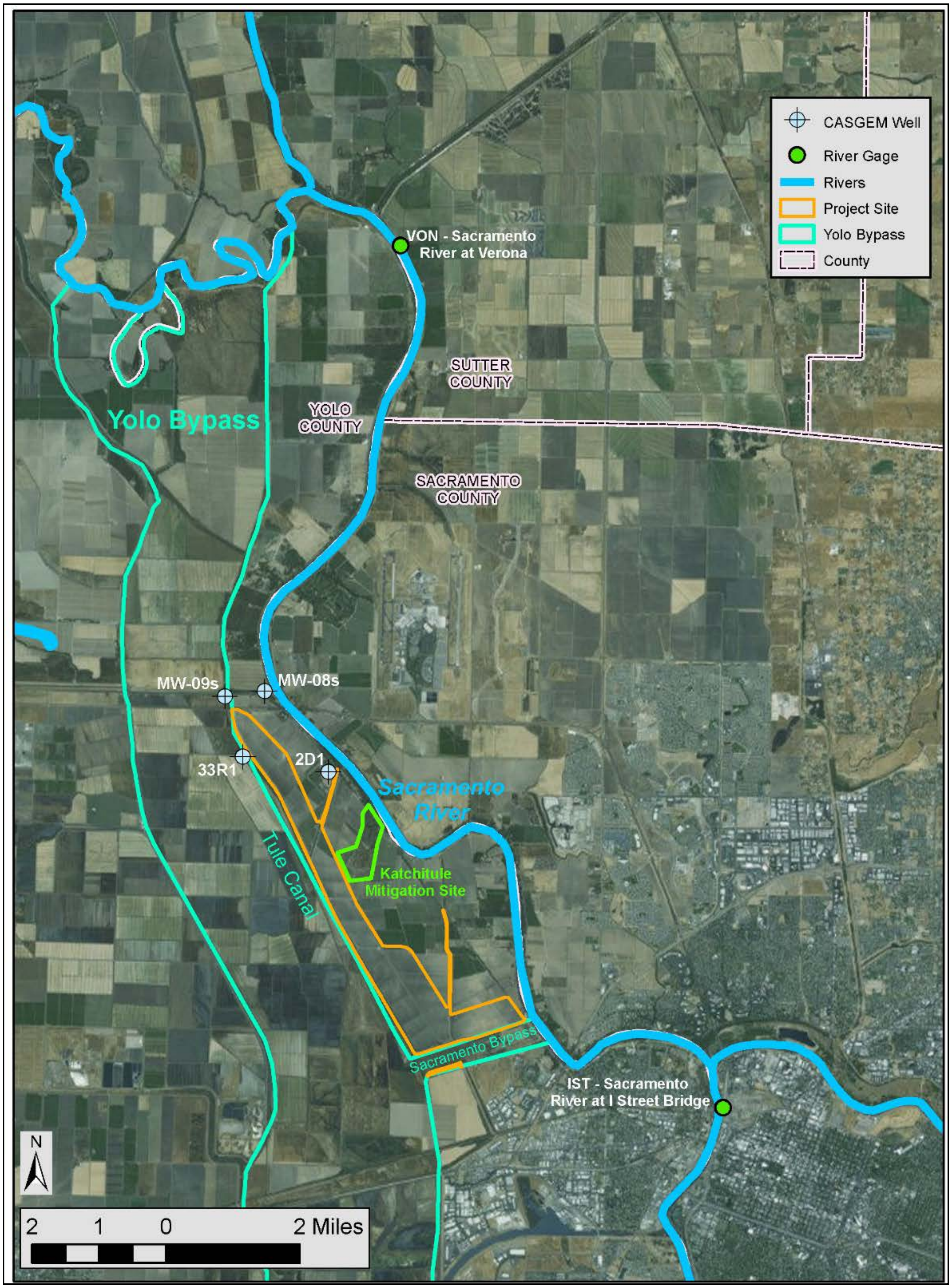
Katchituli Oxbow Restoration Mitigation Site

An existing mitigation site, the Kachituli Oxbow Restoration Mitigation Site, is located to the east of and midway along the alternative setback levee alignments, between the alternative levee alignments and the Sacramento River (please refer to Figure 4.12-1). The Kachituli Oxbow Restoration Mitigation Site is an environmental restoration site that has been transformed from a degraded agricultural area into a functioning and a stable oxbow habitat. The mitigation site does not require irrigation and is sustained only by groundwater flows and natural precipitation. The low-flow channel of the oxbow was designed to collect water from the surrounding soils and the watershed. (McGuirk 2014.)

Analysis of Cutoff Wall Effects on Groundwater

The source of groundwater supply to the Katchituli Oxbow Restoration Mitigation Site and the surrounding area could come from the adjacent Sacramento River if the river is losing (flow away from the river), or the supply could come from areas west of the wetlands if the river is gaining (flow toward

Figure 4.12-1. Location of Wells and Stream Gages Used for Groundwater Analysis

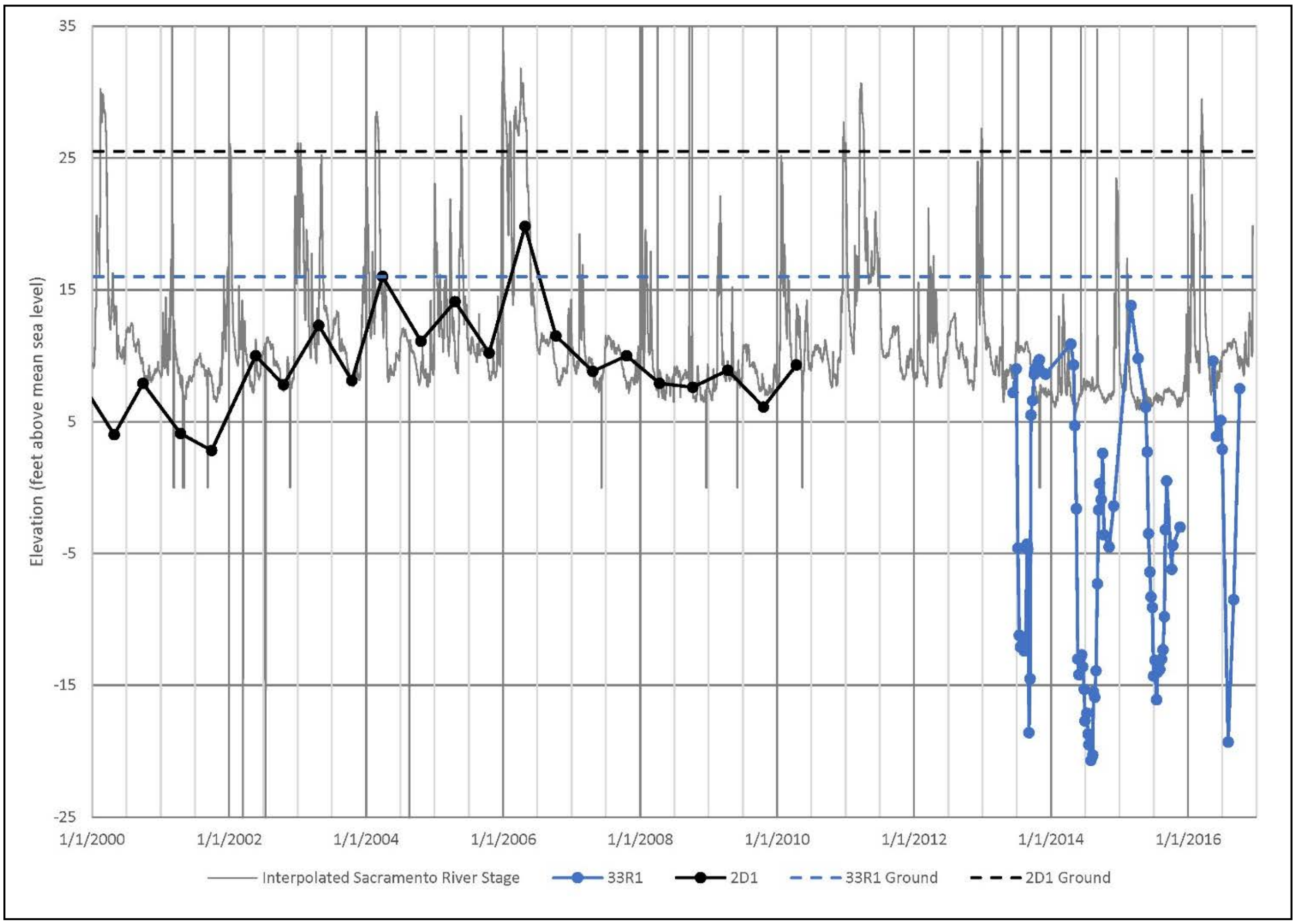


Source: California Department of Water Resources 2016c the river). Groundwater contour maps were inspected to determine groundwater flow direction in the project vicinity. However, these contours lack the local resolution necessary and are typically representative of groundwater conditions in deeper aquifers.

To analyze local conditions in the shallow aquifer, groundwater-level information from the California Statewide Groundwater Elevation Monitoring (DWR 2016j) program was gathered for shallow wells close to the project site and Katchituli Oxbow Restoration Mitigation Site. Figure 4.12-1 shows the locations of the wells.

To assess the connection of the groundwater wells to the river, Sacramento River stage data were downloaded from the California Data Exchange Center (CDEC) (CDEC 2016). Hourly river stage information was available at two gages, Verona (VON) and I Street (IST), located upstream and downstream of the site. Using the distances from the site to the gages, the approximate stage near the site was generated using a linear interpolation, shown in Figure 4.12-2.

Figure 4.12-2. River Stage and Groundwater Level Correlation – Wells 2D1 and 33R1



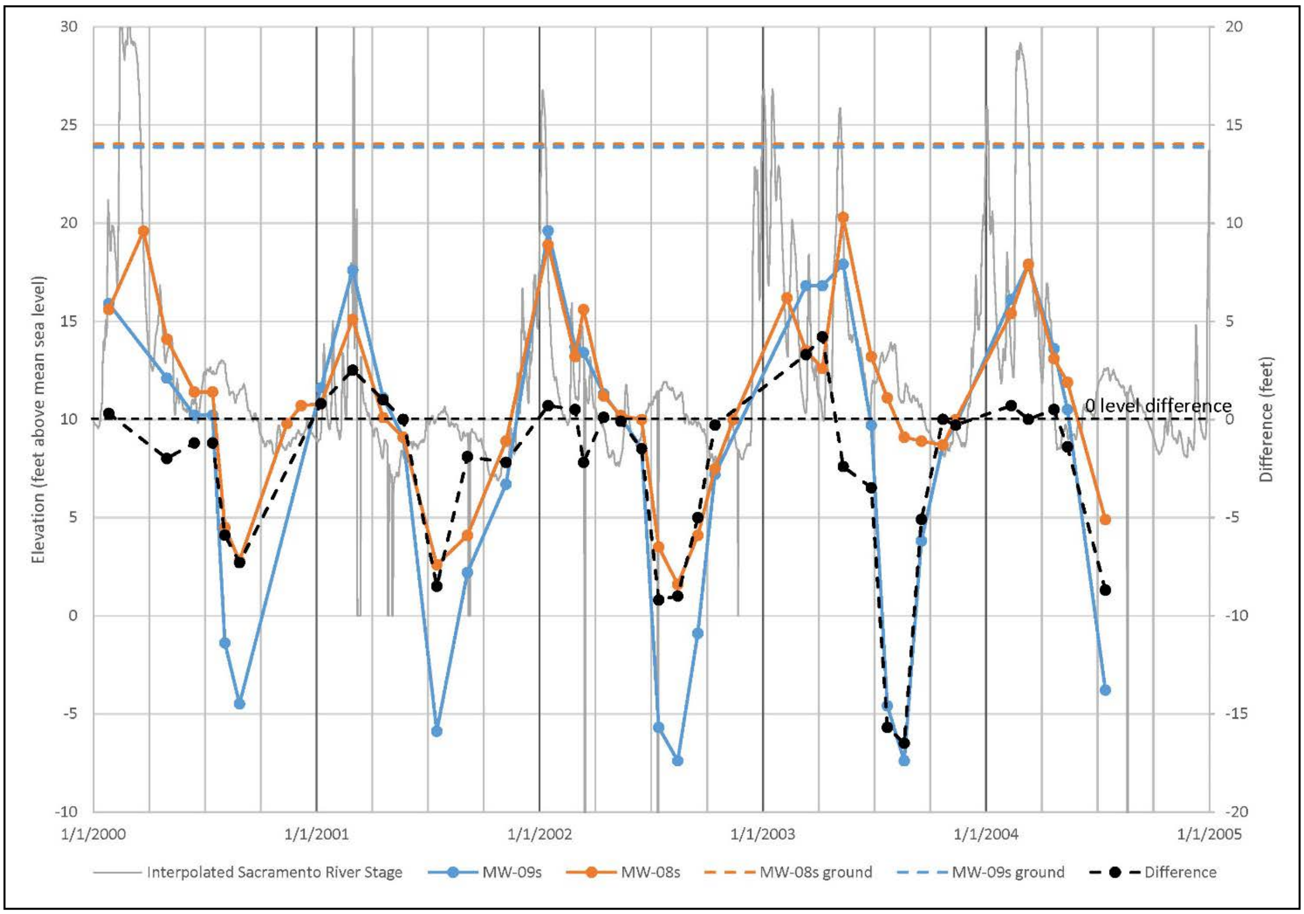
Sources: California Date Exchange Center 2016, California Department of Water Resources 2016j

Figure 4.12-2 also shows water-level measurements at two wells located close to the site. Well 2D1 is located about 1,200 feet from the Sacramento River and correlates to river stage, indicating it is hydrologically connected to the river. Well 33R1 is located about 5,000 feet from the river, and water levels correlate to river levels during winter, with a drawdown during summer and fall of 20 to 30 feet.

Data from Figure 4.12-2 indicate water levels during a majority of the year are below the river stage and gradients are away from the river (losing stream).

The depths of wells shown in Figure 4.12-2 are unknown and the water-level data were not recorded simultaneously at both wells, therefore water levels at two wells located farther north of the site were plotted to further verify the direction of flow. Thus, Figure 4.12-3 shows water levels at wells MW-08s and MW-09s, which are located an estimated 600 and 3,700 feet from the river at depths of 52 and 80 feet, respectively. These wells have temporally concurrent water-level data. The dashed, black line on Figure 4.12-3 indicates the difference between the two measurements, with negative values indicating flow away from the river and positive values indicating flow toward the river. These data show that flow during most times of the year is away from the river, with occasional flow toward the river during spring. This indicates that the aquifer may fill during winter floods and temporarily flow back toward the river after the flood waters recede.

Figure 4.12-3. River Stage and Groundwater-level Correlation – Wells MW-08s and MW-09s



Sources: California Data Exchange Center 2016, California Department of Water Resources 2016j

Based on this analysis, the Katchituli Oxbow Restoration Mitigation Site, under current conditions, is likely supplied with significant water from the filling of the shallow aquifer during winter, but groundwater levels may be seasonally lower during summer. Based on water levels shown in Figure 4.12-2 at Well 33R1 (the closest well to the site that is not adjacent to the river), yearly seasonal drawdown could be as much as 30 feet by the end of summer, under existing conditions.

If on-site subsurface test borings indicate a clay layer is found at a depth of 120 feet and a slurry wall is constructed to that depth, the wall could potentially impede flow to and from the river at shallow depths. However, there are no regionally continuous barriers to vertical groundwater flow (Yolo County 2005) so this effect would be localized. In this case, flow under and around the cutoff wall would continue to allow regional recharge and discharge to and from the river and prevent groundwater from “backing up” on the east side of the cutoff wall. Additionally, cutoff walls, if necessary, may be discontinuous along the new setback levee alignment based on geotechnical conditions which could further reduce or negate any short- or long-term increases or decreases to groundwater levels in the project site and vicinity. Thus, there would be no substantial interruption to existing subsurface flow patterns that currently support groundwater well use in the project site, or to the wetland and upland vegetation in the Katchituli Oxbow Restoration Mitigation Site, due to the hydrologic connection to the Sacramento River.

The Katchituli Oxbow Restoration Mitigation Site could potentially experience slightly higher groundwater levels in late summer or early fall under implementation of the action alternatives. However, this would not result in any net loss of wetlands or waters of the United States and could possibly provide a beneficial impact for the Katchituli Oxbow Restoration Mitigation Site. If any increase in groundwater levels occurred due to cutoff wall installation along the new setback levee, it would most likely affect vegetation (willows) around the margins of the existing wetlands in the Katchituli Oxbow Restoration Mitigation Site and willows are able to withstand periodic and extended inundation of their root zone and above-ground vegetation.

Since groundwater levels in the project site and vicinity are heavily influenced by surface-to-groundwater interactions with the Sacramento River, and this interaction and resultant groundwater levels would not be greatly affected by cutoff walls constructed along the new setback levee alignment, this impact is **less than significant.**

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Agricultural Effects from Changes in Groundwater Level

High water tables and poor drainage can limit crop selection options, lead to crop loss or damage, contribute to pest infestations (e.g., fungus and mildews), and change soil conditions (anaerobic). The interaction between crops and the water table depends on crop type and the water-holding capabilities of the soil. Water table elevations must be below the crop root zone to maximize growth and yield and minimize root rotting from oversaturation (University of California Cooperative Extension 1986).

Permanent nut and fruit crops, as well as annual crops, are grown in the Lower Elkhorn Basin and there are currently no known issues regarding groundwater encroachment on the root zone (waterlogging) which occurs in other areas of California, including extensive areas of the Delta. Additionally, according to wells and groundwater-level data discussed previously in this section, depth to groundwater in the area is generally 10-50 feet, varying seasonally (see Figures 4.12-2 and 4.12-3). Minor fluctuations in groundwater levels are not expected to encroach on the root zone of crops in the setback area. General ranges of crop root depths in the Delta and surrounding areas are detailed in Table 4.12-2, and these depths are out of the range of representative groundwater levels in the project site.

For the reasons stated above, this impact is considered **less than significant**.

Table 4.12-2. Crop Type Root Depths (in feet)

Crop Type	Lowlands	Uplands
Pasture	2.0	2.0
Alfalfa	4.0	6.0
Field	2.0	4.0
Grain	2.0	4.0
Rice	1.0	2.0
Truck	4.0	5.0
Tomatoes	4.0	5.0
Orchards	5.0	6.0
Vineyards	4.0	5.0
Safflower	4.0	5.0
Corn	3.0	4.0
Non-irrigated Pasture	2.0	2.0
Non-irrigated Vineyards	4.0	5.0
Non-irrigated Orchards	5.0	6.0
Dry Grass	2.0	2.0

Source: California Department of Water Resources 1995

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Residual Significant Impacts

The impacts from possible long-term effects on groundwater levels resulting from installation of slurry cutoff walls (Impact GW-1) would be less than significant. Therefore, no residual significant impacts would occur.

4.13 Hazards and Hazardous Materials

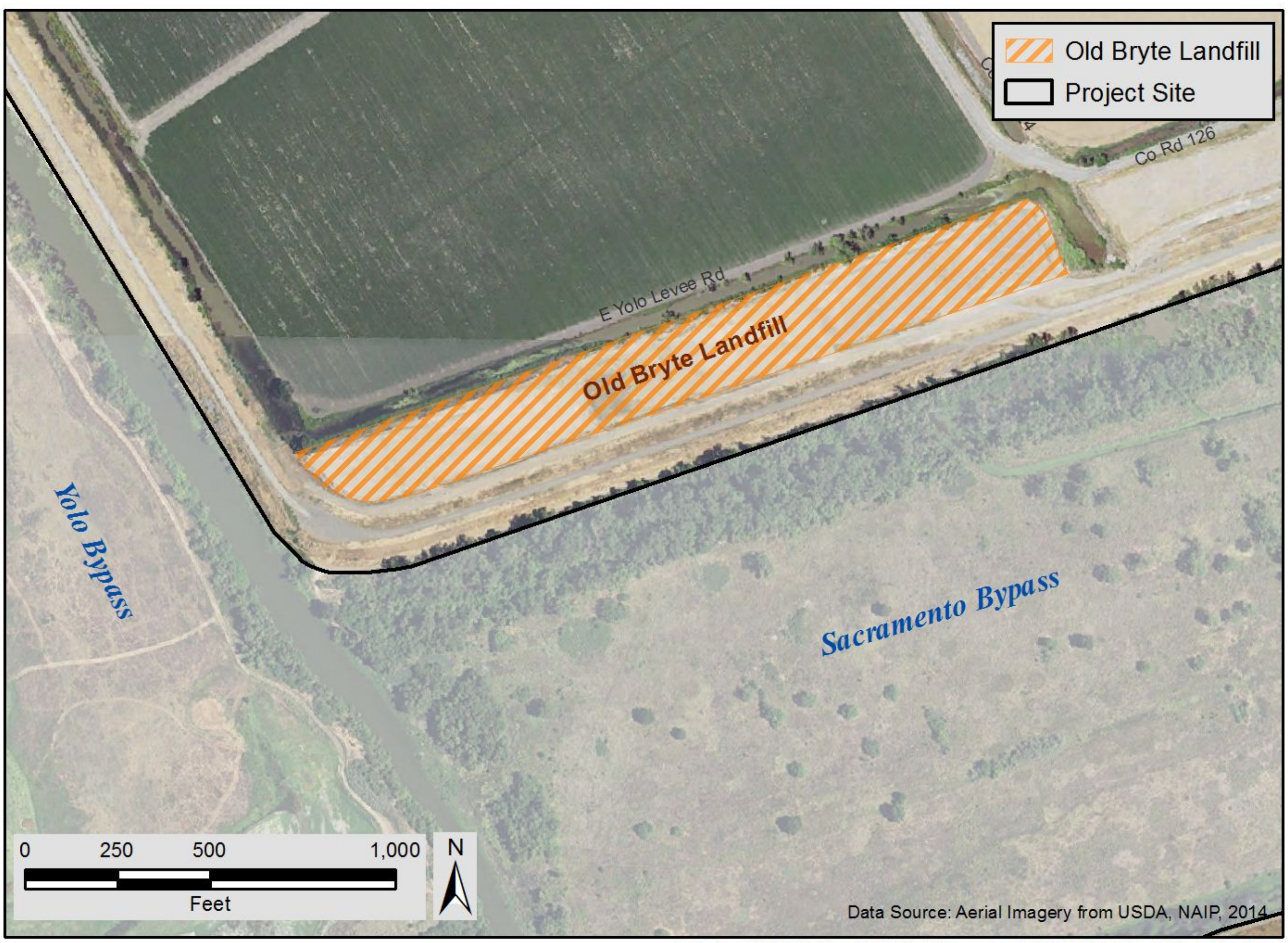
4.13.1 Environmental Setting

Hazardous Materials Sites

Former Old Bryte Landfill

The former Old Bryte Landfill is located at 50035 County Road 126, within the project site, adjacent to the northwestern side of the Sacramento Bypass (see Figure 4.13-1**)**. Use of the site as a landfill was terminated in 1974. The U.S. Environmental Protection Agency (EPA) determined that the landfill should not be listed on the National Priorities List, that no further Federal action was required, and in 2013 archived the landfill site on its database (EPA 2016). However, the landfill has been the subject of numerous Yolo County Environmental Health Department violations, cleanup and abatement orders, and Central Valley Regional Water Quality Control Board (CVRWQCB) review (California Department of Toxic Substances Control [DTSC] 2016, State Water Resources Control Board [SWRCB] 2016, Weston Solutions, Inc. 2012). The summary provided below was obtained from the *Preliminary Assessment Report, Old Bryte Landfill, West Sacramento, California* prepared by Weston Solutions, Inc. (2012).

Figure 4.13-1. Former Old Bryte Landfill



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Source: GEI Consultants, Inc. 2016

In the 1940s, the approximately 17-acre site was leased to Fred Albericci of Albericci Garbage Service, a private garbage service operating in east Yolo County and serving the Communities of Bryte, Broderick, West Sacramento (prior to incorporation of the City of West Sacramento), and the surrounding area. At some point, garbage disposal functions were assumed by the West Sacramento Sanitation District, which later consolidated into the East Yolo County Community Services District and then the City of West Sacramento once it was incorporated. The landfill accepted domestic, municipal, and commercial waste. Wastes were piled, burned, and then leveled. Use of the site as a landfill was terminated in 1974. Sometime after 1974, the property was leased to Clifford Rose for use as a cardboard recycling storage facility. Mr. Rose later abandoned the site, leaving a substantial amount of trash, mostly consisting of cardboard and wooden pallets.

Four on-site groundwater monitoring wells were installed in 1990. During a 2001 site investigation conducted by California Integrated Waste Management Board (CIWMB), scattered metallic debris, piles of demolition waste, agricultural metallic products, and household wastes were observed throughout the site. Broken glass was visible under the grassy vegetation and evidence of burning was present. In addition, several empty 55-gallon drums were observed scattered throughout the site. Trench logs indicated an overall waste depth from ground surface to 13 feet with an average waste depth ranging from 5.9 to 7.2 feet. CIWMB determined that approximately 127,000 cubic yards (cy) of burn ash and waste are present.

Lead, zinc, polychlorinated biphenyls (PCBs), and dioxins were detected in samples collected from the site at concentrations that exceeded both the Total Threshold Limit Concentration (TTLC) and the Soluble Threshold Limit Concentration (STLC). (The TTLC and STLC are used for hazardous waste characterization under California State regulations.) CIWMB also concluded that the burn ash material would likely be classified as a California hazardous waste if it were to be excavated for disposal.

CIWMB recommended that a cover be placed on the site to meet State minimum standards and to prevent exposure to the public and the environment. Since that recommendation was made, the soil cover was emplaced. However, CIWMD's recommendation was based on the fact that the existing levees on the south and west sides of the former landfill ensured that water diverted through the Sacramento Bypass would not reach the landfill and therefore mobilize contaminants.

In April 2016, DTSC signed a Voluntary Cleanup Agreement Amendment with the Sacramento Area Flood Control Agency (SAFCA) to provide oversight in development of a Remedial Investigation/Feasibility Study (RI/FS) for the former Old Bryte Landfill. SAFCA has proposed, and is the process of discussions with DTSC related to, a Presumptive Remedy that would entail the following actions:

- treating the Resource Conservation and Recovery Act (RCRA) hazardous waste to make it non-RCRA waste as part of the removal process;
- consolidating the waste under an appropriate cap;
- recording a land use covenant to limit land use;
- moving the approximately 60,000 cy of contaminated, treated waste approximately 1,500 feet to a location that would be outside of the Yolo Bypass floodplain; and

- entering into an Operation and Maintenance Agreement to maintain the area as a Corrective Action Management Unit (CAMU).

In addition, further samples from on-site groundwater monitoring wells would be submitted for laboratory analysis as part of the RI/FS.

The work described in the Voluntary Cleanup Agreement Amendment (described in this EIS/EIR as the Bryte Landfill Remediation) is expected to be completed during 2018 or 2019. The Bryte Landfill Remediation is a foreseeable, separate project that is included in the No Action Alternative, which is the baseline for NEPA comparison. However, because this remediation had not occurred at the time the NOP for the project was issued in 2016, it is not included in the CEQA baseline for analysis.

In August 2017, SAFCA released an Initial Study/Proposed Mitigated Negative Declaration (IS/Proposed MND) for the Bryte Landfill Remediation Project (SAFCA 2017). The IS/Proposed MND identifies a location for the CAMU that would be outside of the expanded Yolo Bypass floodplain under Alternatives 2 and 5, but inside the expanded Yolo Bypass floodplain in Alternatives 3 and 4 (see Figure 4.13-2). Remediation of the landfill and construction of the CAMU would likely be completed after this EIS/EIR has been certified and an alternative selected in a Record of Decision (ROD). In the event that Alternative 3 or 4 is selected, DTSC would require that the CAMU site be relocated outside the floodway. DTSC's criteria for design of the CAMU do not permit use of an area frequently subject to inundation and, therefore, would not be allowed to be located within the footprints of either Alternatives 3 or 4. In the event that Alternative 3 or 4 is selected for the LEBLS project, SAFCA will work with DWR to adjust the proposed location of its CAMU outside of the Yolo Bypass.

Other Hazardous Material Sites

A search was performed by GEI Consultants of the GeoTracker database, which is a groundwater information management system that is maintained by SWRCB. Data relating to leaking underground storage tanks and other cleanup activities are part of the information that SWRCB is required to maintain under California Public Resources Code (PRC) Section 65962.5 (i.e., the "Cortese List"). GEI Consultants also performed a search of the Hazardous Waste and Substances Site List (i.e., the EnviroStor database), which is maintained by DTSC as part of the requirements of PRC Section 65962.5. The results are listed in Table 4.13-1.

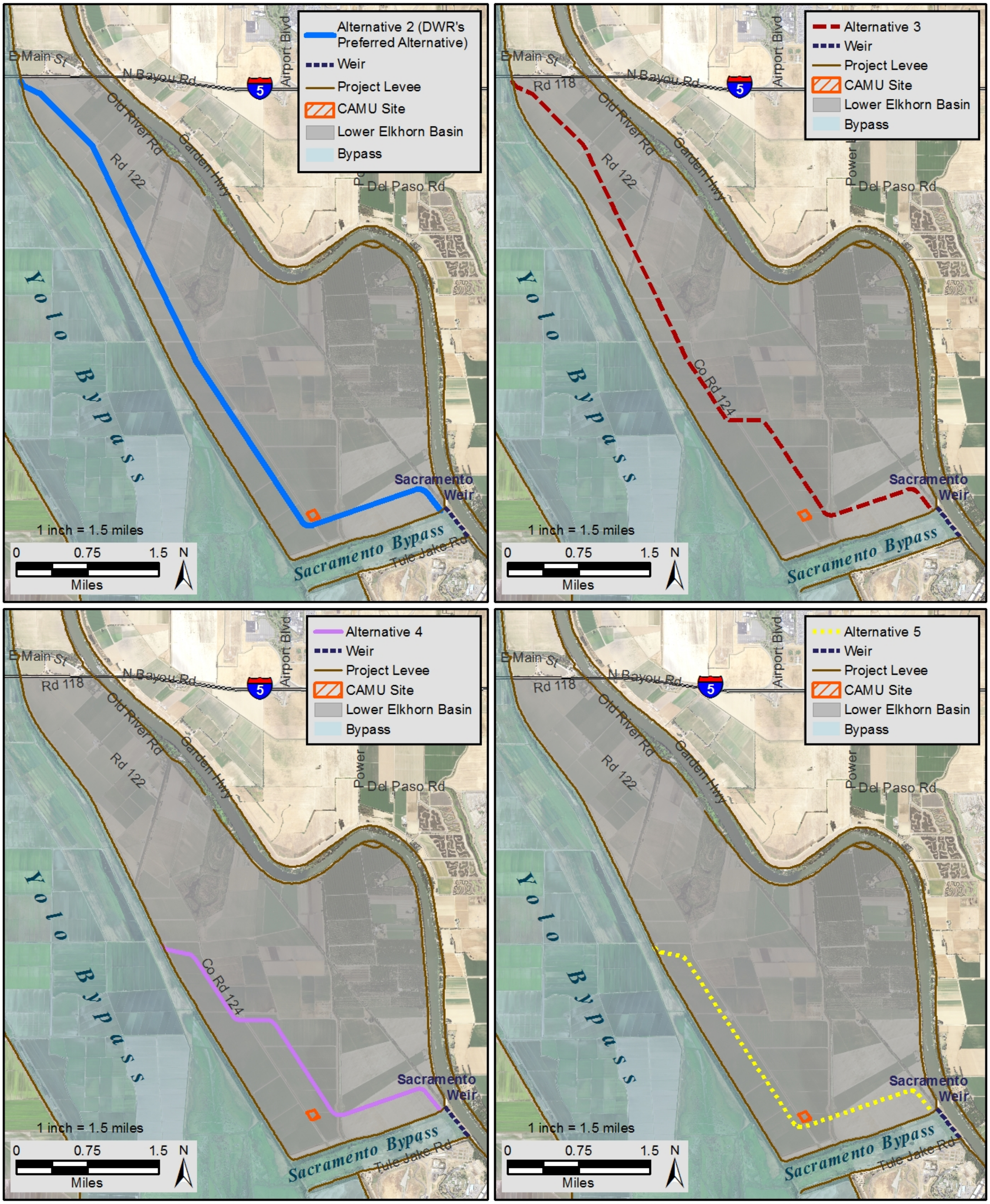
Hazards Associated with Agricultural Land Uses

The project site has historically been and is currently being used for agricultural purposes. Agricultural land use typically involves the application of pesticides and herbicides and the use of fuels, lubricants, and other fluids associated with the operation and maintenance of agricultural equipment. The storage of these materials in the large quantities necessary for agricultural operations frequently requires the use of aboveground and/or underground storage tanks. These tanks could pose a health hazard to workers and a hazard to the environment if encountered during construction activities. In addition, agricultural land uses often require wells, underground piping, and other subsurface infrastructure that could become a hazard if encountered during construction activities.

Lead and Asbestos

Lead is a highly toxic metal that was used until the late 1970s in a number of products, most notably paint. The use of lead as an additive to paint was discontinued in 1978 because human exposure to lead was determined by EPA and the Occupational Health and Safety Administration (OSHA) to be an adverse human

Figure 4.13-2. Bryte Landfill Corrective Action Management Unit Location



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Source: GEI Consultants, Inc., 2017

Table 4.13-1. Summary of Hazardous Materials Database Searches[1]

Site Name and Location	Type of Contamination	Affected Media	Case Status	Summary
On-Site Hazardous Materials				
Agriventure 1341 Property Site No. SL0611538008 Road 124, Yolo County	Petroleum hydrocarbons as diesel (TPHd), benzene, toluene, ethylbenzene, and xylene	Soil and groundwater	Closed	Fuel for agricultural operations was reportedly stored in three aboveground storage tanks. Contaminated soil was excavated and backfill material was amended with an oxygen release compound to enhance bioremediation of the TPHd in soil and groundwater. Subsequent testing indicated that all constituents of concern were either non-detectable or were below their respective screening levels.
Off-site Hazardous Materials Within 0.25 Mile				
Sac Engr Area-Weir Area Site Nos. J09CA0798 and 80000391 111 North Harbor Boulevard, West Sacramento	Gasoline	Potential soil and groundwater	Closed	The site is located on the south side of the Sacramento Bypass, and east of County Road 22, and is not located on the project site. This site was formerly occupied by USACE. After USACE vacated the property, a 1,200-gallon underground storage tank was apparently used by another property owner to store gasoline. The gasoline in the tank was removed in 2012 according to Yolo County Department of Environmental Health procedures, and the empty tank was transported to a disposal yard in Richmond, CA. The tank was determined to be in good condition at the time of its removal, and laboratory testing of soil and groundwater samples obtained at the time of removal indicated that no soil or groundwater contamination had occurred.

Note:
1 The Old Bryte Landfill is discussed separately above.
Sources: California Department of Toxic Substances Control 2016; Central Valley Regional Water Quality Control Board 2010; Cook Environmental Services, Inc. 2012; State Water Resources Control Board 2016

health risk, particularly to young children. Primary sources of lead exposure are deteriorating lead-based paint, lead-contaminated dust, and lead-contaminated soil. Demolition of structures containing lead-based paint requires specific remediation activities regulated by Federal, State, and regional and local laws.

Asbestos is designated as a hazardous substance when the fibers have potential to come in contact with air because the fibers are small enough to lodge in lung tissue and cause health problems. The presence of asbestos-containing materials (ACMs) in existing buildings poses an inhalation threat only if the ACMs are in a friable state. If the ACMs are not friable, then there is no inhalation hazard because asbestos fibers remain bound in the material matrix. People exposed to asbestos may develop lung cancer and mesothelioma. The risk is proportional to the cumulative inhaled dose (quantity of fibers), and also increases with the time since first exposure. Although there are a number of factors that influence the disease-causing potency of any given asbestos (such as fiber length and width, fiber type, and fiber chemistry), all forms are carcinogens. Emissions of asbestos fiber to the ambient air, which can occur during activities such as renovation or demolition of structures made with ACMs (e.g., insulation), are regulated in accordance with EPA's Asbestos National Emission Standards for Hazardous Air Pollutants.

Due to the age of the on-site residences and associated structures that would be demolished as part of the project, lead-based paint and ACMs may be present.

Schools

There are no schools within 0.25 mile of any proposed facilities in the Lower Elkhorn Basin. The nearest schools are Bryte Elementary School and Holy Cross Academy in West Sacramento, approximately 1.6 miles southeast of the project site.

Airports and Airstrips

Sacramento International Airport is located northeast of the project site in Sacramento County, north of I-5 on Airport Boulevard. The nearest runway is approximately 1.95 miles from the project site. The airport is publicly owned by Sacramento County and is open for public use. The airport experienced an operation rate of approximately 294 flights per day for the 12-month period ending June 2015. (AirNav 2016a.) The northern half of the proposed new Yolo Bypass East Levee setback (under DWR's Preferred Alternative and Alternative 3) would be located within Referral Area 1, and Safety Zones 4 (Outer Approach/Departure) and 6 (Traffic Pattern). Referral Area 1 encompasses various safety hazards, including the Federal Aviation Administration's (FAA's) 10,000-foot separation distance for wildlife attractants. (Sacramento Area Council of Governments [SACOG] 2013.) The southern portion of the project site under all of the action alternatives is located in Referral Area 2. According to the FAA's wildlife strike database, there were 184 wildlife strikes reported at Sacramento International Airport in 2015; five of those strikes were from bats, the remaining 179 were from birds. Two of the strikes resulted in substantial damage to the aircraft; the remainder caused minor to no damage. (FAA 2016.) Depending on the alternative selected, the proposed new Yolo Bypass East Levee setback would be located approximately 2.02–3.08 miles southwest of the southern end of the nearest airport runway.

The CHP Academy Airport is located at 3500 Reed Avenue in West Sacramento, adjacent to the Sacramento Bypass. The academy airport is publicly owned by the California Highway Patrol, but is intended for private use only. It contains two paved runways that are 1,400 and 1,200 feet long, respectively. There are two aircraft and one helicopter based at the field. (AirNav 2016b.) Horizontal Directional Drilling (HDD) to relocate the Sacramento International Airport pipeline and installation of riprap along the south Sacramento Bypass Training Levee would occur immediately adjacent to and west of the CHP Academy Airport. Degrading the existing Sacramento Bypass North Levee and installation of riparian plantings after the levee is degraded would occur approximately 2,400 feet north of the CHP Academy Airport.

Wildland Fire Hazards

The Lower Elkhorn Basin primarily consists of agricultural land used for row crops, with scattered rural residences and associated landscaping. According to the California Department of Forestry and Fire Protection (CAL FIRE), the Lower Elkhorn Basin is within a local responsibility area, and CAL FIRE has not zoned most of the Lower Elkhorn Basin with respect to fire hazard severity. However, the northern portion of the Tule Canal, the Katchituli Oxbow Restoration Mitigation Site, Elkhorn Regional Park, and the Sacramento Bypass have each been classified as moderate fire hazard severity zones by CAL FIRE. (CAL FIRE 2007.)

Vector-borne Diseases

West Nile virus (WNV) is a mosquito-borne disease that is found throughout the United States. About 20 percent of people may become ill 3–15 days after being bitten by an infected mosquito. Symptoms can include: fever, headache, body aches, and mild skin rashes. Less than 1 percent of WNV cases lead to the more critical form of the disease. There were no human cases of WNV in Yolo County in 2016, but nine human cases were reported in 2015 and 15 human cases were reported in 2014. (Fight the Bite 2016.)

The Zika virus is an emerging infectious disease that is transmitted by *Aedes aegypti* (yellow fever) mosquitoes and *Aedes albopictus* (Asian tiger) mosquitoes. For most people, the Zika virus causes only a brief, mild flu-like illness, but serious Zika-related birth defects are occurring worldwide, when pregnant woman are infected with the virus. The mosquitoes that transmit the Zika virus are not native to California. However, since 2011 they have been detected in several counties in the San Joaquin Valley, as well as Los Angeles, Orange, and San Diego Counties. An *Aedes* mosquito can only transmit the Zika virus after it bites a person who has this virus in his or her blood. Thus far in California, Zika virus infections have been documented only in people who were infected while traveling outside the United States or through sexual contact with an infected traveler. To date, there has been no local mosquito-borne transmission of Zika virus in California. (California Department of Public Health 2016.)

4.13.2 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to hazards and hazardous materials apply to the alternatives under consideration, as listed below (see Appendix C, “Summary of Applicable Laws, Regulations, Policies, and Plans,” for additional information).

- Resource Conservation and Recovery Act – Applies to project construction and the impact analysis.
- Federal Emergency Planning and Community Right to Know Act of 1986 – Applies to project construction and the impact analysis.
- U.S. Department of Labor Occupational Safety & Health Administration – Applies to project construction and the impact analysis.
- Asbestos National Emission Standards for Hazardous Air Pollutants – Applies to project construction and the impact analysis.
- Federal Aviation Regulations Title 14 Part 77 (Objects Affecting Navigable Airspace) – Applies to project construction and the impact analysis.

State

The following State plans, policies, regulations, or laws related to hazards and hazardous materials apply to the alternatives under consideration, as listed below (see Appendix C, “Summary of Applicable Laws, Regulations, Policies, and Plans,” for additional information).

- Hazardous Waste Control Act – Applies to project construction and the impact analysis.

- California Hazardous Substances Account Act – Applies to project construction and the impact analysis.
- California Health and Safety Code Division 20, Chapter 6.7 and California Code of Regulations (CCR) Title 23, Division 3, Chapters 16 and 18 (Underground Storage Tanks) – Applies to project construction and the impact analysis.
- CCR Title 8 (Cal/OSHA) – Applies to project construction and the impact analysis.
- CCR Title 14, Division 2, Chapter 4, Article 3, Section 1723.1 (Plugging of Oil or Gas Zones) – Applies to the impact analysis.
- California Government Code Sections 51175-51189 (Wildland-Urban Interface Fire Zones) – Applies to the impact analysis.
- California Government Code Section 65962.5 (Cortese List) – Applies to the impact analysis.
- California PRC Sections 4201-4204 (Fire Hazards) – Applies to the impact analysis.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to hazards and hazardous materials are relevant to the analysis of the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Sacramento International Airport Land Use Compatibility Plan (ALUCP) (SACOG 2013) – Relevant to the impact analysis.
- Yolo-Solano Air Quality Management District Asbestos Rules 4.3 and 9.9 – Relevant to the impact analysis.
- Yolo County General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding hazards and hazardous materials are relevant to project design, construction, and/or the impact analysis of the project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

4.13.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

The assessment of impacts related to hazards and hazardous materials considered the locations, duration, and types of project-related activities in relation to known hazardous materials sites (derived from databases maintained by DTSC, SWRCB, and EPA); ALUCPs prepared by SACOG; school district location maps; CAL FIRE fire-hazard severity zone classifications; mosquito and vector control guidelines from the Sacramento-Yolo Mosquito and Vector Control District (SYMVCD); and data related to natural gas wells from the California Department of Oil, Gas, and Geothermal Resources (DOGGR).

Comment letters received on the NOI/NOP indicated a concern regarding remediation of the former Old Bryte Landfill. Soil contamination investigations at the Old Bryte Landfill have been ongoing since at least 2001. DTSC recently approved an RI/FS for the Old Bryte Landfill which includes removing landfill materials and relocating certain materials to a CAMU. Remediation work is expected to be conducted and completed in 2018 or 2019. This remediation work is included in the No Action Alternative for the purposes of NEPA analysis. All action alternatives assume remediation of the former Old Bryte Landfill (located along the northwestern side of the Sacramento Bypass), which is occurring as part of a separate CEQA action led by SAFCA. DTSC has mandated the cleanup of the Old Bryte Landfill, and the Bryte Landfill Remediation project will be completed irrespective of the LEBLS project. The Bryte Landfill Remediation project therefore has independent utility from the LEBLS project but will consider future floodplain location with respect to the siting of the CAMU.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to hazards and hazardous materials if they would do any of the following:

- create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment or through the routine transport, use, or disposal of hazardous materials;
- emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school;
- be located on a site which is included on a list of hazardous materials sites compiled pursuant to California Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment;
- result in a safety hazard for people residing or working in a project area that is located within 2 miles of a public airport or public-use airport;
- impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or residences are intermixed with wildlands.

In addition to the significance thresholds above, the alternatives under consideration would also have a significant impact related to hazards and hazardous materials if the alternatives under consideration would:

- create a public health hazard from substantially increased exposure to mosquito-borne diseases by substantially increasing the amount of mosquito habitat.

Issues Not Discussed Further in this EIS/EIR

Routine Transport, Use, or Disposal of Hazardous Materials—The project would involve the incidental transport and use of common construction materials such as oils, lubricants, and gasoline, and the use of materials specific to levee improvement, such as bentonite used in slurry mixtures for seepage cutoff walls. Potential impacts of accidental spills associated with this incidental use are analyzed in Impact HAZ-1. However, the project would not involve routine or long-term transport of such materials. None of the project components would involve the transport or use of acutely hazardous materials. Therefore, no impact would occur and this issue is not evaluated further in this EIS/EIR.

Handling of Hazardous Materials within 0.25 Mile of a School—There are no schools within 0.25 mile of any proposed facilities in the Lower Elkhorn Basin. Thus, there would be no impact and this issue is not evaluated further in this EIS/EIR.

Remediation of the Old Bryte Landfill—As described above under “Analysis Methodology,” remediation of the Old Bryte Landfill is being completed in 2018 or 2019 to meet DTSC requirements independent of the LEBLS project, and is incorporated into the No Action Alternative for the purposes of NEPA analysis. Although the Old Bryte Landfill is considered as part of the cumulative analysis in this EIS/EIR (see Chapter 5, “Cumulative Impacts”), the specific mechanisms of remediation and associated environmental impacts are not evaluated further in this EIS/EIR as the Bryte Landfill Remediation project will be completed prior to construction of the LEBLS project.

Potential impacts from interference with emergency access and emergency evacuation plans are addressed in Section 4.20, “Traffic and Transportation.” Airport safety hazards associated with nighttime lighting are addressed in Section 4.2, “Aesthetics.”

Impact Analysis

Table 4.13-2 provides a summary of hazards and hazardous materials impacts and mitigation measures for all alternatives under consideration.

Table 4.13-2. Summary of Impacts and Mitigation Measures—Hazards and Hazardous Materials

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
HAZ-1: Potential Accidental Spills of Hazardous Materials Used during Construction Activities	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities	LTS
HAZ-2: Possible Exposure of People and the Environment to Existing Hazardous Materials, Including Cortese-listed Sites	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	HAZ-2a: Prepare a Worker Health and Safety Plan, and Implement Appropriate Measures to Minimize Potential Exposure to Hazardous Materials HAZ-2b: Properly Remove and Dispose of Asbestos-containing Materials and Materials Coated with Lead-Based Paint HAZ-2c: Implement Remediation of Old Bryte Landfill (CEQA Only) UTL-1: Verify Utility Locations, Coordinate with Affected Utility Providers, Prepare and Implement a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage	LTS
HAZ-3: Possible Contamination of Soil and/or Groundwater from Accidental Destruction of Active, Plugged, or Abandoned Natural Gas Wells	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative Alternative 3: 7-Mile Expanded Setback Full Degrade	PS	HAZ-3a: Abandon or Avoid Active Natural Gas Wells, Provide New Infrastructure to Withstand Flood Flows, and Maintain Well Access HAZ-3b: Avoid Abandoned Natural Gas Wells or Consult with the California Division of Oil, Gas, and Geothermal Resources to Determine Additional Well Plugging Requirements and Implement Recommended Measures	LTS
	Alternative 4: 5-Mile Expanded Setback Partial Degrade Alternative 5: 5-Mile Setback Full Degrade	PS	HAZ-3b: Avoid Abandoned Natural Gas Wells or Consult with the California Division of Oil, Gas, and Geothermal Resources to Determine Additional Well Plugging Requirements and Implement Recommended Measures	LTS

Table 4.13-2. Summary of Impacts and Mitigation Measures—Hazards and Hazardous Materials

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
HAZ-4: Creation of Potential Safety Hazards, Including Possible Birdstrike, in the Vicinity of a Public or Private Airport	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	HAZ-4: Consider FAA Guidelines and Coordinate with Sacramento International Airport and CHP Academy Staff Regarding Hazardous Wildlife Attractants	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
HAZ-5: Creation of Potential Wildland Fire Hazards	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	HAZ-5: Prepare and Implement a Fire Prevention Plan	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
HAZ-6: Creation of a Potential Public Health Hazard from Substantially Increased Exposure to Mosquito-borne Diseases by Substantially Increasing the Amount of Mosquito Habitat	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	HAZ-6: Integrate Best Management Practices for Mosquito Control and Implement Workplace Precautions Against Vector-borne Diseases	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact HAZ-1 Potential Accidental Spills of Hazardous Materials Used during Construction Activities.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to potential accidental spills of hazardous materials during construction activities.

Alternatives 2 through 5: All Action Alternatives

Under all action alternatives, the project would not entail any unusual risks associated with the transport and handling of hazardous materials. Construction equipment such as excavators, bulldozers, drilling rigs, or bobcats would be used for all project components including levee setbacks, levee degrades, borrow activities, County road and utility relocation, new drainage canal installation, erosion repair (riprap installation), and biological habitat mitigation activities. Construction activities would use minor amounts of hazardous materials, such as fuels (gasoline and diesel), oils and lubricants, and cleaners (which could include solvents and corrosives in addition to soaps and detergents) commonly used in construction projects. Bentonite would be used where slurry cutoff walls are being constructed to remediate levee seepage conditions.

Regulations governing hazardous materials transport are included in CCR Title 22, the California Vehicle Code (CCR Title 13), and the State Fire Marshal Regulations (CCR Title 19). Transport of hazardous materials can only be conducted under a registration issued by DTSC. ID numbers are issued by DTSC or EPA for tracking of hazardous waste transporters and for treatment, storage, and disposal facilities that handle hazardous materials. The ID number is used to identify the hazardous waste handler and to track waste from point of origin to final disposal; all material transport takes place under manifest. Businesses that handle hazardous materials are required by law to comply with Federal, State, and local laws, regulations, and policies regarding the handling, storage, reporting, tracking, and cleanup (if any accidental spills occur) of hazardous materials, including preparing a hazardous materials business plan and disclosing hazardous materials inventories. The Yolo County Environmental Health Department is the Certified Unified Program Agency responsible for oversight of local businesses that handle hazardous materials. Furthermore, the project would not entail the use or storage of large quantities of hazardous or flammable materials. Construction contractors would be required to use, store, and transport hazardous materials in compliance with Federal, State, and local regulations during project construction as indicated above and in Chapter 8, "Compliance with Applicable Laws, Regulations, Policies, and Plans."

Because Alternatives 2 and 3 would be constructed over two seasons and include a larger area of improvements, the potential for accidental spills would be greater for these alternatives compared to Alternatives 4 and 5, which would be constructed in a single season. However, an accidental spill of hazardous materials could occur during construction of many project components under any of the action alternatives. Therefore, this impact for Alternatives 2 through 5 would be **potentially significant.** Mitigation Measure HAZ-1, described below, has been identified to address this impact.

Mitigation Measure: HAZ-1: Implement a Spill Prevention Control and Countermeasures Plan and Other Measures to Reduce the Potential for Environmental Contamination during Construction Activities.

In addition to compliance with all applicable Federal, State, and local regulations, DWR will implement the measures described below to further reduce the risk of accidental spills and protect the environment.

- **Prepare and Implement a Spill Prevention Control and Countermeasures Plan.** A written spill prevention control and countermeasures plan (SPCCP) will be prepared and implemented. The SPCCP and all material necessary for its implementation will be accessible on site prior to initiation of project construction and throughout the construction period. The SPCCP will include a plan for the emergency cleanup of any spills of fuel or other material. Employees/construction workers will be provided the necessary information from the SPCCP to prevent or reduce the discharge of pollutants from construction activities to waters and to use the appropriate measures should a spill occur. In the event of a spill, work will stop immediately and the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Central Valley Regional Water Quality Control Board, and USACE will be notified within 24 hours.

- **Dispose of All Construction-related Debris and Materials at an Approved Disposal Site.** All debris, litter, unused materials, sediment, rubbish, vegetation, or other material removed from the construction areas that cannot reasonably be secured will be removed daily from the project work area and deposited at an appropriate disposal or storage site.

- **Use Safer Alternative Products to Protect Streams and Other Waters.** Every reasonable precaution will be exercised to protect streams and other waters from pollution with fuels, oils, and other harmful materials. Safer alternative products (such as biodegradable hydraulic fluids) will be used where feasible.

- **Prevent Any Contaminated Construction By-products from Entering Flowing Waters; Collect and Transport Such By-products to An Authorized Disposal Area.** Petroleum products, chemicals, fresh cement, and construction by-products containing, or water contaminated by, any such materials will not be allowed to enter flowing waters and will be collected and transported to an authorized upland disposal area.

- **Prevent Hazardous Petroleum or Other Substances Hazardous to Aquatic Life from Contaminating the Soil or Entering Waters of the State or United States.** Gas, oil, other petroleum products, or any other substances that could be hazardous to aquatic life and resulting from project-related activities, will be prevented from contaminating the soil and/or entering waters of the State and/or waters of the United States.

- **Properly Maintain All Construction Vehicles and Equipment and Inspect Daily for Leaks; Remove and Repair Equipment/Vehicles with Leaks.** Construction vehicles and equipment will be properly maintained to prevent contamination of soil or water from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease. Vehicles and equipment will be checked daily for leaks. If leaks are found, the equipment will be removed from the site and will not be used until the leaks are repaired.

- **Refuel and Service Equipment at Designated Refueling and Staging Areas.** Equipment will be refueled and serviced at designated refueling and staging sites located on the crown or landside of the levee and at least 50 feet from active stream channels or other water bodies. All refueling, maintenance, and staging of equipment and vehicles will be conducted in a location where a spill will not drain directly toward aquatic habitat. Appropriate containment materials will be installed to collect any discharge, and adequate materials for spill cleanup shall be maintained on-site throughout the construction period.

- **Store Heavy Equipment, Vehicles, and Supplies at Designated Staging Areas.** All heavy equipment, vehicles, and supplies will be stored at the designated staging areas at the end of each work period.

- **Install an Impermeable Membrane between the Ground and Any Hazardous Material in Construction Storage Areas.** Storage areas for construction material that contains hazardous or potentially toxic materials will have an impermeable membrane between the ground and the hazardous material and will be bermed as necessary to prevent the discharge of pollutants to groundwater and runoff water.

- **Use Water Trucks to Control Fugitive Dust during Construction.** Water (e.g., trucks, portable pumps with hoses) will be used to control fugitive dust during temporary access road construction.

- **Use Only Nontoxic Materials and Materials with No Coatings or Treatments Deleterious to Aquatic Organisms for Placement in Any Waters.** All materials placed in streams, rivers, or other waters will be nontoxic and will not contain coatings or treatments or consist of substances deleterious to aquatic organisms that may leach into the surrounding environment in amounts harmful to aquatic organisms.

Timing: During construction activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure HAZ-1 would reduce potentially significant construction-related impacts from accidental spills of hazardous materials under Alternatives 2 through 5 to a **less-than-significant** level by requiring preparation and implementation of a spill prevention control countermeasures plan along with other measures specifically designed to prevent contamination of the environment from hazardous materials.

Impact HAZ-2: Possible Exposure of People and the Environment to Existing Hazardous Materials, Including Cortese-listed Sites.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site with the exception of remediation of the Old Bryte Landfill, the No Action Alternative would have **no impact** related to possible exposure to existing hazardous materials.

Alternatives 2 and 3: DWR's Preferred Alternative (7-Mile Setback Partial Degrade), 7-Mile Expanded Setback Full Degrade

The Agriventure 1341 property, which is a Cortese-listed site, encompasses most of the southern portion of the project site under both Alternatives 2 and 3. Two leaking aboveground fuel storage tanks (ASTs) (500 gallon and 3,000 gallon) were removed from the "northerly tank area," which was located adjacent to and on the south side of the northern cross-canal, located adjacent to the RD 785 Cross Levee. The proposed new Yolo Bypass East Levee setback would be located approximately 700 feet northeast of this area. A leaking 3,000-gallon AST was also removed from the "southerly tank area," which was located at the intersection of Yolo County Roads 124 and 128A. The proposed new Yolo Bypass East Levee setback would be located immediately adjacent to and west of this area. Contaminated soil was excavated and removed and the lower portions of the backfill at all locations was amended with an oxygen release compound to enhance bioremediation of the residual petroleum hydrocarbons in soil and groundwater.

In 2009, analyses of soil and groundwater samples at all locations determined that concentrations of petroleum hydrocarbons were below the laboratory detection limits and were below the CVRWQCB water quality objectives for groundwater. It was also determined in 2009 that no hazards were present either for dermal contact or vapor intrusion. In 2010, CVRWQCB determined that no further remedial actions were required at the site, finding that after removal of aboveground tanks and excavation of contaminated soil, concentrations of petroleum hydrocarbons in groundwater were all non-detect or below water quality objectives. (CVRWQCB 2010.) The known contamination at the Agriventure site has been remediated to the satisfaction of the Central Valley RWQCB, and would not contaminate floodwaters in the expanded Bypass.

However, the entire project site has been used for agricultural operations for at least 100 years; therefore, above ground or below ground storage tanks, and/or smaller above ground metal storage drums, containing fuel or agricultural chemicals could be encountered throughout the project site during activities associated with levee construction, levee degrades, drainage canal installation, County road relocation, borrow activities, erosion repair, and riparian plantings.

The Sacramento International Airport Pipeline (Pipeline), owned by Wickland Pipelines, LLC, traverses the southeastern portion of the project site. The Pipeline provides jet fuel to the commercial airlines operating at Sacramento International Airport. The Pipeline originates in West Sacramento and heads north through primarily agricultural land until terminating at the airport's fuel facility. As described in Chapter 3, "Alternatives," a portion of the pipeline would be relocated beneath the Sacramento Bypass Wildlife Area using HDD techniques, and the existing pipeline would be abandoned in place. In addition, a small 30x15-foot concrete equipment pad would be installed on the west side of the southern irrigation tailwater cross canal to provide future access to the pipeline.

Three residences and associated structures would be demolished as part of the project, all of which have individual septic systems and underground septic tanks, as well as natural gas lines or propane tanks, and overhead electrical and telephone lines. Because the residences consist of older structures, they may contain asbestos and lead-based paint. Destruction of these facilities during construction could result in environmental contamination as well as human health hazards. Thus, there is a potential that earthmoving activities associated with all project components could encounter a variety of existing facilities and infrastructure which could result in the possible exposure of people or the environment to hazardous materials. Therefore, Alternatives 2 and 3 would have a **potentially significant** impact. Mitigation Measures HAZ-2a, HAZ-2b, and UTL-1, described below, have been identified to address this impact.

The Old Bryte Landfill is a Cortese-listed site that is located on the project site. For the purposes of NEPA, the Old Bryte Landfill Remediation (a separate project expected to be completed in 2018 or 2019) is part of the No Project Alternative, the baseline for impact comparison. Therefore, under NEPA, the potential for exposure to hazardous materials in the Old Bryte Landfill is not evaluated in this EIS/EIR. However, CEQA uses the existing conditions at the time the NOP was published in 2016 as the baseline to which the alternatives are compared to evaluate environmental impacts. Therefore, under CEQA, there would be a **potentially significant** impact specifically related to the potential exposure to hazardous materials in the landfill. Mitigation Measure HAZ-2c, described below, has been identified to address this CEQA impact.

Mitigation Measure: HAZ-2a: Prepare a Worker Health and Safety Plan, and Implement Appropriate Measures to Minimize Potential Exposure to Hazardous Materials.

DWR will implement the measures described below before and during construction to reduce the potential exposure to hazardous materials.

- Prepare and implement a worker health and safety plan before the start of construction activities that identifies, at a minimum, the potential types of contaminants that could be encountered during construction activity; all appropriate worker, public health, and environmental protection equipment and procedures to be used during project activities; emergency response procedures; the most direct route to the nearest hospitals; and a Site Safety Officer. The plan will describe actions to be taken should hazardous materials be encountered on-site, including the telephone numbers of local and State emergency hazmat response agencies.

- If, during site preparation and construction activities, evidence of hazardous materials contamination is observed or suspected (e.g., stained or odorous soil or groundwater), construction activities will cease immediately in the vicinity of the find. If contamination is observed or suspected, DWR will retain a qualified hazardous materials specialist to assess the site and collect and analyze soil and/or water samples, as necessary. If contaminants are identified in the samples, DWR will notify and consult with the appropriate Federal, State, and/or local agencies. Measures to remediate contamination and protect worker health and the environment will be implemented in accordance with Federal, State, and local regulations before construction activities may resume at the site where contamination is encountered. Such measures could include, but are not limited to, preparing a Phase I and/or Phase II Environmental Site Assessment, removing contaminated soil, and pumping groundwater into containment tanks. DWR may elect to implement cleanup measures, or to coordinate with the owner of the affected parcel to perform cleanup activities.
- DWR will retain a licensed contractor to remove all septic systems in accordance with local and State regulations.
- DWR will retain a licensed contractor to plug and abandon all domestic water wells, taking into consideration the location, type, and depth of excavation activities associated with the new setback levees and borrow activities to ensure that such excavation does not inadvertently damage or destroy the well plugs.

Timing: Before and during construction activities.

Responsibility: California Department of Water Resources.

Mitigation Measure: HAZ-2b: Properly Remove and Dispose of Asbestos-containing Materials and Materials Coated with Lead-based Paint.

DWR will implement the measures described below before and during construction to reduce hazards from exposure to asbestos and lead-based paint.

- DWR will retain a licensed contractor to investigate all of the structures that would be demolished for the presence of lead-based paint and asbestos-containing materials. If these materials are determined to be present, then DWR will ensure such materials are properly removed and disposed of by a licensed abatement contractor in accordance with EPA and Cal/OSHA standards and California Air Resources Board Asbestos Rule 902. The licensed abatement contractor will prepare and submit the Asbestos Demolition/Renovation Form to the Yolo-Solano Air Quality Management District, along with payment of the appropriate fee (depending on the amount of asbestos to be removed). The licensed abatement contractor will develop and implement a worker protection program in accordance with OSHA's regulations pertaining to asbestos to minimize worker risk of asbestos exposure. The plan may include but is not limited to the following components:
  - using engineering controls and work practices, where feasible, designed to reduce exposure (for example, washing hands before eating and providing shower facilities for use before employees leave the work site);

- providing protective clothing and, where necessary, respiratory protection in accordance with 29 CFR 1910.134; and

- disposing wastes from demolition activities at a landfill(s) licensed to accept such waste.

▪ Once all abatement measures have been implemented, a Certified Asbestos Consultant will conduct a clearance examination and provide written documentation to the Yolo-Solano Air Quality Management District that testing and abatement have been completed in accordance with all Federal, State, and local laws and regulations.

Timing: Before and during construction activities.

Responsibility: California Department of Water Resources.

Mitigation Measure HAZ-2c: Implement Remediation of Old Bryte Landfill (CEQA Only).

DWR will confirm that remediation of the Old Bryte Landfill has been completed in compliance with DTSC requirements before any project-related ground-disturbance occurs in the landfill area.

Timing: Before construction activities begin.

Responsibility: California Department of Water Resources.

Mitigation Measure UTL-1: Verify Utility Locations, Coordinate with Affected Utility Providers, Prepare and Implement a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage.

Please refer to Impact UTL-1 in Section 4.21, "Utilities and Service Systems," for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measures HAZ-2a, HAZ-2b, and UTL-1 would reduce the potentially significant impact associated with possible exposure to hazardous materials under Alternatives 2 and 3 to a **less-than-significant** level because work will be halted if evidence of contamination was encountered; remediation will be performed or work will be relocated; an investigation will be performed regarding the presence of asbestos and lead-based paint and any such materials will be remediated according to Federal, State, and local standards; DWR will ensure that remediation of the Old Bryte Landfill is completed in compliance with DTSC requirements prior to project construction in the landfill area, and DWR will coordinate with aboveground utility and underground pipeline owners to locate and safely relocate utility infrastructure.

Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade, 5-Mile Setback Full Degrade

Alternatives 4 and 5 would entail the same types of construction activities as Alternative 2, but the Yolo Bypass East Levee setback would be shorter and would be located farther east. Therefore, borrow materials would not be obtained from the RD 785 Cross Levee. Because the setback levee would be shorter as compared to Alternative 2, a lesser amount of demolition and excavation would occur, and therefore the potential for exposure to hazardous materials would be reduced. However, the same project-related activities would still occur over a large area, residences would still be demolished, above ground and underground septic systems and utilities would still be encountered, and project-related activities would still occur on the Cortese-listed Agriventure 1341 property, although the "northerly tank area" would be avoided in these alternatives. Therefore, for the same reasons described above under Alternative 2, Alternatives 4 and 5 project components would have a **potentially significant** impact. Mitigation Measures HAZ-2a, HAZ-2b, and UTL-1 described below, have been identified to address this impact.

Mitigation Measure HAZ-2a: Prepare a Worker Health and Safety Plan, and Implement Appropriate Measures to Minimize Potential Exposure to Hazardous Materials.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure HAZ-2b: Remove and Dispose of Asbestos-Containing Materials and Materials Coated with Lead-Based Paint.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure UTL-1: Verify Utility Locations, Coordinate with Affected Utility Providers, Prepare and Implement a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage.

Please refer to Impact UTL-1 in Section 4.21, "Utilities and Service Systems," for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measures HAZ-2a, HAZ-2b, and UTL-1 would reduce the potentially significant impact associated with possible exposure to hazardous materials under Alternatives 4 and 5 to a **less-than-significant** level because work will be halted if evidence of contamination is encountered; remediation will be performed or work will be relocated; an investigation will be performed regarding the presence of asbestos and lead-based paint and any such materials will be remediated according to Federal, State, and local standards; and DWR will coordinate with aboveground utility and underground pipeline owners to locate and safely move utility infrastructure.

Impact HAZ-3: Possible Contamination of Soil and/or Groundwater from Accidental Destruction of Active, Plugged, or Abandoned Natural Gas Wells.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no impact related to accidental destruction of natural gas wells.

<u>Alternatives 2 and 3: DWR's Preferred Alternative (7-Mile Setback Partial Degrade), 7-Mile Expanded Setback Full Degrade</u>

As shown on Figure 4.16-1 (see Section 4.16, "Mineral Resources"), the project site includes portions of the Conway Ranch, Sacramento International Airport, and the Sacramento Bypass Gas Fields. Seven natural gas wells are located within the project site, six of which have been plugged and abandoned (DOGGR 2016). As shown on Figure 4.16-2 (see Section 4.16, "Mineral Resources"), construction of the Sacramento Bypass North Levee setback, and installation of erosion protection (i.e., riprap) along the south Sacramento Bypass Training Levee and riparian plantings within the project site, would not occur in the vicinity of any natural gas wells under either Alternative 2 or 3. Therefore, these project components would have **no impact.**

Mitigation Measure: No compensatory mitigation is required.

As shown on Figure 4.16-2 in Section 4.16, "Mineral Resources," active natural gas Well No. 11321887 is located in the northern portion of the project site, within the setback area where excavation for borrow materials is proposed. During the project's operation phase, active natural gas Well No. 11321887 would be located within the Yolo Bypass, where flood-flows are expected to occur. Therefore, the aboveground facilities associated with this well could be damaged or destroyed during borrow excavation activities and from flood-flows when water from the Sacramento River is diverted through the Yolo Bypass.

Wells that can no longer be used must be plugged to prevent the oil and gas reservoir fluids from migrating uphole over time and possibly contaminating soil and/or freshwater aquifers. A well is plugged by setting mechanical or cement plugs in the wellbore at specific intervals to prevent fluid flow. The plugging process usually requires a workover rig and cement that is pumped into the wellbore. State regulations (CCR Title 14, Division 2, Chapter 4, Article 3, Section 1723.1), which are administered by DOGGR, prescribe the depth intervals which must be cemented as well as the materials that are allowable in plugging practices. To receive a permit from DOGGR for a plugged and abandoned cased well, a cement plug must be inserted in the well, extending at least 100 feet above the top of a landed liner, the uppermost perforations, the casing cementing point, the water shut-off holes, or the oil or gas zone, whichever is highest.

The width of the proposed new setback levee is expected to be approximately 214 feet at the base, along with an approximately 20-foot-wide O&M easement on both the landside and the waterside. In addition, seepage berms up to 400 feet wide could be constructed. As shown on Figure 4.16-2, there are two plugged and abandoned natural gas wells where the proposed northern portion of the proposed new Yolo Bypass East Levee setback would cross the northern cross-canal near County Road 124: well Nos. 11320406 and 11320154. In addition, plugged and abandoned Well Nos. 11320294, 11320831, and 11321102 are located east, west, and south of County Road 124, respectively, in the southern part of the project site (see Figure 4.16-2). Any or all of these five wells may be located within the setback levee, seepage berm, and/or drainage canal footprint, as well as the borrow area within the setback area. Finally, plugged and abandoned Well No. 11321099 is located on the northwest side of the south cross-canal; this area is planned for borrow activities and HDD construction associated with rerouting the Sacramento International Airport Pipeline.

Depending on the nature of construction activities, portions of the well plugs could be destroyed during the project-related excavation process, thereby allowing gas reservoir fluids to migrate over time, potentially contaminating soil and groundwater. Therefore, these Alternatives 2 and 3 project components would have a **potentially significant** impact to Well Nos. 11321887, 11320406, 11320154, 11320294, 11320831, 11321101, and 11321099. Mitigation Measures HAZ-3a and HAZ-3b, described below, have been identified to address this impact.

Mitigation Measure: HAZ-3a: Abandon or Avoid Active Natural Gas Wells, Provide New Infrastructure to Withstand Flood Flows, and Maintain Well Access.

DWR will implement the measures described below.

- DWR will consult with the well owner and either abandon active natural gas Well No. 11321187 in accordance with DOGGR requirements, or implement measures to avoid the well. Avoidance measures would include:
  - A 25-foot-wide area outside of and surrounding the perimeter of the well pad associated with active natural gas Well No. 11321187 will be flagged with avoidance tape in the field and shown on construction drawings as an avoidance area. No project-related activities of any kind will take place within the 25-foot-wide avoidance area.
  - DWR will consult with Conway Ranch Gas and will fund and hire a qualified well drilling contractor to construct the necessary new platform and associated facilities to elevate the wellhead and well pad above the projected flood depths and to reinforce the well infrastructure to withstand projected flood flows.
  - DWR will consult with Conway Ranch Gas to ensure that continued access to this active well is maintained, both during and after the completion of project-related construction activities.

Timing: Prior to, during, and after construction activities.

Responsibility: California Department of Water Resources.

Mitigation Measure HAZ-3b: Avoid Abandoned Natural Gas Wells or Consult with the California Division of Oil, Gas, and Geothermal Resources to Determine Additional Well Plugging Requirements and Implement Recommended Measures.

DWR will implement the measures described below.

- Project-related excavation at the locations of plugged and abandoned natural gas Wells Nos. 11320406, 11320154, 11320294, 11320831, 11321102, and 11321099 will be avoided, to the extent feasible. If Well No. 11321187 is abandoned (described in Mitigation Measure HAZ-3a), this well would also be avoided to the extent feasible.
- If avoidance of the plugged and abandoned wells is not feasible, DWR will consult with DOGGR prior to starting construction activities to determine whether the types of levee construction and borrow excavation proposed at these locations would require additional well plugging activities. Feasible recommendations from DOGGR regarding additional well

plugging actions (such as pouring of additional cement) will be paid for by DWR and carried out by a qualified well drilling contractor to ensure that soil and groundwater contamination from oil or natural gas does not occur.

Timing: Prior to and during construction activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measures HAZ-3a and HAZ-3b would reduce the potentially significant impacts associated with the possible contamination of soil and groundwater from accidental destruction of active and plugged and abandoned natural gas wells under Alternatives 2 and 3 to a **less-than-significant** level because either the wells will be avoided, or DWR will implement measures during construction (such as pouring of additional cement) as recommended by DOGGR to ensure that environmental contamination does not occur.

Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade, 5-Mile Setback Full Degrade

Alternatives 4 and 5 would entail construction of the same types of facilities as DWR's Preferred Alternative, but the northern end of the proposed new Yolo Bypass East Levee setback would terminate at the western end of the northern cross-canal south of County Road 124, and the southern end of this levee setback would be located farther east. As shown in Figure 4.16-2, construction of the Sacramento Bypass North Levee setback, installation of erosion protection (i.e., riprap) along the south Sacramento Bypass Training Levee, and riparian plantings would not occur in the vicinity of any natural gas wells. Furthermore, there are no active or plugged and abandoned gas wells that would be located underneath the proposed new Yolo Bypass East Levee setback, seepage berm, or the new drainage canal under Alternatives 4 and 5. Therefore, these project components would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

As shown in Figure 4.16-2, because borrow activities in the setback area under Alternatives 4 and 5 would only occur south of the upper drainage canal, impacts to active Well No. 11321187 would be avoided under Alternatives 4 and 5. Furthermore, because the setback borrow area would be located south of the extreme southwestern end up the upper drainage canal and borrow would not be obtained from the RD 785 Cross Levee, impacts to plugged and abandoned Well Nos. 11320406, 11320294, and 11320154 would also be avoided under Alternatives 4 and 5. However, borrow activities in the setback area and along the northwest side of the lower drainage canal, and HDD construction associated with rerouting the Sacramento International Airport Pipeline along the lower cross canal, could damage or destroy well plugs associated with abandoned Well Nos. 11320831, 11321102, and 11321099. Therefore, borrow activities would have a **potentially significant** impact. Mitigation Measure HAZ-3b, described below, has been identified to address this impact.

Mitigation Measure HAZ-3b: Avoid Abandoned Natural Gas Wells or Consult with the California Division of Oil, Gas, and Geothermal Resources to Determine Additional Well Plugging Requirements and Implement Recommended Measures.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measure HAZ-3b would reduce the potentially significant impact associated with possible contamination of soil and groundwater from potential destruction of previously plugged and abandoned natural gas wells under Alternatives 4 and 5 to a **less-than-significant** level because either the wells will be avoided, or DWR will implement measures during construction (such as pouring of additional cement) as recommended by DOGGR to ensure that environmental contamination does not occur.

Impact HAZ-4: Creation of Potential Safety Hazards, Including Possible Birdstrike, in the Vicinity of a Public or Private Airport.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no impact related to creating safety hazards in the vicinity of an airport.

Alternatives 2 and 3: DWR's Preferred Alternative (7-Mile Setback Partial Degrade), 7-Mile Expanded Setback Full Degrade

The northern portion of the project site is within Sacramento International Airport's Referral Area 1, and the remainder of the project site is within Referral Area 2 (SACOG 2013: Map 1). An airport referral area is an area in which current or future airport-related noise, overflight, safety, or airspace protection factors may affect land uses or necessitate restrictions on those uses, and therefore certain land use proposals are to be referred to the ALUC for review. Referral Area 1 encompasses locations where noise and/or safety represent compatibility concerns. The central and southern portions of the project site (which are in Referral Area 2) lie within the approach surfaces for all of the runways at Sacramento International Airport (SACOG 2013: Map 4b). The airport is located northeast of I-5, and the nearest runway is approximately 1.95 miles from the northern end of the project site. The proposed new Yolo Bypass East Levee setback would be located approximately 2.16 miles from the nearest runway at the closest point, under both Alternatives 2 and 3.

HDD to relocate the Sacramento International Airport pipeline and installation of riprap along the south Sacramento Bypass Training Levee would occur immediately adjacent to and west of the CHP Academy Airport. Degrading the existing Sacramento Bypass North Levee and installation of riparian plantings after the levee is degraded would occur approximately 2,400 feet north of the CHP Academy Airport.

The project does not involve construction of any buildings, and construction of the new setback levees, seepage berms, new drainage canal, pump station, relocation of County roads, HDD for the Sacramento International Airport pipeline, installation of erosion protection, levee degrades, and borrow excavation would not entail the use of cranes operating at a height 100 feet or greater above the ground surface that could interfere with flight patterns or affect operations at Sacramento International Airport or the CHP Academy Airport. Therefore, these project components would have **no impact.** (Airport safety hazards associated with nighttime lighting are addressed in Section 4.2, "Aesthetics.")

Mitigation Measure: No compensatory mitigation is required.

Areas within the FAA-defined 10,000-foot separation distance for wildlife attractants are also encompassed within the airport's Referral Area 1. Birds can be ingested into the engines of aircraft, or make contact with aircraft propellers, which is termed a "strike" hazard. At Sacramento International Airport, the vast majority of strikes of identified birds causing damage to aircraft between 1990 and 2016 were waterfowl (80 percent), with small numbers of gulls (5 percent), raptors (5 percent), and passerines, such as blackbirds and swallows (5 percent). No wildlife strikes have been reported at the CHP Academy Airport. (FAA 2016.) FAA guidance regarding hazardous wildlife attractants on or near airports (FAA 2007) recommends a separation distance of 5,000 feet between the air operations area (AOA) of an airport serving piston-powered aircraft and hazardous wildlife attractants. The recommended separation distance is 10,000 feet for airports serving turbine-powered aircraft. FAA also recommends a distance of 5 miles between the farthest edge of the airport's AOA and hazardous wildlife attractants, if the attractants could cause hazardous wildlife movement into or across the approach or departure airspace.

The Sacramento International Airport ALUCP (SACOG 2013) indicates that projects within 10,000 feet from the AOA that do not include a zoning amendment, such as Alternatives 2 and 3, do not require formal review or a compatibility determination by the ALUC related to hazardous wildlife attractants. Further, crop selection and other routine agricultural activities that do not involve construction or otherwise constitute a land use project and do not need Local Agency approval are not subject to ALUC authority and are not regulated by the policies of the ALUCP. However, the plan recommends that project proponents consider current FAA or other Federal regulations and guidelines pertaining to hazardous wildlife attractants.

The project could change agricultural practices, including cropping patterns at the project site from alfalfa, safflower, sunflower, and tomatoes, to rice production. In addition, Ecosystem project components would be implemented in the existing Yolo Bypass East Levee footprint, providing an approximately 200-foot-wide riparian corridor along the east side of the Tule Canal. New riparian plantings may also be established along the edge of the Sacramento Bypass North Levee setback, and/or within the footprint of the existing Sacramento Bypass North Levee, after it is degraded. Finally, the project includes constructing a new drainage canal along the east side of the southern portion of the setback levee.

The Sacramento Bypass Wildlife Area is located immediately adjacent to and south of the project site, and north of the area where HDD for the Sacramento International Airport pipeline would occur and where riprap would be installed along the south Sacramento Bypass Training Levee. The Yolo Bypass is located immediately adjacent to and west of the project site. Both the Sacramento Bypass Wildlife Area and the Yolo Bypass provide important cover, nesting, and foraging habitat for wildlife—including waterfowl, gamebirds, raptors, songbirds, and mammals—depending on the time of year and habitat conditions. In addition, the Sacramento River and associated riparian vegetation on both sides of the river also provide important cover and feeding areas for wildlife. At the closest point, project-related work would occur approximately 975 feet west of the Sacramento River (in the southeastern corner of the project site). Most project-related work would take place approximately 0.5–2.3 miles west of the river.

Expanding the Yolo and Sacramento Bypasses would not generally increase the overall amount of habitat on the project site, because the site currently provides habitat for a variety of species. However, potential for inundation of the setback area during high flows in the Bypasses, changes in crops likely to be grown in the setback area, and construction of the new canal would change the seasonal habitat types on the project site. These changes may, in turn, increase numbers of bird species considered to pose a high risk for damage to aircraft from wildlife strikes (e.g., waterfowl). For example, agricultural crops currently grown on the project site are primarily row crops that are not typically used by large numbers of waterfowl, but converting these areas to rice production could increase use of the fields by resident waterfowl, when they are flooded early in the growing season, and by migratory waterfowl, if they are flooded by landowners during winter. In addition, this area could be seasonally flooded by floodplain inundation during periods of high flow along the Sacramento River. Up to 300 acres in the northern portion of the project site is within 10,000 feet of the AOA, as mapped in the ALUCP (SACOG 2013: Map 5) and could experience these altered habitat conditions.

Expansion of the Yolo Bypass would increase the potentially inundated area within 5 miles of Sacramento International Airport by approximately 1,000 acres under Alternative 2 or 1,300 acres under Alternative 3. However, approximately 13,000 acres of the Yolo Bypass is already within 5 miles of the AOA. Therefore, Alternatives or 3 would increase this area by less than 8 percent or by 10 percent, respectively. The Sacramento Bypass would increase by approximately 300 acres, some of which would be within 5,000 feet of the CHP Academy Airport, and a small portion of which would be within 5 miles of Sacramento International Airport. The CHP Academy is currently bordered by hundreds of acres of seasonally inundated habitat in the existing Sacramento Bypass to the north and extensive rice fields in the Yolo Bypass to the west.

Establishment of riparian plantings along the eastern edge of the newly established Tule Canal habitat corridor, along the edge of the newly constructed Sacramento Bypass North Levee, and/or within the existing Sacramento Bypass North Levee footprint, would also change habitat composition of the project site. This would increase the amount of suitable nesting habitat for some moderately hazardous species, including raptors and some passerine species. Similar habitat is already present in the Sacramento Bypass, much closer to the CHP Academy Airport, and the new habitat would be over 5,000 feet from the CHP Academy Airport at its nearest point. Created riparian habitat would be approximately 2.5 miles southwest of Sacramento International Airport at its closest point, and high-quality riparian habitat that currently supports nesting birds is present along the Sacramento River, much closer to the airport. In addition, the region currently provides extensive areas of suitable raptor and passerine foraging habitat, including immediately adjacent to both airports.

The landscape surrounding the Sacramento International Airport and CHP Academy Airport AOAs, and within 5 miles of these airports, currently supports many thousands of acres of habitat that is attractive to hazardous wildlife under existing conditions. Because of these attractants, Sacramento International

Airport has ranked in the top ten of airports nationwide in the number of wildlife strikes reported and second in the number of strikes causing significant damage to aircraft (SACOG 2013). Changes in agricultural crops, riparian habitat creation, and floodplain inundation that would result from implementing Alternative 2 or 3 would likely increase the attractiveness of habitat on the project site to hazardous wildlife. Most of the project site is outside the 10,000-foot primary separation area, but it is within the Sacramento International Airport approach and departure space. Although implementing Alternative2 or 3 are unlikely to increase overall populations of hazardous species in the region, it could increase numbers of hazardous wildlife within 5 miles of Sacramento International Airport and movement of hazardous wildlife into or across the approach or departure airspace zones. Therefore, project-related changes in agricultural crops, riparian and canal habitats, and seasonal inundation, would have a **potentially significant** impact. Mitigation Measure HAZ-4, described below, has been identified to address this impact.

Mitigation Measure: HAZ-4: Consider FAA Guidelines and Coordinate with Sacramento International Airport and CHP Academy Airport Staff Regarding Hazardous Wildlife Attractants.

DWR will implement the measures described below to minimize increase in birdstrike hazard, where feasible.

- DWR will review and consider FAA guidelines regarding conditions that can attract hazardous wildlife, with particular attention given to Advisory Circular 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports*.
- DWR will coordinate with Sacramento International Airport/Sacramento County Airport System staff and CHP Academy Airport staff regarding the potential for project components to increase movement of hazardous wildlife into or across the approach or departure airspace zones and attempt to identify feasible measures to reduce such an increase.

Timing: Prior to construction activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure HAZ-4 may reduce the potentially significant impact associated with birdstrike hazard under Alternatives 2 and 3, but not to a less-than-significant level, because habitat changes would still increase attractiveness to hazardous wildlife. Therefore, Impact HAZ-4 would be potentially **significant and unavoidable**.

Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade, 5-Mile Setback Full Degrade

Alternatives 4 and 5 would entail construction of the same types of facilities as Alternative 2, but the proposed new Yolo Bypass East Levee setback would be shorter and would be located farther east. The project does not involve construction of any buildings, and construction of the setback levees, seepage berms, new drainage canal, pump station, relocation of county roads, HDD for the Sacramento International Airport pipeline, installation of erosion protection, levee degrades, and excavation for borrow would not entail the use of cranes operating at a height 100 feet or greater above the ground surface that could interfere with flight patterns or affect operations at Sacramento International Airport or the CHP Academy Airport. Therefore, these project components of Alternatives 4 and 5 would have

no impact. (Airport safety hazards associated with nighttime lighting are addressed in Section 4.2, "Aesthetics.")

Mitigation Measure: No compensatory mitigation is required.

Alternatives 4 and 5 would include the same types of habitat changes as under Alternatives 2 and 3, but the total setback area would be smaller, no habitat changes would occur within the 10,000-foot-wildlife attractant separation area for Sacramento International Airport, and the amount of riparian habitat creation would be less. Up to approximately 900 acres of the new setback area could be converted to rice production under Alternative 4 and 600 acres could be converted under Alternative 5. Although the extent of habitat changes and resulting increase in attractiveness of habitat on the project site to wildlife that pose an aircraft strike risk would be less, Implementing Alternative 4 or 5 could increase numbers of hazardous wildlife within 5 miles of Sacramento International Airport and movement of hazardous wildlife into or across the approach or departure airspace zones. Therefore, project-related changes in agricultural crops, riparian and canal habitats, and seasonal inundation, would have a **potentially significant** impact. Mitigation Measure HAZ-4, described below, has been identified to address this impact.

Mitigation Measure HAZ-4: Consider FAA Guidelines and Coordinate with Sacramento International Airport and CHP Academy Airport Staff Regarding Hazardous Wildlife Attractants.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measure HAZ-4 may reduce the potentially significant impact associated with increasing birdstrike hazard under Alternatives 4 and 5, but not to a less-than-significant level, because habitat changes would still increase attractiveness to hazardous wildlife. Therefore, Impact HAZ-4 would be **potentially significant and unavoidable**.

Impact HAZ-5: Creation of Potential Wildland Fire Hazards.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to the creation of potential wildland fire hazards.

Alternatives 2 and 3: DWR's Preferred Alternative (7-Mile Setback Partial Degrade), 7-Mile Expanded Setback Full Degrade

The project site and the Lower Elkhorn Basin primarily consist of agricultural land used for row crops, along with scattered rural residences and associated landscaping. Although CAL FIRE has not classified most of the Lower Elkhorn Basin in terms of fire hazard, the northern portion of the Tule Canal, Katchituli Oxbow Restoration Mitigation Site, Elkhorn Regional Park, and Sacramento Bypass Wildlife Area have all been classified as moderate fire hazard severity zones (CAL FIRE 2007). Project-related work would take place immediately adjacent to all of these areas. In addition, the northern cross-canal carrying irrigation tailwater that bisects the project site (south of County Road 124) is heavily vegetated with shrubs and trees (see KOP 8 in Section 4.2, "Aesthetics"); project-related work would take place on both the north and south sides of this drainage canal. Vegetation is present in all areas where project-related work would occur, and the levee setback and degradation activities would be implemented in locations with natural settings where physical and weather conditions may combine to lead to a high risk of fire hazard. Most of the project-related work would occur during summer and fall when hot and dry conditions would enable rapid spread of fires. Construction equipment can emit sparks that could ignite fires, thereby possibly exposing residents and homes, agricultural structures, and businesses in the Lower Elkhorn Basin and the northern portion of West Sacramento to a direct significant risk of loss, injury, or mortality, as well as loss of wildlife habitat and indirect economic effects from crop losses. Therefore, Alternatives 2 and 3 would have a **potentially significant** impact. Mitigation Measure HAZ-5, described below, has been identified to address this impact.

Mitigation Measure: HAZ-5: Prepare and Implement a Fire Prevention Plan.

A fire prevention plan will be prepared and implemented by DWR in coordination with the appropriate emergency service and/or fire suppression agencies of the applicable local or State jurisdictions before the start of any construction activities. The plan shall describe fire prevention and response methods, including fire precaution, requirements for spark arrestors on equipment, and suppression measures that are consistent with the policies and standards of the affected jurisdictions. When heavy equipment is used for construction during the dry season, a water truck shall be maintained on the construction site. Materials and equipment required for implementation of the plan will be available on the construction site. Training shall be provided to all construction personnel regarding fire safety, and all personnel shall be made familiar with the contents of the plan before the start of construction activities.

Timing: Before and during construction activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure HAZ-5 would reduce the potentially significant impact associated with possible creation of wildland fire hazards under Alternatives 2 and 3 to a **less-than-significant** level because a fire prevention plan will be prepared and implemented.

Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade, 5-Mile Setback Full Degrade

Alternatives 4 and 5 would entail the same types of construction activities as DWR's Preferred Alternative, but the proposed new Yolo Bypass East Levee setback would be shorter and would be located farther east. Because the new setback levee would be shorter and because borrow would not be obtained from the RD 785 Cross Levee, a lesser amount of construction and excavation would occur, and therefore the potential for wildland fires from sparks generated by construction equipment would be somewhat reduced. However, the same project-related activities would still occur over a large area. Therefore, for the same reasons described above under Alternative 2, Alternatives 4 and 5 would have a **potentially significant** impact. Mitigation Measure HAZ-5, described below, has been identified to address this impact.

Mitigation Measure HAZ-5: Prepare and Implement a Fire Prevention Plan.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measure HAZ-5 would reduce the potentially significant impact associated with possible creation of wildland fire hazards under Alternatives 4 and 5 to a **less-than-significant** level because a fire prevention plan will be prepared and implemented.

Impact HAZ-6: Creation of a Potential Public Health Hazard from Substantially Increased Exposure to Mosquito-borne Diseases by Substantially Increasing the Amount of Mosquito Habitat

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of Levee Failure."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to substantially increased exposure to mosquito-borne disease.

Alternatives 2 through 5: All Action Alternatives

Under all action alternatives, construction of the proposed pump station, relocation of County Roads 124 and 126, borrow activities, installation of erosion protection, and rerouting of the Sacramento International Airport Pipeline would not create any new wetted areas and would not change the amount of mosquito habitat. Therefore, these project components of all action alternatives would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

Construction of the proposed setback levees and degrading the existing levees would place additional land into the Yolo and Sacramento Bypasses. Table 4.13-3 presents a comparison among the action alternatives of land area placed into the Bypasses, and thus subject to more frequent inundation by floodwaters during winter and early spring.

Table 4.13-3. Acreage of Additional Inundated Land under the Action Alternatives

Alternative	Additional Yolo and Sacramento Bypass Acreage
Alternative 2: DWR's Preferred Alternative	1,180
Alternative 3: 7-Mile Expanded Setback Full Degrade	1,470
Alternative 4: 5-Mile Expanded Setback Partial Degrade	950
Alternative 5: 5-Mile Setback Full Degrade	690

Source: Data calculated by GEI Consultants, Inc. in 2016

In addition, rice production would likely occur on some or all of the project site west of the proposed new Yolo Bypass East Levee setback and south of the proposed Sacramento Bypass North Levee setback. Crops currently grown on the project site consist of alfalfa, safflower, sunflower, tomatoes, and walnuts. Therefore, conversion from row crops to rice production would create new wetted areas that could potentially serve as mosquito-breeding habitat year-round. Finally, a new agricultural irrigation canal would be created on the east side of the Yolo Bypass East Levee setback, which could also potentially serve as year-round mosquito-breeding habitat.

Because project implementation would substantially increase the amount of mosquito habitat, these project components of Alternatives 2 through 5 would have a **potentially significant** impact. Mitigation Measure HAZ-6, described below, has been identified to address this impact.

Mitigation Measure: HAZ-6: Integrate Best Management Practices for Mosquito Control and Implement Workplace Precautions Against Vector-borne Diseases.

To the extent feasible, design and operation of the proposed drainage canal east of the new Yolo Bypass East Levee setback, rice production implemented as part of agricultural and biological habitat mitigation, and any other wetted habitat created as part of the project's agricultural and biological habitat mitigation will incorporate applicable Best Management Practices (BMPs) identified in the *Best Management Practices for Mosquito Control on California State Properties* (California Department of Public Health 2008); and other guidelines such as the Central Valley Joint Venture's *Technical Guide to Best Management Practices for Mosquito Control in Managed Wetlands* (Kwasny et al. 2004) and *Best Management Practices for Mosquito Control in California* (California Department of Public Health and Mosquito and Vector Control Association of California 2012).

DWR will also inform the Sacramento-Yolo Mosquito and Vector Control District about implementation of the project, and will provide information requested to support vector control activities along waterways affected or created by the project.

In addition, DWR will implement the workplace precautions listed below.

- Conduct construction worker personnel training that covers the potential hazards and risks associated with exposure to and protection from vector-borne diseases such as West Nile virus. Instruct personnel in the use of proper construction apparel and warn them against handling any dead animals (particularly birds) with bare hands.

- Inspect work areas and eliminate sources of standing water that could provide breeding habitat for mosquitoes. For example, eliminate uncovered, upright containers that could accumulate water, and fill or drain potholes or other areas where water is likely to accumulate.

- Provide insect repellent for worker use at construction sites. As recommended by the Centers for Disease Control and Prevention (CDC), the insect repellent should contain active ingredients that have been registered with EPA for use as insect repellents on skin or clothing such as diethyl(meta)toulamide (DEET) or picaridin.

- Notify the appropriate City or County health department about dead birds found at any project site.

Timing: During project design and operation.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure HAZ-6 would reduce the potentially significant impact associated with creation of potential mosquito habitat under all action alternatives to a **less-than-significant** level because BMPs designed to minimize mosquito-breeding habitats and populations, as well as workplace precautions, will be incorporated into project design components and implemented during project operation.

Residual Significant Impacts

Impacts related to increased potential for birdstrike from hazardous wildlife attractants (Impact HAZ-4) would be potentially significant. Even with implementation of Mitigation Measure HAZ-4, this impact cannot be reduced to a less-than-significant level, and therefore, there would be potentially significant and unavoidable residual impacts. All action alternatives must necessarily be located near the Sacramento International Airport. Furthermore, an expanded floodplain could result in some seasonal increase in bird use of the expanded floodplain. Again, an expanded floodplain is required to increase channel capacity and reduce flood risks. Consequently, no feasible mitigation measures exist in addition to Mitigation Measure HAZ-4 to further minimize this impact.

Impacts related to accidental spills of hazardous materials during construction (Impact HAZ-1), potential exposure of people or the environment to hazardous materials including Cortese-listed sites (Impact HAZ-2), possible environmental contamination from destruction of plugged and abandoned natural gas wells (Impact HAZ-3), and creation of potential wildland fire hazards (Impact HAZ-5) would all be potentially significant. In addition, impacts related to creation of new mosquito-breeding habitat (Impact 4.3-6) would be significant. However, implementation of Mitigation Measures HAZ-1, HAZ-2a, HAZ-2b, HAZ-3, HAZ-5, HAZ-6, and UTL-1 would reduce these impacts to a less-than-significant level. Therefore, no residual significant impacts would occur for these impacts.

4.14 Hydrology, Hydraulics, and Flood Risk Management

4.14.1 Environmental Setting

Systemwide Hydrology and Function of Flood Facilities

The Sacramento River Flood Control System is a vast, complex system that is part of a commonly administered system by the State of California through the Central Valley Flood Protection Board (CVFPB) with joint jurisdiction with USACE. The system includes levees along the major rivers and streams of the valley floor and around the islands of the Delta, a major bypass system, and reservoirs. Levee construction and improvement began in about 1850 and continues to this day. The Sacramento River bypass system was Federally authorized in 1917. It includes a system of flood relief structures and weirs that release Sacramento River flows into the bypass system when flows exceed downstream channel capacity. The Sacramento River Flood Control System includes the Sacramento River downstream of Ord Ferry, and its tributaries: the Feather River, Lower Yuba River, Lower American River, Sutter Bypass, Yolo Bypass, Sacramento Bypass, and other smaller waterways and flood control features. A detailed description of the overall context of the Yolo Bypass and Sacramento Bypass flood risk reduction facilities, specifications, function, and operations within and affecting the project site and vicinity is provided in Section B5 of Appendix B, “Project Background and Context.”

In general, flows and water availability within the project vicinity are controlled almost entirely by conditions outside the project site; the Yolo and Sacramento Bypasses function as flood overflow facilities during high Sacramento and American River flows. For all other hydrologic conditions, the Bypasses are generally dry with the exception of Tule Canal and minor flows, drainage, and ponding from upstream sources. The combined operations of Shasta, Oroville, and Folsom Dams and other upstream water storage facilities largely control the low-flow regime and exert a strong influence on the flood flow regime at the project site and vicinity.

Levee Conditions in the Project Vicinity

A summary of levee conditions in the project vicinity is provided below.

- **Yolo Bypass –** Yolo Bypass levees experienced high water events in 1929, 1952, 1964, 1967, 1970, 1971, 1974, 1976, 1979, 1984, 1986, 1987, 1997, 1998, 2005, 2007, 2008, and 2017. A total of five levee breaches were identified in the California Levee Database (CLD). The lengths of three breaches were recorded and ranged from 100 to 325 feet. The 1986 breach at linear mile (LM) 1.17 occurred at approximately the same location of a rotational slope failure of a similar length during the same flood. Three seepage events were identified from the CLD along the Yolo Bypass, including seepage events at LM 1.14 and LM 1.2 in 2005. Clear water was observed flowing through a boil during low water. Sloughing, boils, and slope cracking have also occurred in the past and as recently as early 2017 and required repairs.

- **Sacramento Bypass –** One levee breach and a seepage event at LM 0.85 in 1997 were identified from the CLD. No other information was provided on these events. Several slope failures occurred in early 2017 and required repairs.

Local Hydrology and Precipitation

The hydrology of the region is characterized by relatively wet winters with rising river levels during precipitation events and during snowmelt. Summers are generally dry with low river levels lasting through fall. Local hydrology at the project site is dominated by precipitation and surface runoff. As defined by DWR, Yolo County is a small portion, about 3.8 percent or 1,034 square miles, of the large Sacramento Hydrologic Region, which covers an estimated 26,960 square miles. Precipitation in Yolo County averages 16-18 inches per year (Yolo County 2005).

Yolo Bypass

The Yolo Bypass has received floodwaters from the Sacramento River and Sutter Bypass due to overflows at Fremont Weir 53 out of the last 74 years. In the absence of spills at the Fremont and Sacramento Weirs, the hydrology of the Yolo Bypass is dominated by inflows from Knights Landing Ridge Cut, Cache Creek, Willow Slough, and Putah Creek. Base flow discharges from these tributaries may be important sources of water for irrigation supply and to maintain aquatic and riparian habitats along the waterways. Moderate or high flows from the tributaries can cause localized flooding. During non-flood periods, surface water flows from west to east through a network of channels that cross the Yolo Bypass and discharge into the Tule Canal, an artificial channel that follows the toe of the east side levee along the entire length of the Bypass. In winter, low flow in the northern half of the Yolo Bypass consists primarily of base flow discharges from Cache Creek and Willow Slough. In summer, flows are dominated by irrigation deliveries and return flows diverted from Cache Creek, the Knights Landing Ridge Cut, and the Sacramento River, as well as discharges from the Woodland wastewater treatment plants (Yolo County 2005). All waterways in the project vicinity are tributary to the Sacramento River, as the Yolo Bypass drains floodwater back into the river at the southern end of the Bypass.

Tule Canal

The Tule Canal is the major internal drain of the Yolo Bypass. During flood events, the Tule Canal is completely inundated. During non-flood periods, the Tule Canal serves as an agricultural drainage.

Sacramento Bypass

The Sacramento Bypass provides an integral role in regional flood risk reduction operations. It receives floodwaters from the Sacramento and American Rivers when the Sacramento Weir gates are manually opened to shunt flows from the Sacramento River into the Sacramento Bypass, and then into the Yolo Bypass. The Sacramento Weir gates have been opened 22 out of the last 74 years. During non-flood periods, internal drainage in the Sacramento Bypass occurs via levee toe drains which feed into the Tule Canal.

Agricultural Water Supply

The project site and vicinity is characterized by agricultural land uses. Agricultural water supplies consist of surface and groundwater supplies and contract water agreements with the U.S. Bureau of Reclamation (Table 4.14-1).

4.11.1 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to hydrology, hydraulics, and flood risk management apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

Table 4-14.1. Water Rights for Project Site Properties

Owner	Source	Water Right Type	Date	Permit No.	Application ID	Face Value or Average Annual Use (af)	Point of Diversion Status	Max Allowed Diversion Rate (cfs)	Permitted Use	Direct Diversion Season	Acres Allowed Under Water Right
Wilson Ranch Partnership	Sacramento River	Appropriative	10/24/1934	4459	A008141	2717.4	Active	5	Irrigation	02/01 to 11/01	366
Wilson Ranch Partnership	Sacramento River	N/A	7/1/2010		S017109	370	Active	N/A	N/A	N/A	160
Kent Lang	Sacramento River	Riparian, Pre-1914		1930	S020230	329	Active	N/A	N/A	N/A	115
Yeung Farms Enterprises, LLC	Sacramento River	Riparian, Pre-1914	3/25/1905	N/A	S010294	900	Active	N/A	N/A	N/A	200
Lexington Ranch, LLC	East Borrow Pit, Yolo Bypass	Appropriative	01/18/1939	5454	A009492	3759.1	Active	10.3	Irrigation	04/15 to 10/15	1,146.4
Riverby	Reclamation Contract	Contract	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ishimoto	None on record	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total						**8,075.5**					

Notes: af = acre-feet; cfs = cubic feet per second; N/A = not available; Reclamation = U.S. Bureau of Reclamation
Source: State Water Resources Control Board 2016

- Section 408 Permission – The sole authority to grant permission for temporary or permanent alterations of USACE-constructed public works projects, including the Yolo and Sacramento Bypasses, is contained in Section 14 of the Rivers and Harbors Act of 1899 and codified in 33 USC 408 (Section 408). Approval for any modifications, alterations, or occupation of public works projects is granted through the USACE Section 408 program. DWR has initiated this process for the project with USACE, which will evaluate the project for impacts to flood conveyance, structural integrity, O&M, NEPA requirements, and flood-fighting capabilities, as well as meeting USACE policy and criteria. Engineering Circular (EC) 1165-2-216 provides the policies and procedural guidance that USACE districts follow in processing requests. Section 408 applies to most aspects of the Lower Elkhorn Basin Levee Setback (LEBLS) project including project design and NEPA compliance.

- Sacramento River Bank Protection Project (SRBPP) – Provides guidelines for levee evaluation and bank protection, and applies to impact analysis.

- Sacramento River Flood Control Project (SRFCP) Levee Height Requirements – Defines minimum levee freeboard for the SRFCP 1957 design profiles and applies to project design and impact analysis.

- USACE Levee Design Criteria – Yolo and Sacramento Bypass levees at the project site are Federally authorized and under USACE jurisdiction and engineering criteria, including Engineering Manual (EM) 111—1913, *Design and Construction of Levees;* Engineering Technical Letter (ETL) 1110-2-569, *Design Guidance for Levee Underseepage;* and ETL 1110-2-555, *Design Guidance on Levees*. Applies to project design and impact analyses.

- National Flood Insurance Program (NFIP) – NFIP covers communities that adopt and enforce ordinances that meet or exceed Federal Emergency Management Agency (FEMA) requirements. Applies to impact analyses.

State

The following State plans, policies, regulations, or laws related to hydrology, hydraulics, and flood risk management apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- 2012 Central Valley Flood Protection Plan (CVFPP) and CVFPP 2017 Update – The 2012 CVFPP and CVFPP 2017 Update apply to the project goals, objectives, design, implementation, and impact analysis, including guidance for improvements to rural-agricultural levees.

- Urban Levee Design Criteria (ULDC) – Although levees at the project site are classified as non-urban levees by the State, the ULDC, prepared by DWR, provides engineering criteria and guidance for meeting the Government Code requirements for levees and floodwalls. Applies to project design.

- California Water Code (CWC) and California Code of Regulations (CCR) Title 23 – These require permits for any project that may encroach upon, improve, alter or affect adopted plans of flood control (including Federal/State flood control systems, regulated streams, and designated floodways under CVFPB's jurisdiction). Applies to project design.

Regional and Local

The following regional and local plans, policies, regulations, and ordinances laws related to hydrology, hydraulics, and flood risk management are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County Improvement Standards – Several policies from the Yolo County Improvement Standards regarding hydrology, hydraulics, and flood risk reduction are relevant to project design, construction, and/or impact analysis as contained in Section 9, Storm Drainage; Section 10, Grading; and Section 11, Stormwater Quality, Erosion, and Sediment Control (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

- Yolo County Integrated Regional Water Management Plan (IRWMP) – Addresses water supply, water quality, flood risk reduction, enhancement of aquatic and riparian habitat, and improvement of the County's recreational opportunities.

- Yolo County 2030 General Plan – Several policies from the Yolo County General Plan regarding hydrology, hydraulics, and flood risk management are relevant to project design, construction, and/or impact analysis (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies). 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.

4.11.2 Environmental Consequences and Mitigation Measures

Analysis Methodology

DWR performed a hydraulic impact analysis to analyze the effects of the project on water surface elevations and flood risk both upstream and downstream of the project site and vicinity Appendix G, "Lower Elkhorn Basin Levee Setback Project Hydraulic Impact Analysis (Draft)," provides detailed information on the methods, models, and modeling results, which are only summarized herein.

The purpose of the hydraulic impact analysis and the accompanying risk and uncertainty (R&U) analysis is to determine the potential hydrologic and hydraulic impacts of the project within the Sacramento River Flood Control System. Factors considered included changes in water surface elevations (i.e., stage), water velocities, scour, and flow distribution upstream and downstream of the project site. The R&U analysis is used to determine impacts by assessing changes in conditional annual exceedance probability (C-AEP) within the system. Here, C-AEP is the probability that the authorized design water surface elevation (DWSE) is equaled or exceeded in any given year. Conditional non-exceedance probability (CNP) will also be computed. CNP is the probability that the authorized DWSE will *not* be equaled or exceeded in any given year.

The hydraulic and R&U analyses also support compliance with the Section 408 requirements and inform the design of the levee setback based on the ULDC guidance developed by DWR.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. Comments related to hydrology, hydraulics, and flood risk management were focused on levee design standards, levee alignments, reduction of flood stage in the Sacramento River, avoidance of west side Yolo Bypass expansion, and water supply changes downstream of the project site. These topics are addressed in the analysis presented in this section.

Model Parameters and Assumptions

The analysis was performed for 100- and 200-year flood events using the updated Sacramento River HEC-ResSim system model, which was originally developed for the Central Valley Hydrologic Study (CVHS) by DWR and USACE. Conditions within the Sacramento River Basin are represented at 58 index points in the model, including points on the Feather, American, and Sacramento Rivers; Yolo, Sacramento, and Sutter Bypasses; and the Sacramento River Deep Water Ship Channel (DWSC) (Figure 4.14-1). Fifteen key index points from the 58 points modeled have been chosen to represent effects upstream, within, and downstream of the project site.

Levee Design Criteria

Although the setback levee is classified as non-urban by DWR, it is being designed following guidance from DWR's ULDC, except for the top of levee (TOL), which is based on the 100-year (instead of the 200-year) DWSE. The hydraulic analysis informs the levee design primarily for setting the levee heights and ensuring adequate freeboard for wind and wave run-up heights, and potential erosion and scour impacts associated with the project (DWR 2016b).

Model Scenarios

Four scenarios were modeled to represent different conditions and are described in detail in Appendix G, "Lower Elkhorn Basin Levee Setback Project Hydraulic Impact Analysis (Draft)":

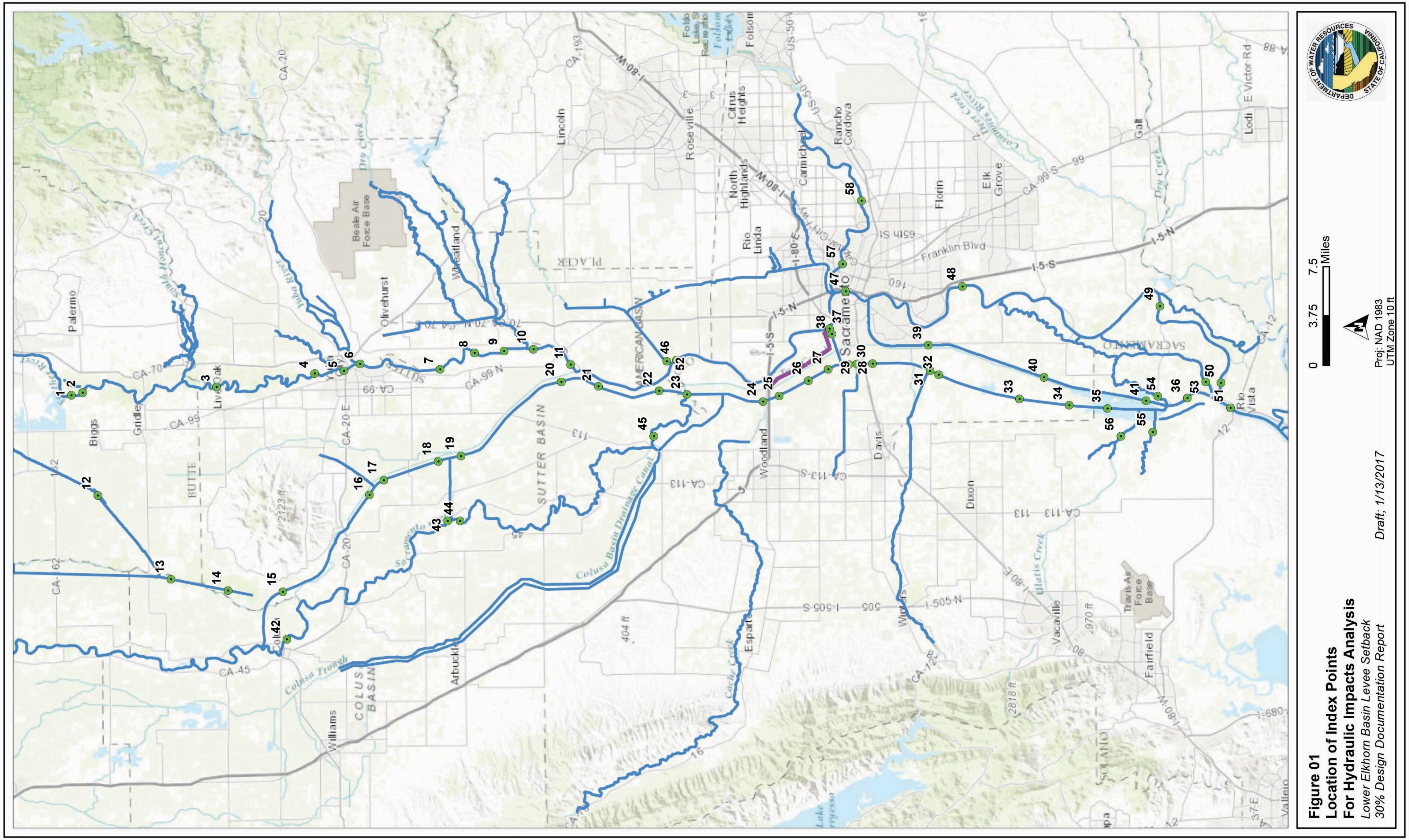
- Existing Conditions – Existing conditions without LEBLS project
- Existing With-Project – Existing conditions with LEBLS project (includes Sacramento Bypass Levee Setback and Yolo Bypass levee setback only)
- Future Without-Project – Future conditions without LEBLS project (includes American River Common Features [ARCF] General Reevaluation Report [GR]} and Sacramento Bypass levee setback and Sacramento Weir widening only)
- Future With-Project – Future conditions with LEBLS project (includes Sacramento bypass Levee Setback, Yolo Bypass levee setback, and ARCF GRR Sacramento Weir widening)

For hydraulic modeling purposes, the Existing Conditions scenario is identical to the No Action Alternative and the No Project Alternative. The ARCF GRR Sacramento Bypass Levee Setback and Sacramento Weir widening were included in the Future Without-Project scenario to provide additional hydraulic information since both the ARCF GRR and the project have the Sacramento Bypass Levee Setback as a common feature. The Future With-Project scenario represents cumulative conditions with all project and ARCF GRR features combined.

Agricultural Water Supply Methodology

Existing, available water rights information for parcels within the project setback area was reviewed and compared to average annual water use information for rice growing to ascertain the suitability (from a strictly water supply perspective) of the setback area lands for the cultivation of rice. As discussed in

Figure 4.14-1. Location of Sacramento River HEC-ResSim System Model Index Points



Source: California Department of Water Resources 2016, adapted by GEI Consultants, Inc. in 2016

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Section 4.15, "Land Use and Planning, and Agricultural and Forestry Resources," Yolo County has proposed rice farming in the expanded floodway (to retain existing agricultural production at the site). DWR has designed the Yolo Bypass East Levee setback to minimize impacts to agriculture to the greatest extent feasible and concurs with Yolo County that planting the acreage in rice to maintain agricultural productivity, as well as increase habitat values for fish and wildlife, is desirable and therefore is proposed.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to hydrology, hydraulics, and flood risk management if they would do any of the following:

- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in manner which would result in flooding on- or off-site;
- place housing within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- cause inundation by seiche, tsunami, or mudflow.

In addition to the thresholds listed above, the project would have a significant hydrology, hydraulics, or flood risk management impact if:

- agricultural water supplies would be modified such that agricultural production could not be maintained in the Lower Elkhorn Basin.

Issues Not Discussed Further in this EIS/EIR

Place Housing or Structures within a 100-year Flood Hazard Area as Mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or Other Flood Hazard Delineation Which Would Impede or Redirect Flood Flows—No housing or structures would be constructed or placed in the floodway as a result of the project. Therefore, this issue is not evaluated further in this EIS/EIR.

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 Dam (failure of levees is covered under Impact HH-1)—The project would not contribute to the possibility of a dam failure as it would not affect any facilities classified as a dam under the DWR, Division of Safety of Dams criteria. Additionally, the new setback levee would be fully constructed on the landside of the existing Bypass levees before any degrade of existing levees would occur. Thus, in the event of an upstream dam failure, there would be no portion of the Bypasses that would be left unprotected during new setback levee construction. Therefore, there would be no impact and this issue is not evaluated further in this EIS/EIR.

Cause Inundation by Tsunami, Mudflow, or Seiche—A tsunami is a series of water waves caused by the displacement of a large volume of a body of water, typically an ocean or a large lake. Earthquakes, volcanic eruptions, landslides, and other disturbances above or below water all have the potential to generate a tsunami. Since the project site is many miles inland from the coast and San Francisco Bay, the project site is not exposed to flooding risks from tsunamis. Additionally, the project site and surrounding areas are relatively flat, which essentially eliminates the potential for mudflows on the project site. There would be no impacts from these events. Therefore, the risk of tsunami or mudflow is not evaluated further in this EIS/EIR.

A seiche is a standing wave in an enclosed or partially enclosed body of water. Seiches and seiche-related phenomena have been observed on lakes, reservoirs, swimming pools, bays, harbors, and seas. The key requirement for formation of a seiche is that the body of water be at least partially bounded, allowing the formation of the standing wave. Seiches of a significant height can inundate developed areas, threatening public safety and structures. There are no large bodies of standing water in the vicinity of the project site except for the Yolo Bypass during high-flow conditions when it is full of water. The inundated Yolo Bypass is identified in the County of Yolo Emergency Plan (County of Yolo 2000) as an area where a seiche could occur. However, a seiche has never been recorded in the Yolo Bypass and active seismic sources are generally located in the Coast Ranges (a long distance from the project site). The potential for a seiche at the project site is negligible and there would be no impact. Therefore, this issue is not evaluated further.

Impact Analysis

Table 4.14-2 provides a summary of hydrology, hydraulics, and flood risk management impacts and mitigation measures for all alternatives under consideration.

Table 4.14-2. Summary of Impacts and Mitigation Measures—Hydrology, Hydraulics, and Flood Risk Management

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
HH-1: 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	Alternative 1: No Action Alternative	LTS	None	LTS
	Alternative 2: DWR's Preferred Alternative	B	HH-1: Coordinate with Local Maintaining Agencies to Ensure Proper Maintenance of Yolo Bypass Levees from Sacramento Bypass to Cache Slough	B
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
HH-2: Loss of Agricultural Water Supplies	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	NI	None	NI
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
HH-3: Substantially Alter the Existing Drainage Pattern of the Site or Area, including through the Alteration of the Course of a Stream or River, in a Manner Which Would Result in Substantial Erosion, Siltation, or Flooding On- or Off-site	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact HH-1: 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.

The risk of flooding as a result of levee failure was evaluated primarily based on modeled changes in river stage (water surface elevation) during 100- and 200-year flood events, and R&U analysis. Figure 4.14-2 and Tables 4.14-3 through 4.14-6 summarize stage changes for each alternative under existing and future scenarios at representative index points during 100- and 200-year flood events. To aide in reviewing these tables, cells shaded green show project-related stages decreasing at least 0.20 foot, while cells shaded yellow show project-related stages increasing at least 0.20 foot. Additional hydraulic modeling results are presented in Appendix G, "Lower Elkhorn Basin Levee Setback Project Hydraulic Impact Analysis (Draft)."

Alternative 1: No Action Alternative

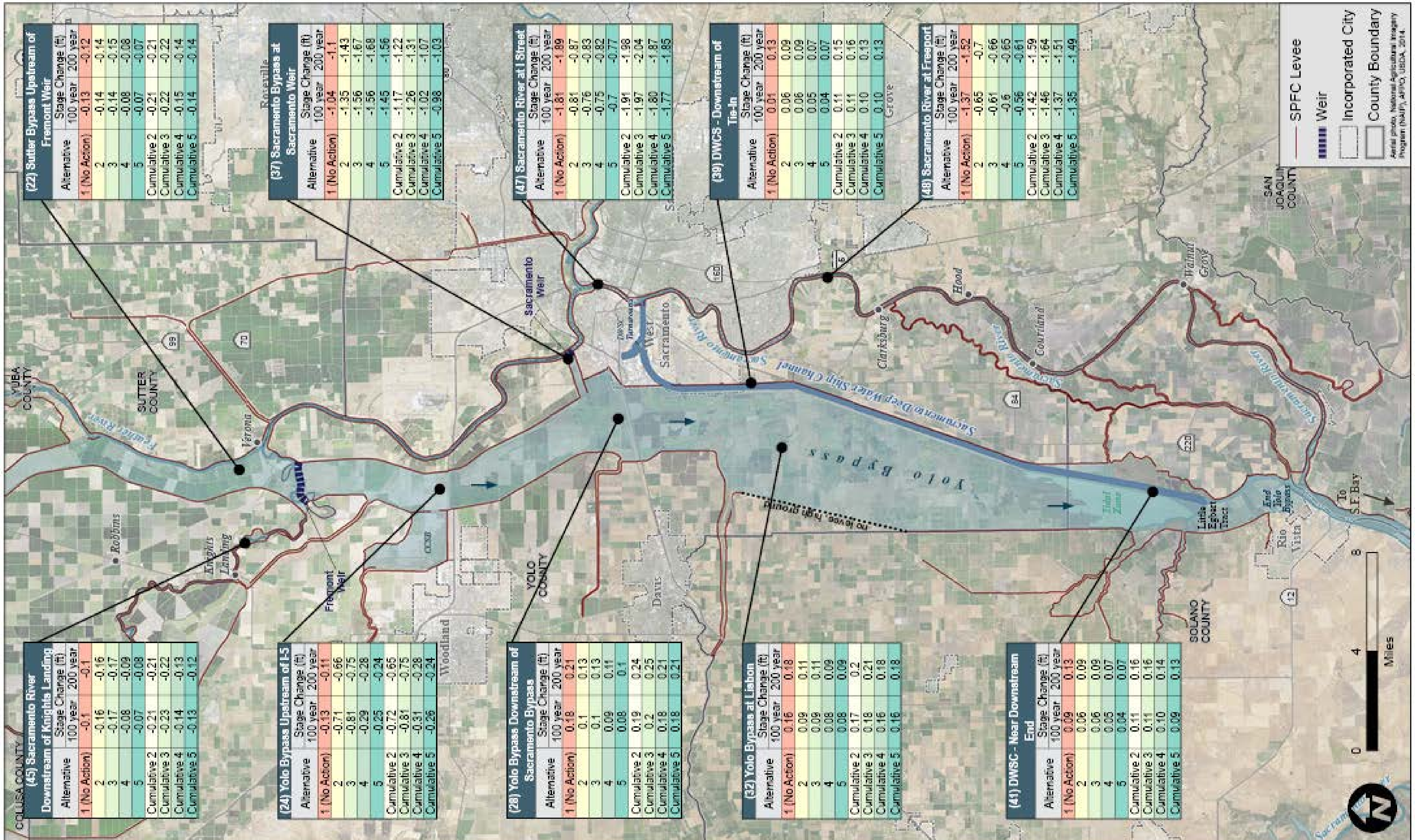
Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento River Flood Control System improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue along the Yolo Bypass East Levee. There would be no changes under the No Action Alternative compared to the Existing Conditions scenario; for hydraulic analyses, they are identical.

Under the No Action Alternative, the following flood risks would remain:

- A high risk of flooding threatening life and public safety, property, critical infrastructure, and the environment would remain throughout the areas protected by the Yolo and Sacramento Bypasses, including but not limited to portions of the Cities of Sacramento, West Sacramento, and Woodland.
- The Sacramento River Flood Control Project, including the Yolo and Sacramento Bypasses, would continue to have inadequate capacity to convey large flood events.
- The existing Sacramento Bypass North Levee and portions of the Yolo Bypass East Levee would continue to be deficient, as evidenced by several slope failures, sloughing, boils, and slope cracking in early 2017, and no improvements or replacements would occur to minimize future flood risks.
- New, well-engineered flood facilities needed to reduce long-term operations, maintenance, repair, replacement, and rehabilitation costs would not be constructed.
- Climate change may increase hydrologic variability and may put further stress on the flood management system and erode the level of protection provided from previous flood system investments; no increase in system capacity would occur to provide resiliency in the face of uncertain future flow conditions due to climate change.

Until a flood event occurs, there would be **no impact.** If and when a flood occurs from Sacramento and lower American River flows, the substantial and significant impacts discussed in "Consequences of No Action" in Section 3.5.2, "No Action/No Project Alternative Description," would occur.

Figure 4.14-2a. Summary of Hydraulic Modeling Results by Alternative for Representative Index Points and 100- and 200-year Flood Events



(45) Sacramento River Downstream of Knights Landing

Alternative	Stage Change (ft) 100 year	200 year
1 (No Action)	-0.1	-0.1
2	-0.16	-0.16
3	-0.17	-0.17
4	-0.08	-0.09
5	-0.07	-0.08
Cumulative 2	-0.21	-0.21
Cumulative 3	-0.23	-0.22
Cumulative 4	-0.14	-0.13
Cumulative 5	-0.13	-0.12

(22) Sutter Bypass Upstream of Fremont Weir

Alternative	Stage Change (ft) 100 year	200 year
1 (No Action)	-0.13	-0.12
2	-0.14	-0.14
3	-0.14	-0.15
4	-0.08	-0.08
5	-0.07	-0.07
Cumulative 2	-0.21	-0.21
Cumulative 3	-0.22	-0.22
Cumulative 4	-0.15	-0.14
Cumulative 5	-0.14	-0.14

(24) Yolo Bypass Upstream of I-5

Alternative	Stage Change (ft) 100 year	200 year
1 (No Action)	-0.13	-0.11
2	-0.71	-0.66
3	-0.81	-0.75
4	-0.29	-0.28
5	-0.25	-0.24
Cumulative 2	-0.72	-0.65
Cumulative 3	-0.81	-0.75
Cumulative 4	-0.31	-0.28
Cumulative 5	-0.26	-0.24

(37) Sacramento Bypass at Sacramento Weir

Alternative	Stage Change (ft) 100 year	200 year
1 (No Action)	-1.04	-1.1
2	-1.35	-1.43
3	-1.56	-1.67
4	-1.56	-1.68
5	-1.45	-1.56
Cumulative 2	-1.17	-1.22
Cumulative 3	-1.26	-1.31
Cumulative 4	-1.02	-1.07
Cumulative 5	-0.98	-1.03

(28) Yolo Bypass Downstream of Sacramento Bypass

Alternative	Stage Change (ft) 100 year	200 year
1 (No Action)	0.18	0.21
2	0.1	0.13
3	0.1	0.13
4	0.09	0.11
5	0.08	0.1
Cumulative 2	0.19	0.24
Cumulative 3	0.2	0.25
Cumulative 4	0.18	0.21
Cumulative 5	0.18	0.21

(47) Sacramento River at I Street

Alternative	Stage Change (ft) 100 year	200 year
1 (No Action)	-1.81	-1.89
2	-0.81	-0.87
3	-0.76	-0.83
4	-0.75	-0.82
5	-0.7	-0.77
Cumulative 2	-1.91	-1.98
Cumulative 3	-1.97	-2.04
Cumulative 4	-1.80	-1.87
Cumulative 5	-1.77	-1.85

(32) Yolo Bypass at Lisbon

Alternative	Stage Change (ft) 100 year	200 year
1 (No Action)	0.16	0.18
2	0.09	0.11
3	0.09	0.11
4	0.08	0.09
5	0.08	0.09
Cumulative 2	0.17	0.2
Cumulative 3	0.18	0.21
Cumulative 4	0.16	0.18
Cumulative 5	0.16	0.18

(39) DWCS - Downstream of Tie-In

Alternative	Stage Change (ft) 100 year	200 year
1 (No Action)	0.01	0.13
2	0.06	0.09
3	0.06	0.09
4	0.05	0.07
5	0.04	0.07
Cumulative 2	0.11	0.15
Cumulative 3	0.11	0.16
Cumulative 4	0.10	0.13
Cumulative 5	0.10	0.13

(48) Sacramento River at Freeport

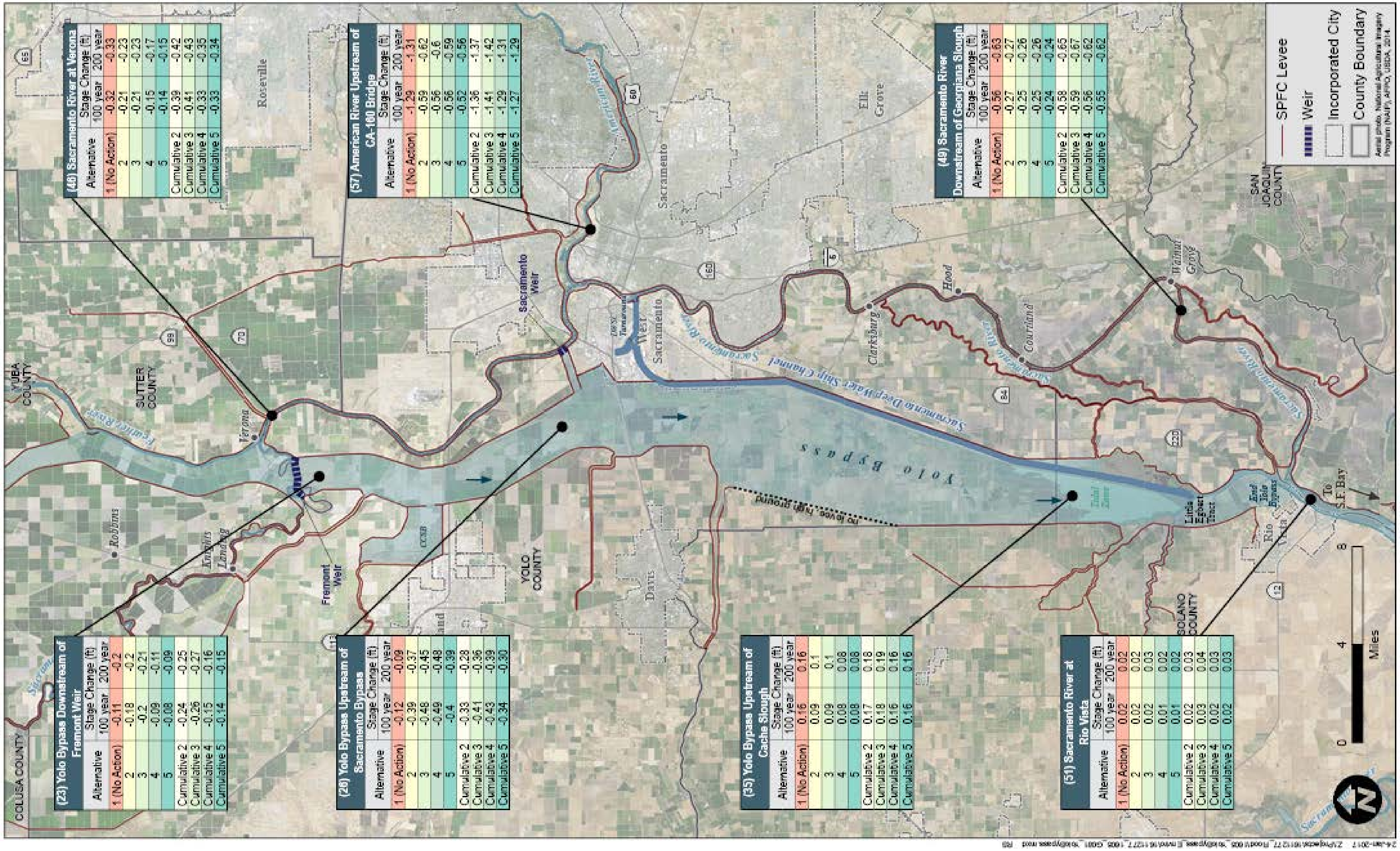
Alternative	Stage Change (ft) 100 year	200 year
1 (No Action)	-1.37	-1.52
2	-0.65	-0.7
3	-0.61	-0.66
4	-0.6	-0.65
5	-0.56	-0.61
Cumulative 2	-1.42	-1.59
Cumulative 3	-1.46	-1.64
Cumulative 4	-1.37	-1.51
Cumulative 5	-1.35	-1.49

(41) DWSC - Near Downstream End

Alternative	Stage Change (ft) 100 year	200 year
1 (No Action)	0.09	0.13
2	0.06	0.09
3	0.06	0.09
4	0.05	0.07
5	0.04	0.07
Cumulative 2	0.11	0.16
Cumulative 3	0.11	0.16
Cumulative 4	0.10	0.14
Cumulative 5	0.09	0.13

Source: California Department of Water Resources 2016, adapted by GEI Consultants, Inc. in 2017

Figure 4.14-2b. Summary of Hydraulic Modeling Results by Alternative for Representative Index Points and 100- and 200-year Flood Events



(23) Yolo Bypass Downstream of Fremont Weir

Alternative	Stage Change (ft) 100 year	Stage Change (ft) 200 year
1 (No Action)	-0.11	-0.2
2	-0.18	-0.2
3	-0.2	-0.21
4	-0.09	-0.11
5	-0.08	-0.09
Cumulative 2	-0.24	-0.25
Cumulative 3	-0.26	-0.27
Cumulative 4	-0.15	-0.16
Cumulative 5	-0.14	-0.15

(48) Sacramento River at Verona

Alternative	Stage Change (ft) 100 year	Stage Change (ft) 200 year
1 (No Action)	-0.32	-0.33
2	-0.21	-0.23
3	-0.21	-0.23
4	-0.15	-0.17
5	-0.14	-0.15
Cumulative 2	-0.39	-0.42
Cumulative 3	-0.41	-0.43
Cumulative 4	-0.33	-0.35
Cumulative 5	-0.33	-0.34

(28) Yolo Bypass Upstream of Sacramento Bypass

Alternative	Stage Change (ft) 100 year	Stage Change (ft) 200 year
1 (No Action)	-0.12	-0.09
2	-0.39	-0.37
3	-0.48	-0.45
4	-0.49	-0.48
5	-0.4	-0.39
Cumulative 2	-0.33	-0.28
Cumulative 3	-0.41	-0.36
Cumulative 4	-0.43	-0.39
Cumulative 5	-0.34	-0.30

(57) American River Upstream of CA-160 Bridge

Alternative	Stage Change (ft) 100 year	Stage Change (ft) 200 year
1 (No Action)	-1.29	-1.31
2	-0.59	-0.62
3	-0.56	-0.6
4	-0.56	-0.59
5	-0.52	-0.56
Cumulative 2	-1.36	-1.37
Cumulative 3	-1.41	-1.42
Cumulative 4	-1.29	-1.31
Cumulative 5	-1.27	-1.29

(35) Yolo Bypass Upstream of Cache Slough

Alternative	Stage Change (ft) 100 year	Stage Change (ft) 200 year
1 (No Action)	0.16	0.16
2	0.09	0.1
3	0.09	0.1
4	0.08	0.08
5	0.08	0.08
Cumulative 2	0.17	0.18
Cumulative 3	0.18	0.19
Cumulative 4	0.16	0.16
Cumulative 5	0.16	0.16

(49) Sacramento River Downstream of Georgiana Slough

Alternative	Stage Change (ft) 100 year	Stage Change (ft) 200 year
1 (No Action)	-0.56	-0.63
2	-0.27	-0.27
3	-0.25	-0.26
4	-0.25	-0.26
5	-0.24	-0.24
Cumulative 2	-0.58	-0.65
Cumulative 3	-0.59	-0.67
Cumulative 4	-0.56	-0.62
Cumulative 5	-0.55	-0.62

(51) Sacramento River at Rio Vista

Alternative	Stage Change (ft) 100 year	Stage Change (ft) 200 year
1 (No Action)	0.02	0.02
2	0.02	0.02
3	0.02	0.03
4	0.01	0.02
5	0.01	0.02
Cumulative 2	0.02	0.03
Cumulative 3	0.03	0.04
Cumulative 4	0.02	0.03
Cumulative 5	0.02	0.03

Source: California Department of Water Resources 2016, adapted by GEI Consultants, Inc. in 2017

Table 4.14-3. Hydraulic Modeling Results at Representative Index Points for 100- and 200-year Events: Alternative 2 (DWR's Preferred Alternative)

Index Point ID	Index Point Name	Existing Conditions (No Action Alternative) Stage (feet)		Future Without-Project Stage (feet)		Existing With-Project Stage (feet)		Future With Project Stage (feet)		Existing With Project (Alternative 2) vs. Existing Conditions Change in Stage (feet)		Future Without-Project vs. Existing Conditions Change in Stage (feet)		Future With-Project (Alternative 2 and Cumulative) vs. Existing Conditions Change in Stage (feet)	
		100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year
22	Sutter Bypass Upstream of Fremont Weir	43.21	44.21	43.08	44.09	43.07	44.07	43.00	44.00	-0.14	-0.14	-0.13	-0.12	-0.21	-0.21
23	Yolo Bypass Downstream of Fremont Weir	41.13	42.08	41.02	41.96	40.95	41.88	40.89	41.83	-0.18	-0.2	-0.11	-0.12	-0.24	-0.25
24	Yolo Bypass Upstream of I-5	35.43	36.44	35.30	36.33	34.72	35.78	34.71	35.79	-0.71	-0.66	-0.13	-0.11	-0.72	-0.65
26	Yolo Bypass Upstream of Sacramento Bypass	32.08	33.10	31.96	33.01	31.69	32.73	31.75	32.82	-0.39	-0.37	-0.12	-0.09	-0.33	-0.28
28	Yolo Bypass Downstream of Sacramento Bypass	30.66	31.68	30.84	31.89	30.76	31.81	30.85	31.92	0.1	0.13	0.18	0.21	0.19	0.24
32	Yolo Bypass at Lisbon	27.31	28.20	27.47	28.38	27.40	28.31	27.48	28.40	0.09	0.11	0.16	0.18	0.17	0.2
35	Yolo Bypass Upstream of Cache Slough	20.08	21.09	20.24	21.25	20.17	21.19	20.25	21.27	0.09	0.1	0.16	0.16	0.17	0.18
37	Sacramento Bypass at Sacramento Weir	32.93	34.08	31.89	32.98	31.58	32.65	31.76	32.86	-1.35	-1.43	-1.04	-1.1	-1.17	-1.22
39	Deep Water Ship Channel Downstream of Tie-in	17.03	18.09	17.13	18.22	17.09	18.18	17.14	18.24	0.06	0.09	0.1	0.13	0.11	0.15
41	Deep Water Ship Channel Near Downstream End	17.01	18.08	17.10	18.21	17.07	18.17	17.12	18.24	0.06	0.09	0.09	0.13	0.11	0.16
45	Sacramento River Downstream of Knights Landing	42.57	43.51	42.47	43.41	42.41	43.35	42.36	43.30	-0.16	-0.16	-0.1	-0.1	-0.21	-0.21
46	Sacramento River at Verona	41.72	42.71	41.40	42.38	41.51	42.48	41.33	42.29	-0.21	-0.23	-0.32	-0.33	-0.39	-0.42
47	Sacramento River at I Street	34.22	35.44	32.41	33.55	33.41	34.57	32.31	33.46	-0.81	-0.87	-1.81	-1.89	-1.91	-1.98
48	Sacramento River at Freeport	27.90	28.93	26.53	27.41	27.25	28.23	26.48	27.34	-0.65	-0.7	-1.37	-1.52	-1.42	-1.59
49	Sacramento River Downstream of Georgiana Slough	17.17	17.71	16.61	17.08	16.90	17.44	16.59	17.06	-0.27	-0.27	-0.56	-0.63	-0.58	-0.65
51	Sacramento River at Rio Vista	12.23	12.88	12.25	12.90	12.25	12.90	12.25	12.91	0.02	0.02	0.02	0.02	0.02	0.03
57	American River Upstream of SR 160 Bridge	37.28	38.71	35.99	37.40	36.69	38.09	35.92	37.34	-0.59	-0.62	-1.29	-1.31	-1.36	-1.37

Note: All Future scenarios include the ARCF GRR Sacramento Bypass Setback Levee and Sacramento Weir Widening
Source: Modeled by California Department of Water Resources in 2016 and 2017

Table 4.14-4. Hydraulic Modeling Results at Representative Index Points for 100- and 200-year Events: Alternative 3

Index Point ID	Index Point Name	Existing Conditions (No Action Alternative) Stage (feet)		Future Without-Project Stage (feet)		Existing With-Project Stage (feet)		Future With Project Stage (feet)		Existing With Project (Alternative 3) vs. Existing Conditions Change in Stage (feet)		Future Without-Project vs. Existing Conditions Change in Stage (feet)		Future With-Project (Alternative 3 and Cumulative) vs. Existing Conditions Change in Stage (feet)	
		100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year
22	Sutter Bypass Upstream of Fremont Weir	43.21	44.21	43.08	44.09	43.13	44.13	42.99	44.43	-0.14	-0.15	-0.13	-0.12	-0.22	-0.22
23	Yolo Bypass Downstream of Fremont Weir	41.13	42.08	41.02	41.96	41.04	41.97	40.87	41.73	-0.2	-0.21	-0.11	-0.12	-0.26	-0.27
24	Yolo Bypass Upstream of I-5	35.43	36.44	35.3	36.33	35.14	36.16	34.62	35.69	-0.81	-0.75	-0.13	-0.11	-0.81	-0.75
26	Yolo Bypass Upstream of Sacramento Bypass	32.08	33.1	31.96	33.01	31.59	32.62	31.67	32.83	-0.48	-0.45	-0.12	-0.09	-0.41	-0.36
28	Yolo Bypass Downstream of Sacramento Bypass	30.66	31.68	30.84	31.89	30.75	31.79	30.86	31.88	0.1	0.13	0.18	0.21	0.2	0.25
32	Yolo Bypass at Lisbon	27.31	28.2	27.47	28.38	27.39	28.29	27.49	28.37	0.09	0.11	0.16	0.18	0.18	0.21
35	Yolo Bypass Upstream of Cache Slough	20.08	21.09	20.24	21.25	20.16	21.17	20.26	21.25	0.09	0.1	0.16	0.16	0.18	0.19
37	Sacramento Bypass at Sacramento Weir	32.93	34.08	31.89	32.98	31.37	32.4	31.67	32.85	-1.56	-1.67	-1.04	-1.1	-1.26	-1.31
39	Deep Water Ship Channel Downstream of Tie-in	17.03	18.09	17.13	18.22	17.08	18.16	17.14	18.2	0.06	0.09	0.1	0.13	0.11	0.16
41	Deep Water Ship Channel Near Downstream End	17.01	18.08	17.1	18.21	17.06	18.15	17.12	18.19	0.06	0.09	0.09	0.13	0.11	0.16
45	Sacramento River Downstream of Knights Landing	42.57	43.51	42.47	43.41	42.49	43.42	42.34	43.81	-0.17	-0.17	-0.1	-0.1	-0.23	-0.22
46	Sacramento River at Verona	41.72	42.71	41.4	42.38	41.57	42.54	41.31	42.67	-0.21	-0.23	-0.32	-0.33	-0.41	-0.43
47	Sacramento River at I Street	34.22	35.44	32.41	33.55	33.47	34.62	32.25	33.49	-0.76	-0.83	-1.81	-1.89	-1.97	-2.04
48	Sacramento River at Freeport	27.9	28.93	26.53	27.41	27.3	28.28	26.44	27.34	-0.61	-0.66	-1.37	-1.52	-1.46	-1.64
49	Sacramento River Downstream of Georgiana Slough	17.17	17.71	16.61	17.08	16.92	17.45	16.58	17.05	-0.25	-0.26	-0.56	-0.63	-0.59	-0.67
51	Sacramento River at Rio Vista	12.23	12.88	12.25	12.9	12.24	12.9	12.26	12.82	0.02	0.03	0.02	0.02	0.03	0.04
57	American River Upstream of SR 160 Bridge	37.28	38.71	35.99	37.4	36.72	38.12	35.87	37.34	-0.56	-0.6	-1.29	-1.31	-1.41	-1.42

Source: Modeled by California Department of Water Resources in 2016 and 2017

Table 4.14-5. Hydraulic Modeling Results at Representative Index Points for 100- and 200-year Events: Alternative 4

Index Point ID	Index Point Name	Existing Conditions (No Action Alternative) Stage (feet)		Future Without-Project Stage (feet)		Existing With-Project Stage (feet)		Future With Project Stage (feet)		Existing With Project (Alternative 4) vs. Existing Conditions Change in Stage (feet)		Future Without-Project vs. Existing Conditions Change in Stage (feet)		Future With-Project (Alternative 4 and Cumulative) vs. Existing Conditions Change in Stage (feet)	
		100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year
22	Sutter Bypass Upstream of Fremont Weir	43.21	44.21	43.08	44.09	43.13	44.13	43.07	44.51	-0.08	-0.08	-0.13	-0.12	-0.15	-0.14
23	Yolo Bypass Downstream of Fremont Weir	41.13	42.08	41.02	41.96	41.04	41.97	40.99	41.85	-0.09	-0.11	-0.11	-0.12	-0.15	-0.16
24	Yolo Bypass Upstream of I-5	35.43	36.44	35.3	36.33	35.14	36.16	35.13	36.14	-0.29	-0.28	-0.13	-0.11	-0.31	-0.28
26	Yolo Bypass Upstream of Sacramento Bypass	32.08	33.1	31.96	33.01	31.59	32.62	31.64	32.78	-0.49	-0.48	-0.12	-0.09	-0.43	-0.39
28	Yolo Bypass Downstream of Sacramento Bypass	30.66	31.68	30.84	31.89	30.75	31.79	30.82	31.82	0.09	0.11	0.18	0.21	0.18	0.21
32	Yolo Bypass at Lisbon	27.31	28.2	27.47	28.38	27.39	28.29	27.45	28.32	0.08	0.09	0.16	0.18	0.16	0.18
35	Yolo Bypass Upstream of Cache Slough	20.08	21.09	20.24	21.25	20.16	21.17	20.23	21.21	0.08	0.08	0.16	0.16	0.16	0.16
37	Sacramento Bypass at Sacramento Weir	32.93	34.08	31.89	32.98	31.37	32.4	32.16	33.37	-1.56	-1.68	-1.04	-1.1	-1.02	-1.07
39	Deep Water Ship Channel Downstream of Tie-in	17.03	18.09	17.13	18.22	17.08	18.16	17.12	18.16	0.05	0.07	0.1	0.13	0.1	0.13
41	Deep Water Ship Channel Near Downstream End	17.01	18.08	17.1	18.21	17.06	18.15	17.1	18.15	0.05	0.07	0.09	0.13	0.1	0.14
45	Sacramento River Downstream of Knights Landing	42.57	43.51	42.47	43.41	42.49	43.42	42.44	43.89	-0.08	-0.09	-0.1	-0.1	-0.14	-0.13
46	Sacramento River at Verona	41.72	42.71	41.4	42.38	41.57	42.54	41.41	42.77	-0.15	-0.17	-0.32	-0.33	-0.33	-0.35
47	Sacramento River at I Street	34.22	35.44	32.41	33.55	33.47	34.62	32.6	33.86	-0.75	-0.82	-1.81	-1.89	-1.8	-1.87
48	Sacramento River at Freeport	27.9	28.93	26.53	27.41	27.3	28.28	26.65	27.63	-0.6	-0.65	-1.37	-1.52	-1.37	-1.51
49	Sacramento River Downstream of Georgiana Slough	17.17	17.71	16.61	17.08	16.92	17.45	16.66	17.14	-0.25	-0.26	-0.56	-0.63	-0.56	-0.62
51	Sacramento River at Rio Vista	12.23	12.88	12.25	12.9	12.24	12.9	12.25	12.81	0.01	0.02	0.02	0.02	0.02	0.03
57	American River Upstream of SR 160 Bridge	37.28	38.71	35.99	37.4	36.72	38.12	36.12	37.58	-0.56	-0.59	-1.29	-1.31	-1.29	-1.31

Source: Modeled by California Department of Water Resources in 2016 and 2017

Table 4.14-6. Hydraulic Modeling Results at Representative Index Points for 100- and 200-year Events: Alternative 5

Index Point ID	Index Point Name	Existing Conditions (No Action Alternative) Stage (feet)		Future Without-Project Stage (feet)		Existing With-Project Stage (feet)		Future With Project Stage (feet)		Existing With Project (Alternative 5) vs. Existing Conditions Change in Stage (feet)		Future Without-Project vs. Existing Conditions Change in Stage (feet)		Future With-Project (Alternative 5 and Cumulative) vs. Existing Conditions Change in Stage (feet)	
		100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year	100-year	200-year
22	Sutter Bypass Upstream of Fremont Weir	43.21	44.21	43.08	44.09	43.14	44.14	43.07	44.5	-0.07	-0.07	-0.13	-0.12	-0.14	-0.14
23	Yolo Bypass Downstream of Fremont Weir	41.13	42.08	41.02	41.96	41.05	41.99	40.99	41.85	-0.08	-0.09	-0.11	-0.12	-0.14	-0.15
24	Yolo Bypass Upstream of I-5	35.43	36.44	35.3	36.33	35.18	36.2	35.17	36.18	-0.25	-0.24	-0.13	-0.11	-0.26	-0.24
26	Yolo Bypass Upstream of Sacramento Bypass	32.08	33.1	31.96	33.01	31.68	32.71	31.74	32.88	-0.4	-0.39	-0.12	-0.09	-0.34	-0.3
28	Yolo Bypass Downstream of Sacramento Bypass	30.66	31.68	30.84	31.89	30.74	31.78	30.84	31.84	0.08	0.1	0.18	0.21	0.18	0.21
32	Yolo Bypass at Lisbon	27.31	28.2	27.47	28.38	27.39	28.29	27.47	28.33	0.08	0.09	0.16	0.18	0.16	0.18
35	Yolo Bypass Upstream of Cache Slough	20.08	21.09	20.24	21.25	20.16	21.17	20.24	21.22	0.08	0.08	0.16	0.16	0.16	0.16
37	Sacramento Bypass at Sacramento Weir	32.93	34.08	31.89	32.98	31.48	32.52	31.95	33.14	-1.45	-1.56	-1.04	-1.1	-0.98	-1.03
39	Deep Water Ship Channel Downstream of Tie-in	17.03	18.09	17.13	18.22	17.07	18.16	17.13	18.17	0.04	0.07	0.1	0.13	0.1	0.13
41	Deep Water Ship Channel Near Downstream End	17.01	18.08	17.1	18.21	17.05	18.15	17.1	18.16	0.04	0.07	0.09	0.13	0.09	0.13
45	Sacramento River Downstream of Knights Landing	42.57	43.51	42.47	43.41	42.5	43.43	42.44	43.89	-0.07	-0.08	-0.1	-0.1	-0.13	-0.12
46	Sacramento River at Verona	41.72	42.71	41.4	42.38	41.58	42.56	41.39	42.75	-0.14	-0.15	-0.32	-0.33	-0.33	-0.34
47	Sacramento River at I Street	34.22	35.44	32.41	33.55	33.52	34.67	32.45	33.69	-0.7	-0.77	-1.81	-1.89	-1.77	-1.85
48	Sacramento River at Freeport	27.9	28.93	26.53	27.41	27.34	28.32	26.55	27.5	-0.56	-0.61	-1.37	-1.52	-1.35	-1.49
49	Sacramento River Downstream of Georgiana Slough	17.17	17.71	16.61	17.08	16.93	17.47	16.62	17.09	-0.24	-0.24	-0.56	-0.63	-0.55	-0.62
51	Sacramento River at Rio Vista	12.23	12.88	12.25	12.9	12.24	12.9	12.25	12.81	0.01	0.02	0.02	0.02	0.02	0.03
57	American River Upstream of SR 160 Bridge	37.28	38.71	35.99	37.4	36.76	38.15	36.01	37.47	-0.52	-0.56	-1.29	-1.31	-1.27	-1.29

Source: Modeled by California Department of Water Resources in 2016 and 2017

Alternative 2: DWR's Preferred Alternative (7-Mile Setback Partial Degrade)

Under Alternative 2, DWR would construct setback levees in the Lower Elkhorn Basin as described in Chapter 3, "Alternatives." Impacts to stage under Alternative 2 are represented by the Existing With-Project scenario. To determine impacts of Alternative 2, the 100- and 200-year stages with the project were compared to Existing Conditions (see Table 4.14-3, Existing With-Project vs. Existing Conditions).

Existing Conditions With-Project Effects during 100-Year Flood Event

Compared to Existing Conditions (No Action Alternative without project), the Existing With-Project scenario would result in beneficial impacts to stage during a 100-year event both upstream and downstream of the project site at most index points. Stage decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during 100-year flood events throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Existing With-Project scenario during a 100-year event under Alternative 2 would decrease stage as follows at the following locations:

- -0.71 foot in the Yolo Bypass Upstream of I-5
- -0.81 foot in the Sacramento River at the I Street Bridge
- -0.65 foot in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), however, the Existing With-Project scenario during 100-year flood events would increase stage slightly at three locations in the Yolo Bypass: 0.10 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.09 foot at Lisbon (Index Point 32), and 0.09 foot upstream of Cache Slough (Index Point 35), as well as similarly small increases in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Stage increase is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site are a function of normal Bypass flows (which are spread over a wider channel area within the project site by the project, due to the increased width of the Yolo and Sacramento Bypasses from new setback levees), entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach Rio Vista on the Sacramento River, the increase in stage is 0.02 foot and essentially unchanged.

None of these stage increases exceed a minor 0.1-foot increase, as shown in Figure 4.14-2. These stage increases would not expose people or structures to a significant risk of loss, injury, or death involving flooding. Therefore, for the 100-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System. The project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards. Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, Alternative 2 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under existing conditions and 100-year flood events would be **beneficial**.

Existing Conditions With-Project Effects during 200-Year Flood Event

Compared to Existing Conditions (No Action Alternative without project), the Existing With-Project scenario would result in beneficial impacts to stage during a 200-year event both upstream and downstream of the project site at most index points. Stages decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during a 200-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Existing With-Project scenario during a 200-year event under Alternative 2 would decrease stage as follows:

- -0.66 foot in the Yolo Bypass Upstream of I-5
- -0.87 foot in the Sacramento River at the I Street Bridge
- -0.70 foot in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), however, the Existing With-Project scenario during a 200-year flood event would increase stage at three locations in the Yolo Bypass: 0.1 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.09 foot at Lisbon (Index Point 32), and 0.09 foot upstream of Cache Slough (Index Point 35), as well as similarly small increases in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Stage increase is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site with the project are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach Rio Vista on the Sacramento River, the increase in stage is 0.02 foot and essentially unchanged.

None of these stage increases exceed a small 0.13-foot increase, as shown in Figure 4.14-2. These stage increases would not expose people or structures to a significant risk of loss, injury, or death involving flooding. Therefore, for the 200-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System. The project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards. Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, Alternative 2 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under existing conditions and 200-year flood events would be **beneficial**.

Future Conditions With-Project Effects during 100-Year Flood Event (Cumulative)

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario would result in beneficial impacts to stage during a 100-year event both upstream and downstream of the project site at most index points. Stage decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These stage reductions reduce the flooding risk during a 100-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Future With-Project scenario (cumulative conditions) during a 100-year event under Alternative 2 would decrease stage as follows:

- -0.72 foot in the Yolo Bypass Upstream of I-5
- -1.91 feet in the Sacramento River at the I Street Bridge
- -1.42 feet in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario during a 100-year flood event would increase stage at three locations in the Yolo Bypass: 0.19 foot in the Yolo Bypass downstream of Sacramento Bypass (Index Point 28), 0.17 foot at Lisbon (Index Point 32), and 0.17 foot upstream of Cache Slough (Index Point 35), as well as two locations in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Stage increase is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site in the Yolo Bypass with the project are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach the Sacramento River at Rio Vista, the increase in stage is 0.02 foot and essentially unchanged.

Therefore, for the 100-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System except for the Yolo Bypass downstream of the Sacramento Bypass and in the DWSC (and a minor 0.02-foot increase in the Sacramento River at Rio Vista) compared to Existing Conditions. Moreover, the maximum stage change under these cumulative conditions is 0.19 foot in the Yolo Bypass downstream of the Sacramento Bypass. Even at the index point of greatest stage increase, the stage increases would not be expected to expose people or structures to a significant risk of loss, injury, or death involving flooding.

Alternative 2 under Future (cumulative) conditions would substantially decrease flood risks during 100-year flood events in the upper Yolo Bypass, lower American River, and the Sacramento River through the Sacramento metropolitan area by conveying potential flood flows through the Sacramento Bypass into the Yolo Bypass. Therefore, Alternative 2 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under Future With-Project Conditions (cumulative) and 100-year flood events would be **beneficial**.

Future Conditions With-Project Effects during 200-Year Flood Event (Cumulative)

Similar to results for the 100-year event, as compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario would result in beneficial impacts to stage during a 200-year event both upstream and downstream of the project site at most index points. Stages decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during a 200-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Future With-Project (cumulative) scenario during a 200-year event under Alternative 2 would decrease stage as follows:

- -0.65 foot in the Yolo Bypass Upstream of I-5
- -1.98 feet in the Sacramento River at the I Street Bridge
- -1.59 feet in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario during a 200-year flood event would increase stage at three locations in the Yolo Bypass: 0.24 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.20 foot at Lisbon (Index Point 32), and 0.18 foot upstream of Cache Slough (Index Point 35), as well as two locations in the DWSC (Index Points 39 and 41)) and in the Sacramento River at Rio Vista (Index Point 51). Stage increase is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site in the Yolo Bypass with the project are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach the Sacramento River at Rio Vista, the increase in stage is 0.03 foot and essentially unchanged.

Therefore, for the 200-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System except for the Yolo Bypass downstream of the Sacramento Bypass and in the DWSC (and a minor 0.03-foot increase in the Sacramento River at Rio Vista) compared to Existing Conditions (No Action Alternative without project). Moreover, the maximum stage change under these cumulative conditions is 0.24 foot in the Yolo Bypass downstream of the Sacramento Bypass (i.e., a similar contribution the project makes under Existing Conditions and a 100-year flood event). Even at the point of greatest stage increase (i.e., 0.24 foot at Yolo Bypass downstream of the Sacramento Bypass), these stage increases would not be expected to expose people or structures to a significant risk of loss, injury, or death involving flooding.

There are substantial cumulative benefits from the LEBLS and ARCF GRR projects at the three critical sites bulleted above, as well as generally throughout the Sacramento River Flood Control System. The LEBLS project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, including at critical sites in the Yolo Bypass and on the Sacramento and American Rivers, Alternative 2 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure. The project impacts under Future With-Project Conditions (cumulative) and 200-year flood events would be **beneficial**.

Although not required for beneficial project impacts, DWR would implement Mitigation Measure HH-1 described below to reduce the potential for any adverse effects from the stage increases described above under both Existing and Future Conditions and 100- and 200-year flood events.

Mitigation Measure HH-1: Coordinate with Local Maintaining Agencies to Ensure Proper Maintenance of Yolo Bypass Levees from Sacramento Bypass to Cache Slough.

DWR will coordinate on an annual basis with local maintaining agencies responsible for O&M of Yolo Bypass levees from the Sacramento Bypass to Cache Slough to ensure proper levee maintenance (specific local maintaining agencies will depend on the alternative selected for implementation). This coordination will help ensure that these levees and adequate freeboard are properly maintained according to all applicable regulations and O&M manual requirements for these levee reaches.

Timing: During and after project construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementing Mitigation Measure HH-1 would reduce potential impacts from stage increases expected in these bypass and river reaches. The impact remains **beneficial**.

Alternatives 3: 7-Mile Expanded Setback Full Degrade

Under Alternative 3, DWR would construct setback levees in the Lower Elkhorn Basin as described in Chapter 3, "Alternatives." Impacts to stage under Alternative 3 are represented by the Existing With-Project scenario. To determine impacts of Alternative 3, the 100- and 200-year stages with the project were compared to Existing Conditions (see Table 4.14-4, Existing With-Project vs. Existing Conditions).

Existing Conditions With-Project Effects during 100-Year Flood Event

Compared to Existing Conditions (No Action Alternative without project), the Existing With-Project scenario would result in beneficial impacts to stage during a 100-year event both upstream and downstream of the project site at most index points. Stage decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of the I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during 100-year flood events throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Existing With-Project scenario during a 100-year event under Alternative 3 would decrease stage as follows:

- -0.81 foot in the Yolo Bypass Upstream of I-5
- -0.76 foot in the Sacramento River at the I Street Bridge
- -0.61 foot in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), however, the Existing With-Project scenario during 100-year flood events would increase stage slightly at three locations in the Yolo Bypass: 0.1 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.09 foot at Lisbon (Index Point 32), and 0.09 foot upstream of Cache Slough (Index Point 35), as well as similarly small increases in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Similar to Alternative 2, stage increase under Alternative 3 is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site are a function of normal Bypass flows (which are spread over a wider channel area within the project site by the project, due to the increased width of the Yolo and Sacramento Bypasses from new setback levees), entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach Rio Vista on the Sacramento River, the increase in stage is 0.02 and essentially unchanged.

None of these stage increases exceed a minor 0.1-foot increase, as shown in Figure 4.14-2. These stage increases would not expose people or structures to a significant risk of loss, injury, or death involving flooding. Therefore, for the 100-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System. The project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards. Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, Alternative 3 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under Existing Conditions and 100-year flood events would be **beneficial**.

Existing Conditions With-Project Effects during 200-Year Flood Event

Compared to Existing Conditions (No Action Alternative without project), the Existing With-Project scenario would result in beneficial impacts to stage during a 200-year event both upstream and downstream of the project site at most index points. Stages decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during a 200-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Existing With-Project scenario during a 200-year event under Alternative 3 would decrease stage as follows:

- -0.75 foot in the Yolo Bypass Upstream of I-5
- -0.83 foot in the Sacramento River at the I Street Bridge
- -0.66 foot in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), however, the Existing With-Project scenario during a 200-year flood event would increase stage at three locations in the Yolo Bypass: 0.13 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.11 foot at Lisbon (Index Point 32), and 0.1 foot upstream of Cache Slough (Index Point 35), as well as similarly small increases in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Similar to Alternative 2, stage increases under Alternative 3 are highest immediately downstream of the project site and decrease as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site with the project are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach Rio Vista on the Sacramento River, the increase in stage is 0.03 and essentially unchanged.

None of these stage increases exceed a minor 0.13-foot increase, as shown in Figure 4.14-2. These stage increases would not expose people or structures to a significant risk of loss, injury, or death involving flooding. Therefore, for the 200-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System. The project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards. Consequently, considering the context and intensity of these impacts to stage throughout the

Sacramento River Flood Control System, Alternative 3 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under Existing Conditions and 200-year flood events would be **beneficial**.

Future Conditions With-Project Effects during 100-Year Flood Event (Cumulative)

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario would result in beneficial impacts to stage during a 100-year event both upstream and downstream of the project site at most index points. Stage decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These stage reductions reduce the flooding risk during a 100-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Future With-Project scenario (cumulative conditions) during a 100-year event under Alternative 3 would decrease stage as follows:

- -0.81 foot in the Yolo Bypass Upstream of I-5
- -1.97 feet in the Sacramento River at the I Street Bridge
- -1.46 feet in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario during a 100-year flood event would increase stage at three locations in the Yolo Bypass: 0.20 foot in the Yolo Bypass downstream of Sacramento Bypass (Index Point 28), 0.18 foot at Lisbon (Index Point 32), and 0.18 foot upstream of Cache Slough (Index Point 35), as well as two locations in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Stage increase is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site in the Yolo Bypass with the project are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach the Sacramento River at Rio Vista, the increase in stage is 0.03 foot and essentially unchanged.

Therefore, for the 100-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System except for the Yolo Bypass downstream of the Sacramento Bypass and in the DWSC (and a minor 0.03-foot increase in the Sacramento River at Rio Vista) compared to Existing Conditions. Moreover, the maximum stage change under these cumulative conditions is 0.20 foot in the Yolo Bypass downstream of the Sacramento Bypass. Even at the index point of greatest stage increase, these stage increases would not be expected to expose people or structures to a significant risk of loss, injury, or death involving flooding.

Alternative 3 under Future With-Project Conditions (cumulative) would substantially decrease flood risks during 100-year flood events in the upper Yolo Bypass, lower American River, and Sacramento River through the Sacramento metropolitan area by conveying those potential flood flows through the Sacramento Bypass into the Yolo Bypass. Therefore, Alternative 3 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under Future With-Project Conditions (cumulative) and 100-year flood events would be **beneficial**.

Future Conditions With-Project Effects during 200-Year Flood Event (Cumulative)

Similar to results for the 100-year event, as compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario would result in beneficial impacts to stage during a 200-year event both upstream and downstream of the project site at most index points. Stages decreases would occur in the Yolo Bypass downstream of Fremont Weir and upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Verona to Rio Vista (Index Points 46-51), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during a 200-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Future With-Project scenario (cumulative conditions) during a 200-year event under Alternative 3 would decrease stage as follows:

- -0.75 foot in the Yolo Bypass Upstream of I-5
- -2.04 feet in the Sacramento River at the I Street Bridge
- -1.64 feet in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario during a 200-year flood event would increase stage at three locations in the Yolo Bypass, 0.25 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.21 foot at Lisbon (Index Point 32), and 0.19 foot upstream of Cache Slough (Index Point 35), as well as two locations in the DWSC (Index Points 39 and 41). Stage increase is generally highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Similar to Alternative 2, stage increases under Alternative 3 immediately downstream of the project site in the Yolo Bypass are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach the Sacramento River at Rio Vista, the decrease in stage is 0.04 foot and essentially unchanged.

Therefore, for the 200-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System except Yolo Bypass downstream of the Sacramento Bypass, and in the DWSC (and a minor 0.04 increase in the Sacramento River at Rio Vista) compared to Existing Conditions (No Action Alternative without project). Moreover, the maximum stage change under these cumulative conditions is 0.25 foot in the Yolo Bypass downstream of the Sacramento Bypass. Even at the index point of greatest stage increase, these stage increases would not be expected to expose people or structures to a significant risk of loss, injury, or death involving flooding.

Alternative 3 under Future With-Project Conditions (cumulative) would substantially decrease flood risks during 100-year flood events in the upper Yolo Bypass, lower American River, and Sacramento River through the Sacramento metropolitan area by conveying those potential flood flows through the Sacramento Bypass into the Yolo Bypass. Therefore, Alternative 3 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure.

There are substantial cumulative benefits from the LEBLS and ARCF GRR projects at the three critical sites bulleted above, as well as generally throughout the Sacramento River Flood Control System. The LEBLS project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards. Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, including at critical sites in the Yolo Bypass and on the Sacramento and American Rivers, Alternative 3 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure. The project impacts under Future Conditions (cumulative) and 200-year flood events would be **beneficial**.

Although not required for beneficial project impacts, DWR would implement Mitigation Measure HH-1 described below to reduce the potential for any adverse effects from the stage increases described above under both Existing and Future conditions and 100- and 200-year flood events.

> **Mitigation Measure HH-1: Coordinate with Local Maintaining Agencies to Ensure Proper Maintenance of Yolo Bypass Levees from Sacramento Bypass to Cache Slough.**
>
> Please refer to the first appearance earlier in this section for the full text of this mitigation measure.
>
> **Significance after Mitigation:** Implementing Mitigation Measure HH-1 would reduce potential impacts from stage increases expected in these bypass and river reaches. The impact remains **beneficial**.

Alternative 4: 5-Mile Expanded Setback Partial Degrade

Under Alternative 4, DWR would construct setback levees in the Lower Elkhorn Basin as described in Chapter 3, "Alternatives." Impacts to stage under Alternative 4 are represented by the Existing With-Project scenario. To determine impacts of Alternative 4, the 100- and 200-year stages with the project were compared to Existing Conditions (see Table 4.14-5, Existing With-Project vs. Existing Conditions).

Existing Conditions With-Project Effects during 100-Year Flood Event

Compared to Existing Conditions (No Action Alternative without project), the Existing With-Project scenario would result in beneficial impacts to stage during a 100-year event both upstream and downstream of the project site at most index points. Stage decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of the I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during 100-year flood events throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Existing With-Project scenario during a 100-year event under Alternative 4 would decrease stage as follows:

- -0.29 foot in the Yolo Bypass Upstream of I-5
- -0.75 foot in the Sacramento River at the I Street Bridge
- -0.6 foot in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), however, the Existing With-Project scenario during 100-year flood events would increase stage slightly at three locations in the Yolo Bypass: 0.09 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.08 foot at Lisbon (Index Point 32), and 0.08 foot upstream of Cache Slough (Index Point 35), as well as similarly small increases in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Similar to Alternatives 2 and 3, stage increase under Alternative 4 is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site are a function of normal Bypass flows (which are spread over a wider channel area within the project site by the project, due to the increased width of the Yolo and Sacramento Bypasses from new setback levees), entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach Rio Vista on the Sacramento River, the increase in stage is 0.01 and essentially unchanged.

None of these stage increases exceed a minor 0.09-foot increase, as shown in Figure 4.14-2. These stage increases would not expose people or structures to a significant risk of loss, injury, or death involving flooding. Therefore, for the 100-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System. The project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards. Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, Alternative 4 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under Existing Conditions and 100-year flood events would be **beneficial**.

Existing Conditions With-Project Effects during 200-Year Flood Event

Compared to Existing Conditions (No Action Alternative without project), the Existing With-Project scenario would result in beneficial impacts to stage during a 200-year event both upstream and downstream of the project site at most index points. Stages decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during a 200-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Existing With-Project scenario during a 200-year event under Alternative 4 would decrease stage as follows:

- -0.28 foot in the Yolo Bypass Upstream of I-5
- -0.82 foot in the Sacramento River at the I Street Bridge
- -0.65 foot in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), however, the Existing With-Project scenario during a 200-year flood event would increase stage at three locations in the Yolo Bypass: 0.11 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.09 foot at Lisbon (Index Point 32), and 0.08 foot upstream of Cache Slough (Index Point 35), as well as similarly small increases in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Similar to Alternatives 2 and 3, stage increases under Alternative 4 are highest immediately downstream of the project site and decrease as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site with the project are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred.

At the point that flood flows reach Rio Vista on the Sacramento River, the increase in stage is 0.02 and essentially unchanged.

None of these stage increases exceed a minor 0.11-foot increase, as shown in Figure 4.14-2. These stage increases would not expose people or structures to a significant risk of loss, injury, or death involving flooding. Therefore, for the 200-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System. The project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards. Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, Alternative 4 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under Existing Conditions and 200-year flood events would be **beneficial**.

Future Conditions With-Project Effects during 200-Year Flood Event (Cumulative)

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario would result in beneficial impacts to stage during a 100-year event both upstream and downstream of the project site at most index points. Stage decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These stage reductions reduce the flooding risk during a 100-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Future With-Project scenario (cumulative conditions) during a 100-year event under Alternative 4 would decrease stage as follows:

- -0.31 foot in the Yolo Bypass Upstream of I-5
- -1.8 feet in the Sacramento River at the I Street Bridge
- -1.37 feet in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario during a 100-year flood event would increase stage at three locations in the Yolo Bypass: 0.18 foot in the Yolo Bypass downstream of Sacramento Bypass (Index Point 28), 0.16 foot at Lisbon (Index Point 32), and 0.16 foot upstream of Cache Slough (Index Point 35), as well as two locations in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Stage increase is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site in the Yolo Bypass with the project are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach the Sacramento River at Rio Vista, the increase in stage is 0.02 foot and essentially unchanged.

Therefore, for the 100-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System except for the Yolo Bypass downstream of the Sacramento Bypass and in the DWSC (and a minor 0.02-foot increase in the Sacramento River at Rio Vista) compared to Existing Conditions. Moreover, the maximum stage change under these cumulative conditions is 0.18 foot in the Yolo Bypass downstream of the Sacramento Bypass. Even at the index point of greatest stage increase, these stage increases would not be expected to expose people or structures to a significant risk of loss, injury, or death involving flooding.

Alternative 4 under Future With-Project Conditions (cumulative) would substantially decrease flood risks during 100-year flood events in the upper Yolo Bypass, lower American River, and Sacramento River through the Sacramento metropolitan area by conveying those potential flood flows through the Sacramento Bypass into the Yolo Bypass. Therefore, Alternative 4 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under Future With-Project Conditions (cumulative) and 100-year flood events would be **beneficial**.

Future Conditions With-Project Effects during 200-Year Flood Event (Cumulative)

Similar to results for the 100-year event, as compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario would result in beneficial impacts to stage during a 200-year event both upstream and downstream of the project site at most index points. Stages decreases would occur in the Yolo Bypass downstream of Fremont Weir and upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Verona to Rio Vista (Index Points 46-51), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during a 200-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Future With-Project scenario (cumulative conditions) during a 200-year event under Alternative 4 would decrease stage as follows:

- -0.28 foot in the Yolo Bypass Upstream of I-5
- -1.87 feet in the Sacramento River at the I Street Bridge
- -1.51 feet in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario during a 200-year flood event would increase stage at three locations in the Yolo Bypass: 0.21 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.18 foot at Lisbon (Index Point 32), and 0.16 foot upstream of Cache Slough (Index Point 35), as well as two locations in the DWSC (Index Points 39 and 41). Stage increase is generally highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Similar to Alternatives 2 and 3, stage increases under Alternative 4 immediately downstream of the project site in the Yolo Bypass are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach the Sacramento River at Rio Vista, the decrease in stage is 0.03 foot and essentially unchanged.

Therefore, for the 200-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System except Yolo Bypass downstream of the Sacramento Bypass, and in the DWSC (and a minor 0.03 increase in the Sacramento River at Rio Vista) compared to Existing Conditions (No Action Alternative without project). Moreover, the maximum stage change under these cumulative conditions is 0.21 foot in the Yolo Bypass downstream of the Sacramento Bypass. Even at the index point of greatest stage increase, these stage increases would not be expected to expose people or structures to a significant risk of loss, injury, or death involving flooding.

Alternative 4 under Future With-Project Conditions (cumulative) would substantially decrease flood risks during 100-year flood events in the upper Yolo Bypass, lower American River, and Sacramento River through the Sacramento metropolitan area by conveying those potential flood flows through the Sacramento Bypass into the Yolo Bypass. Therefore, Alternative 4 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure.

There are substantial cumulative benefits from the LEBLS and ARCF GRR projects at the critical four sites bulleted above, as well as generally throughout the Sacramento River Flood Control System. The LEBLS project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, including at critical sites in the Yolo Bypass and on the Sacramento and American Rivers, Alternative 4 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure. The project impacts under Future Conditions (cumulative) and 200-year flood events would be **beneficial**.

Although not required for beneficial project impacts, DWR would implement Mitigation Measure HH-1 described below to reduce the potential for any adverse effects from the stage increases described above under both Existing and Future conditions and 100- and 200-year flood events.

> **Mitigation Measure HH-1: Coordinate with Local Maintaining Agencies to Ensure Proper Maintenance of Yolo Bypass Levees from Sacramento Bypass to Cache Slough.**
>
> Please refer to the first appearance earlier in this section for the full text of this mitigation measure.
>
> **Significance after Mitigation:** Implementing Mitigation Measure HH-1 would reduce potential impacts from stage increases expected in these bypass and river reaches. The impact remains **beneficial**.

Alternative 5: 5-Mile Setback Full Degrade

Under Alternative 5, DWR would construct setback levees in the Lower Elkhorn Basin as described in Chapter 3, "Alternatives." Impacts to stage under Alternative 5 are represented by the Existing With-Project scenario. To determine impacts of Alternative 5, the 100- and 200-year stages with the project were compared to Existing Conditions (see Table 4.14-6, Existing With-Project vs. Existing Conditions).

Existing Conditions With-Project Effects during 100-Year Flood Event

Compared to Existing Conditions (No Action Alternative without project), the Existing With-Project scenario would result in beneficial impacts to stage during a 100-year event both upstream and downstream of the project site at most index points. Stages decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during 100-year flood events throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Existing With-Project scenario during a 100-year event under Alternative 5 would decrease stage as follows:

- -0.25 foot in the Yolo Bypass Upstream of I-5
- -0.7 foot in the Sacramento River at the I Street Bridge
- -0.56 foot in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), however, the Existing With-Project scenario during 100-year flood events would increase stage slightly at three locations in the Yolo Bypass: 0.08 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.08 foot at Lisbon (Index Point 32), and 0.08 foot upstream of Cache Slough (Index Point 35), as well as similarly small increases in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Stage increase is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Similar to the other action alternatives, stage increases under Alternative 5 immediately downstream of the project site are a function of normal Bypass flows (which are spread over a wider channel area within the project site by the project, due to the increased width of the Yolo and Sacramento Bypasses from new setback levees), entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach Rio Vista on the Sacramento River, the increase in stage is 0.01 foot and essentially unchanged.

None of these stage increases exceed a minor 0.08-foot increase, as shown in Figure 4.14-2. These stage increases would not expose people or structures to a significant risk of loss, injury, or death involving flooding. Therefore, for the 100-year flood event, the project generally decreases overall stage throughout the Sacramento River Flood Control System. The project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, Alternative 5 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under Existing Conditions and 100-year flood events would be **beneficial**.

Existing Conditions With-Project Effects during 200-Year Flood Event

Compared to Existing Conditions (No Action Alternative without project), the Existing With-Project scenario would result in beneficial impacts to stage during a 200-year event both upstream and downstream of the project site at most index points. Stages decreases would occur from the Sutter Bypass upstream of the Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during a 200-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Existing With-Project scenario during a 200-year event under Alternative 5 would decrease stage as follows:

- -0.24 foot in the Yolo Bypass Upstream of I-5
- -0.77 foot in the Sacramento River at the I Street Bridge
- -0.61 foot in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), however, the Existing With-Project scenario during a 200-year flood event would increase stage at three locations in the Yolo Bypass: 0.10 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.09 foot at Lisbon (Index Point 32), and 0.08 foot upstream of Cache Slough (Index Point 35), as well as similarly small increases in the DWSC (Index Points 39 and 41) and on the Sacramento River at Rio Vista. Stage increase is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site with the project are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach Rio Vista on the Sacramento River, the increase in stage is 0.02 foot and essentially unchanged.

None of these stage increases exceed a minor 0.1-foot increase, as shown in Figure 4.14-2. Therefore, for the 200-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System. Furthermore, none of these stage increases would expose people or structures to a significant risk of loss, injury, or death involving flooding. The project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, Alternative 5 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure, and the project impacts under Existing Conditions and 200-year flood events would be **beneficial**.

Future Conditions With-Project Effects during 100-Year Flood Event (Cumulative)

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario would result in beneficial impacts to stage during a 100-year event both upstream and downstream of the project site at most index points. Stage decreases would occur from the Sutter Bypass upstream of Fremont Weir and in the Yolo Bypass upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 22, 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from Knights Landing to Georgiana Slough (Index Points 45-49), and on the American River upstream of the SR 160 Bridge (Index Point 57). These stage reductions reduce the flooding risk during a 100-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Future With-Project scenario (cumulative conditions) during a 100-year event under Alternative 5 would decrease stage as follows:

- -0.26 foot in the Yolo Bypass Upstream of I-5
- -1.77 feet in the Sacramento River at the I Street Bridge
- -1.35 feet in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project scenario during a 100-year flood event would increase stage at three locations in the Yolo Bypass: 0.18 foot in the Yolo Bypass downstream of Sacramento Bypass (Index Point 28), 0.16 foot at Lisbon (Index Point 32), and 0.16 foot upstream of Cache Slough (Index Point 35), as well as two locations in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point 51). Stage increase is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site in the Yolo Bypass with the project are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach the Sacramento River at Rio Vista, the increase in stage is 0.02 foot and essentially unchanged.

Therefore, for the 100-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System except for the Yolo Bypass downstream of the Sacramento Bypass and in the DWSC (and a minor 0.02-foot increase in the Sacramento River at Rio Vista) compared to Existing Conditions. Moreover, the maximum stage change under these cumulative conditions is 0.18 foot in the Yolo Bypass downstream of the Sacramento Bypass. Even at the index point of greatest stage increase, these stage increases would not be expected to expose people or structures to a significant risk of loss, injury, or death involving flooding.

Alternative 5 under Future With-Project Conditions (cumulative) would substantially decrease flood risks during 100-year flood events in the upper Yolo Bypass, lower American River, and Sacramento River through the Sacramento metropolitan area by conveying those potential flood flows through the Sacramento Bypass into the Yolo Bypass. Moreover, there are substantial cumulative benefits from the LEBLS and ARCF GRR projects at the critical four sites bulleted above, as well as generally throughout the Sacramento River Flood Control System. The LEBLS project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee and the Sacramento Bypass, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, including at critical sites in the Yolo Bypass and on the Sacramento and American Rivers, Alternative 5 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure. The project impacts under Future Conditions (cumulative) and 200-year flood events would be **beneficial**.

Future Conditions With-Project Effects during 200-Year Flood Event (Cumulative)

Similar to results for the 100-year event, as compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario would result in beneficial impacts to stage during a 200-year event both upstream and downstream of the project site at most index points. Stages decreases would occur in the Yolo Bypass downstream of Fremont Weir and upstream of I-5 through the Yolo Bypass upstream of the Sacramento Bypass (Index Points 23, 24, and 26), in the Sacramento Bypass (Index Point 37), on the Sacramento River from the I Street Bridge to Rio Vista (Index Points 47-52), and on the American River upstream of the SR 160 Bridge (Index Point 57). These reductions in stage reduce the risk of flooding during a 200-year flood event throughout the Sacramento River Flood Control System and these impacts would be beneficial.

Most importantly, the Future With-Project scenario (cumulative conditions) during a 200-year event under Alternative 5 would decrease stage as follows:

- -0.24 foot in the Yolo Bypass Upstream of I-5
- -1.85 feet in the Sacramento River at the I Street Bridge
- -1.49 feet in the Sacramento River at Freeport

Compared to Existing Conditions (No Action Alternative without project), the Future With-Project (cumulative) scenario during a 200-year flood event would increase stage at three locations in the Yolo Bypass: 0.21 foot in the Yolo Bypass downstream of the Sacramento Bypass (Index Point 28), 0.18 foot at Lisbon (Index Point 32), and 0.16 foot upstream of Cache Slough (Index Point 35), as well as two locations in the DWSC (Index Points 39 and 41) and in the Sacramento River at Rio Vista (Index Point

51). Stage increase is highest immediately downstream of the project site and decreases as flows move down the Yolo Bypass. Stage increases immediately downstream of the project site in the Yolo Bypass with the project are a function of normal Bypass flows entering the portion of the Yolo Bypass below the project site where no expansion has occurred. At the point that flood flows reach the Sacramento River at Rio Vista, the stage decreases 0.03 foot and is essentially unchanged.

Therefore, for the 200-year flood event, the project generally decreases stage throughout the Sacramento River Flood Control System except for in the Yolo Bypass downstream of the Sacramento Bypass, the DWSC, and in the Sacramento River at Rio Vista (Index Point 51) as compared to Existing Conditions (No Action Alternative without project). Moreover, the maximum stage change under these cumulative conditions is 0.21 foot in the Yolo Bypass downstream of the Sacramento Bypass. Even at the index point of greatest stage increase, these stage increases would not be expected to expose people or structures to a significant risk of loss, injury, or death involving flooding.

There are substantial cumulative benefits from the LEBLS and ARCF GRR projects at the critical three sites bulleted above, as well as generally throughout the Sacramento River Flood Control System. The LEBLS project would also replace aging levees, at least along one reach of the Yolo Bypass East Levee, with stronger levees that meet more stringent levee construction and engineer design standards, including using guidance from DWR ULDC standards Consequently, considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, including at critical sites in the Yolo Bypass and on the Sacramento and American Rivers, Alternative 5 would not expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of levee failure. The project impacts under future conditions (cumulative) and 200-year flood events would be **beneficial**.

Although not required for beneficial project impacts, DWR would implement Mitigation Measure HH-1 described below to reduce the potential for any adverse effects from the stage increases described above under both Existing and Future conditions and 100- and 200-year flood events.

> **Mitigation Measure HH-1: Coordinate with Local Maintaining Agencies to Ensure Proper Maintenance of Yolo Bypass Levees from Sacramento Bypass to Cache Slough.**
>
> Please refer to the first appearance earlier in this section for the full text of this mitigation measure.
>
> **Significance after Mitigation:** Implementing Mitigation Measure HH-1 would reduce potential impacts from stage increases expected in these bypass and river reaches. The impact remains **beneficial**.

Impact HH-2: Loss of Agricultural Water Supplies.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin Flood Control System improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, “No Action/No Project Alternative,” under “Consequences of No Action.”

Without construction of the project, and no other meaningful changes to existing conditions at the site, there would be no changes to land use, crop type, or agricultural water supplies necessitated by construction and operation of the project. Land uses, crop types, and agricultural water supplies would remain relatively unchanged from existing conditions in the Lower Elkhorn Basin. There would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

Alternatives 2 and 3 have the largest project footprints and were used to estimate the maximum agricultural water supply impacts. Approximately 1,300 and 1,500 acres of land for Alternatives 2 and 3, respectively, would be added to the Yolo and Sacramento Bypasses after new setback levee construction. Current farming practices would not likely continue with the currently protected land subject to flooding after being placed into the newly expanded floodplain. It is reasonable to assume that the land would continue to be used for agricultural purposes and that rice cultivation is most likely given the frequent inundation and successful rice cultivation in other areas within the Yolo Bypass floodplain (see Section 4.15, “Land Use and Planning, and Agricultural and Forestry Resources,” for more detail).

According to the State Water Resources Control Board online water rights database, parcels within the proposed setback area currently hold surface water rights to approximately 8,075.5 acre-feet/year (Table 4.14-1). If the entire acreage of land moved into the setback area was farmed in rice, approximately 4.5 to 5.1 acre-feet/acre/year of water would be required to support this land use (U.S. Department of Agriculture 2013; Pacific Institute 2015). Depending on the alternative selected, approximately 5,850 to 7,650 acre-feet of water/year would be required to support rice cultivation within the setback area. Additionally, although rice fields are submerged during the growing season, rice does not consume water to the same extent as other row crops, thus there may be opportunities at the project site for water reuse. Consequently, existing water rights and water supplies within the setback area are sufficient to support rice cultivation in the Lower Elkhorn Basin at the project site. There would not be any loss of agricultural water supplies; therefore, there would be **no impact**.

Mitigation Measure: No compensatory mitigation is required.

Impact HH-3: ***Substantially Alter the Existing Drainage Pattern of the Site or Area, including through the Alteration of the Course of a Stream or River, in a Manner Which Would result in Substantial Erosion, Siltation, or Flooding On- or Off-site.***

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento River Flood Control System improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

Without construction and operation of the project, and no other meaningful changes to existing conditions at the site, there would be no impacts to the existing drainage pattern of the site or area, or alteration of the course of a stream or river, in a manner which would result in substantial erosion, siltation, or flooding on- or off-site. There would be no meaningful changes to existing conditions at the site. Drainage patterns, erosion, sedimentation, flooding risks, and inundation of Bypass lands during flood flows resulting from passive overtopping of Fremont Weir or managed operation of the Sacramento Weir would generally be unchanged in the Lower Elkhorn Basin. Frequency of inundation of lands in the project site is best described by comparing Fremont Weir (far upstream of the project site) overtopping events with flooding at the Lisbon gage (far downstream of the project site).

Due to operational criteria and system hydrology, the Sacramento Weir does not spill unless the Fremont Weir is already overtopping, thus Sacramento Weir effects on stage at Lisbon gage are negligible. However, during the period of overlapping records at Lisbon Gage and Fremont Weir (1947–1998), the years with spills at Fremont Weir corresponded almost exactly with the years in which there was flooding at the Lisbon gage, and there is a rough correlation between the magnitude of the maximum daily weir flow and the duration of inundation. Further confirmation of the dominant role played by Fremont Weir spills in causing inundation in the Bypass is shown by comparing the timing of individual spill events at the weir and inundation events at the Lisbon gage; there is a near identical correspondence between Fremont Weir Spills and Lisbon gage inundations, as detailed in the Yolo Bypass Management Strategy Final Report (Yolo Basin Foundation 2001). As would be expected, the onset of inundation typically lags a day or two following the onset of spills over the weir, and inundation can linger from 5 days to over 100 days after weir spills have ceased. Brief spill events at the weir often do not result in flood stages at the Lisbon gage, which is a result of the large storage capacity of the Bypass (Yolo Basin Foundation 2001). As detailed in Table 4.14-3, stage within the bypass can exceed 30 feet during the 100- and 200-year events. There would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

The project, under all action alternatives, would expand the existing flood conveyance capacity of the Yolo and Sacramento Bypasses by setting back these Bypass levees. The project would place the new setback levees on existing agricultural lands, requiring modifications to existing agricultural drainage facilities, including ditches, canals, and pumps. The new setback levees and agricultural drainage would modify the existing drainage patterns at the project site, but not in a manner that would alter the course of a stream or river, or in a manner that would cause substantial erosion, siltation, or contribute stormflows that would exceed the capacity of the existing or planned drainage system during project operations. Because one of the project objectives is to expand the Yolo Bypass conveyance, there would be flooding over the expanded floodplain area during high-flow conditions. The Sacramento Bypass would still receive floodwaters during managed overflow of the Sacramento Weir and local agricultural drainages would still receive normal return flows and stormflows. The Yolo Bypass would still receive floodwaters from passive overflow of the Fremont Weir, managed overflow of the Sacramento Weir, agricultural drainage stormflows, and treated wastewater discharges into the Tule Canal and other local agricultural drainages. Frequency of inundation of lands in the Bypasses would be the same as under the No Action Alternative. However, inundation depths would be slightly reduced during the 100- and 200-year events, due to the wider channel profile of the Bypasses after the levees are set back. Additionally, the project design and grading plan minimize erosion- and siltation-related impacts during and after flood flows (which would also include stormwater flows) in the Bypasses and the new expanded floodplains to less-than-significant levels. Therefore, this impact is **less than significant**.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Erosion and siltation from construction activities are discussed in (1) Section 4.11, "Geology, Soils, and Paleontological Resources;" in Impact GEO-2, "Potential Temporary, Short-term Construction-related Erosion;" and in (2) Section 4.22, "Water Quality," in Impact WQ-1, "Possible Temporary and Short-term Impacts on Water Quality from Stormwater Runoff, Erosion, and Spills Associated with Construction."

Residual Significant Impacts

Hydraulic impacts resulting from construction and implementation of the project would be beneficial. All other impacts related to hydrology, hydraulics, and flood risk management are less than significant. Therefore, no residual significant impacts would occur.

4.15 Land Use and Planning, and Agricultural and Forestry Resources

4.15.1 Environmental Setting

Land Uses and Zoning

Project Site

The Lower Elkhorn Basin, including the project site, has been in agricultural use for more than 100 years. Most of the project site is cultivated with row crops such as sunflower, safflower, and tomatoes. Several alfalfa fields are also present, and a young walnut orchard is located in the southeastern corner of the project site. For details regarding the types of crops grown at the project site and associated acreages, please see Section 4.19, "Socioeconomics (including Population, Housing, and Employment)." DWR employs a land classification system that includes four general categories of land uses: Agriculture, Native Classes, Urban, and Not Surveyed. The most recent DWR land use survey for Yolo County was conducted in 2008. Based on the results of that survey, there are two DWR land use classifications at the project site: Agriculture and Native Classes.

- **Agriculture—**This category consists of both agricultural and semiagricultural classes. In mapping land uses, DWR groups agricultural land uses into a variety of subcategories and types. The subcategories consist of grain and hay crops (e.g., barley and oats); rice; field crops (e.g., cotton, corn, and beans); pasture (e.g., alfalfa); truck (e.g., onions and garlic), nursery, and berry crops; deciduous fruits and nuts (e.g., almonds and pistachios); citrus and subtropical (e.g., oranges); vineyards (e.g., table, wine, and raisin grapes); and idle areas (e.g., fallow fields). The "Agriculture" category, as defined by DWR, also includes semiagricultural classes (e.g., dairies and livestock feed lots). Most of the project site is classified as Agriculture.

- **Native Classes—**This category consists of areas of native vegetation, surface water, and barren and wasteland areas. Vegetation includes forest land (e.g., oak woodland) and other types of native vegetation (e.g., grassland), riparian vegetation, surface water, and barren and wasteland areas (e.g., mine tailings). At the project site, Native Classes are mapped only along the existing water features (i.e., existing levees and associated canal/bypass areas, berms along Reclamation District (RD) 785 and RD 537 Cross Levees and canal, and berms along the agricultural irrigation canals and ditches scattered throughout the project site).

Most of the project site is designated by the Yolo County 2030 General Plan as Agriculture and is zoned A-N (Agricultural Intensive) (Yolo County 2009a).

Yolo County has applied a Specific Plan land use designation to the proposed Elkhorn Specific Plan Area, approximately 100 acres of which is located in the northern portion of the project site (Yolo County 2009a, 2013). Buildout of the Elkhorn Specific Plan area (if a site-specific development proposal were to be brought forth in the future and approved by the Yolo County Board of Supervisors) would entail developing a hotel and meeting complex, commercial and industrial land uses, and high-density residential development on approximately 400 acres in the northern portion of the Lower Elkhorn Basin and the southern portion of the Upper Elkhorn Basin, adjacent to I-5 (Yolo County 2009b, 2013). However, such development could not proceed unless and until a 200-year level of urban flood protection were to be provided to the Specific Plan Area. This project does not provide a 200-year level of urban flood protection.

Four rural residences are located within the project site. Most of these residences are associated with farming activities, which are the predominant land use in the Lower Elkhorn Basin. Agricultural land uses within the project site consist of irrigated fields cultivated with row crops such as tomatoes, sunflower, and safflower, and associated agricultural irrigation ditches. In addition, approximately 230 acres in the southeastern portion of the project site have been planted with a young walnut orchard.

Two drainage canals that carry irrigation tailwater to the Sacramento River are present in the Lower Elkhorn Basin and traverse the project site: the north and south cross-canals. In addition, the project site includes an agricultural irrigation canal on the east side of the existing Yolo Bypass East Levee, as well as numerous small agricultural irrigation ditches.

The western boundary of the project site consists of the Tule Canal and the Yolo Bypass East Levee. Floodwater over the Fremont Weir initially flows through the Tule Canal, a perennial riparian channel on the eastern edge of the Yolo Bypass, before spilling onto the floodplain when discharge in this small channel exceeds 3,530 cubic feet per second (cfs). The Tule Canal's resident fish species include white catfish and black crappie, and Tule Canal is occasionally used by fisherman along its banks.

A portion of the Sierra Northern Railway Railroad tracks are located on top of the Sacramento Weir, on the east side of the Sacramento Bypass. The Sierra Northern Railway operates the Sacramento River Train, which offers dinner excursion trips along the 16-mile "Woodland Branch Line" between Woodland and West Sacramento. The train travels through the Lower Elkhorn Basin, east of the project site. The Sierra Northern Railway Railroad tracks form the southeastern boundary of the project site.

The former Old Bryte Landfill is located at 50035 County Road 126, in the southwestern corner of the project site, adjacent to the Sacramento Bypass North Levee (see Figure 4.13-1 in Section 4.13, "Hazards and Hazardous Materials," for additional details).

The Sacramento Bypass and the Sacramento Weir are located along the west bank of the Sacramento River approximately 2 miles upstream from the confluence with the American River. The Sacramento Bypass North Levee forms the southern boundary of the project site.

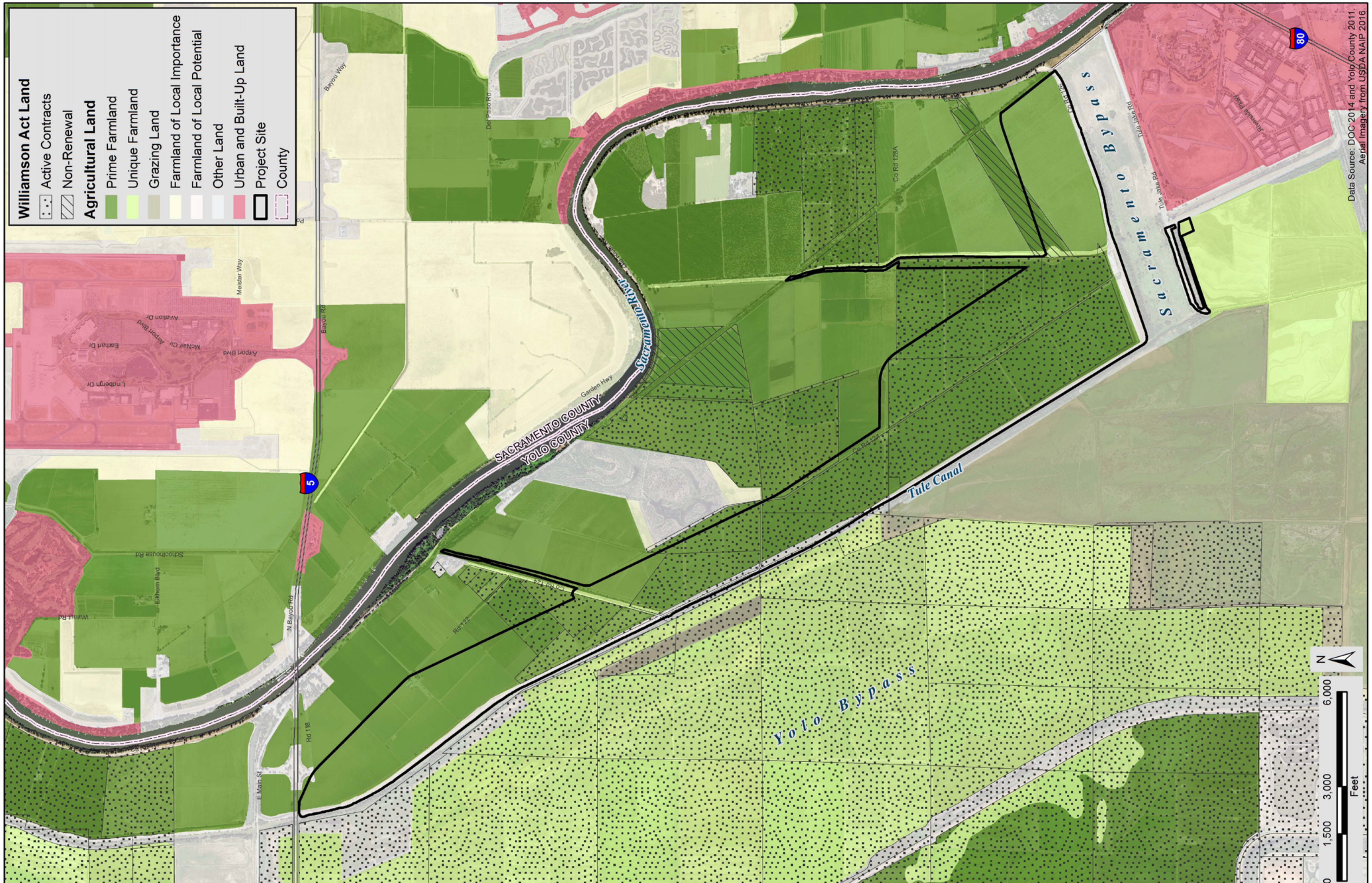
Finally, the southern end of the project site also includes the South Sacramento Bypass Training Levee, which was designed to help channel flood flows from the Sacramento Bypass into the mainstem of the Yolo Bypass.

Project Vicinity

The eastern planning area boundary of the City of Woodland is located approximately 0.75 mile west of the Yolo Bypass (approximately 2.5 miles west of the project site), south of and adjacent to I-5. Currently, the only land use within the eastern planning area boundary is the City of Woodland's Water Pollution Control Facility.

West of the Tule Canal, the Yolo Bypass consists of flat, irrigated agricultural land that is cultivated with row crops. The primary purpose of the Yolo Bypass is to provide flood control, specifically the conveyance of floodwaters from the entire Sacramento River watershed. Land use within the Yolo Bypass is restricted by flood easements held by the Sacramento-San Joaquin Drainage District, as amended by the State of California Reclamation Board (now the Central Valley Flood Protection Board). These easements allow for the use of the land within the Yolo Bypass for agriculture and duck clubs.

Figure 4.15-1. Farmland and Williamson Act Contracts in the Project Site and Vicinity



Sources: California Department of Conservation 2015, Yolo County 2011

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The 55-acre Elkhorn Regional Park is located at 18989 Old River Road, east of the project site. This facility on the west side of the Sacramento River includes recreational opportunities related to fishing, picnicking, birding, nature study, wildlife viewing, and boating. The park has a paved boat launch ramp and parking lot, a picnic area, and restrooms.

The Katchituli Oxbow Restoration Mitigation Site is a 100-acre environmental restoration site on the east side of the project site. The restoration site was created to provide native riparian vegetation, which includes Fremont cottonwood (*Populus sect. Aigeiros*) forest, elderberry (*Sambucus*) savannah, and valley oak (*Quercus lobata*) woodland, to mitigate for the loss of comparable habitat at the Lighthouse Marina project site located approximately 7 miles downriver, in West Sacramento. The restoration site does not receive water from the Sacramento River except under extreme hydrological conditions; instead, the low-flow channel of the oxbow was designed to collect water from the surrounding soils and the watershed. (McGuirk 2014.) The restoration site is not open for public access.

The 360-acre Sacramento Bypass Wildlife Area encompasses the interior area of the Sacramento Bypass. This wildlife area is an important cover and feeding area for wildlife during late fall, winter, and early spring. Game birds, raptors, songbirds, and native mammals are present. Recreational activities include fishing, wildlife viewing, birding, and hunting. The wildlife area is administered by the California Department of Fish and Wildlife (CDFW). (CDFW 2016.)

The California Highway Patrol (CHP) Academy and CHP Airport are located immediately adjacent to and south of the Sacramento Bypass, within the City of West Sacramento. Industrial and commercial land uses in West Sacramento are located along Reed Avenue and Riverside Parkway, approximately 0.9 mile south of the project site.

Agricultural Resources

Project Site

The California Department of Conservation (DOC) Important Farmland classifications recognize the land’s suitability for agricultural production by considering physical and chemical characteristics of the soil, such as soil temperature range, depth of the groundwater table, flooding potential, rock fragment content, and rooting depth. The classifications also consider location, growing season, and moisture available to sustain high-yield crops. In addition, DOC identifies other categories based on their suitability for agricultural use. The list below provides a description of all the categories mapped by the DOC under the Farmland Mapping and Monitoring Program (FMMP).

- **Prime Farmland—**Farmland with the best combination of physical and chemical features able to sustain long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields.

- **Farmland of Statewide Importance—**Land similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture.

- **Unique Farmland—**Land of lesser quality soils used for the production of the State’s leading agricultural crops. This land is usually irrigated, but may include nonirrigated orchards or vineyards as found in some climatic zones in California.

- **Farmland of Local Importance—**Land that is of importance to the local agricultural economy, as determined by each county’s board of supervisors and a local advisory committee.

- **Grazing Land—**Land with existing vegetation that is suitable for livestock grazing.
- **Urban and Built-up Lands—**Land that is used for residential, industrial, commercial, institutional, and public utility structures and for other developed purposes, and which is occupied by structures with a building density of at least one unit to 1.5 acres (or approximately six structures to a 10-acre parcel).
- **Land Committed to Nonagricultural Use—**Existing farmland, grazing land, and vacant areas that have a permanent commitment for development.
- **Other Land—**Land that does not meet the criteria of any of the previously described categories and generally includes low-density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry, or aquaculture facilities; strip mines and borrow pits; water bodies smaller than 40 acres; and vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres.

The 2014 Important Farmland Map for Yolo County, produced by the DOC Division of Land Resource Protection (DOC 2015), was used to evaluate the agricultural significance of the lands at the project site. As shown in Figure 4.15-1, nearly the entire project site is designated as Prime Farmland. Two large drainage canals convey irrigation tailwater from the Lower Elkhorn Basin to the Sacramento River, both of which flow through the project site and are designated as Unique Farmland. Unique Farmland is also present on the south side of the South Sacramento Bypass Training Levee, where construction activities associated with rerouting the Sacramento International Airport jet fuel pipeline would occur. The existing Yolo Bypass East Levee, Sacramento Bypass North Levee, and South Sacramento Bypass Training Levee are designated as Other Land. One other small area of Other Land within the project site is located at the west end of Yolo County Road 118 (near I-5). No land within the project site is designated as Grazing Land. For details regarding the types of crops grown at the project site and associated acreages, please see Section 4.19, "Socioeconomics (including Population, Housing, and Employment)."

All of the Lower Elkhorn Basin, including the project site, is located within the Yolo County Resource Conservation District. The District encompasses an estimated 505,000 acres and was created to assist local growers and landowners in implementing practices that protect, improve, and sustain the agricultural and natural resources of Yolo County. (Yolo County Local Agency Formation Commission [LAFCo] 2016.) Within Yolo County as a whole, approximately 365,535 acres were designated by DOC as Important Farmland in 2014 (DOC 2014).

Project Vicinity

As shown in Figure 4.15-1, most of the Lower Elkhorn Basin is designated as Prime Farmland by DOC under the FMMP. Although the agricultural soils are similar, most of the land within the Yolo Bypass (west of the project site) is designated as Unique Farmland because of its potential for periodic inundation during flood events. An area of Unique Farmland is also located adjacent to and south of the Sacramento Bypass, west of the West Sacramento City limits. Grazing Land is also present within the Yolo Bypass, on the west side of the Sacramento Bypass. The Sacramento Bypass and the Katchituli Oxbow Restoration Mitigation Site are designated as Other Land, as are several other small areas within the Lower Elkhorn Basin. (DOC 2015.)

In the City of West Sacramento south of the project site, the only remaining areas of Important Farmland are located in the Southport area, south of the Deep Water Ship Channel and adjacent to the Sacramento River approximately 5–6 miles south of the project site (DOC 2015).

Important Farmland in the City of Sacramento is located in the Natomas Basin and in the vicinity of Freeport (City of Sacramento 2015). The Natomas Basin is located on the east side of the Sacramento River, opposite the project site. Approximately 60 percent of the Natomas Basin is in some form of developed agricultural or open space use in unincorporated areas of northern Sacramento County (USACE 2009). As shown in Figure 4.15-1, land on the east side of the Sacramento River, opposite the project site, consists mainly of Prime Farmland and Farmland of Local Importance.

Williamson Act Contracts

The California Land Conservation Act of 1965, also known as the Williamson Act, is designed to preserve agriculture and open space lands by discouraging their premature and unnecessary conversion to urban uses. The act enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural 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.

Sixty-seven percent of the unincorporated area of Yolo County is protected under Williamson Act contracts to provide long-term protection of agricultural land (Yolo County 2009b). As shown in Figure 4.15-1, there are numerous active Williamson Act contracts within the project site and on land in the project vicinity. (Although Figure 4.5-1 shows that a portion of the existing Yolo Bypass East Levee is held under a Williamson Act, this is most likely due to a mapping scale issue, since none of the levees are used for agricultural activities.)

Forestland Resources

Forestland, as defined in California Public Resources Code (PRC) Section 12220(g), is land that can support 10 percent native tree cover of any species—including hardwoods—under natural conditions, and that allows for management of one or more forest resources including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits. Most of the project site consists of agricultural fields cultivated with row crops, and does not contain 10 percent native tree cover that would trigger classification as forestland under California PRC Section 12220(g). Furthermore, the Yolo County Board of Supervisors has determined that the County has no commercial forestland or timber resources (Yolo County 2009b).

4.15.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to land use, agriculture, or forestry apply to the alternatives under consideration. There are no Natural Resources Conservation Service conservation easements on lands that would be acquired to construct the project.

State

The following State plans, policies, regulations, and laws related to land use and agricultural resources apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- California Important Farmland Inventory System and Farmland Mapping and Monitoring Program – Applies to the impact analysis.
- California Land Conservation Act of 1965 (Williamson Act) – Applies to the impact analysis.

Regional and Local

The following regional and local plans, policies, regulations, and ordinances laws related to land use and agricultural resources are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County General Plan (Yolo County 2009b) – Several policies from the Yolo County General Plan regarding land use and agricultural resources are relevant to project design, construction, and/or the impact analysis of the project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).
- Yolo County Zoning Code (Yolo County 2015) – Relevant to the impact analysis.
- Yolo County Farmland Conversion Mitigation Program – Relevant to the impact analysis.

4.15.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

Land Use and Planning

The assessment of impacts related to land use considered the locations, duration, and types of project-related activities in relation to existing land uses and zoning based on DWR's Land Use Surveys (DWR 2008), the Yolo County General Plan (Yolo County 2009b), and the Yolo County Zoning Code (Yolo County 2015).

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. Comments related to agriculture were focused on requests for avoidance and minimization of impacts on farmland, potential impacts to the agricultural economy, and potential conflicts with Williamson Act contracts. Coordination with Yolo County was requested by all commenters. The comments also requested that the project's ecosystem mitigation measures be designed with the goal of minimizing the conversion of productive farmland. Impacts related to agricultural economics, including anticipated changes in type of crops grown, are evaluated in Section 4.19, "Socioeconomics (including Population, Housing, and Employment)." Other comments related to agricultural land and the Williamson Act are addressed in the impact analyses below.

Additionally, a comment was received from the U.S. Environmental Protection Agency requesting that the EIS/EIR evaluate the project's consistency with objectives of Federal, State, Tribal, or local land use plans, policies, and controls in the project vicinity. An evaluation of the project's consistency with land use and zoning classification is presented below in Impact LU-1. However, it should be noted that any inconsistency of the project with land use and zoning code designations is an issue related to land use regulation rather than a physical environmental consequence of the project. Where the project could conflict with a land use plan or policy that was adopted specifically for the purposes of preventing or reducing an adverse environmental effect, such potential conflicts are evaluated as stand-alone environmental impacts within each topic area of this EIS/EIR. For example, the potential for project-related noise to exceed Yolo County General Plan standards is evaluated in Section 4.17, "Noise and Vibration"; the potential for project-related facilities to conflict with agricultural land uses and Williamson Act contracts is evaluated below in Impact AG-1; and the potential for the project to conflict with an adopted natural communities conservation plan or habitat conservation plan is evaluated in Section 4.4, "Biological Resources – Fish and Aquatic Organisms," and Section 4.5, "Biological Resources – Vegetation and Wildlife." Impacts related to Native American Tribal Concerns are presented in Section 4.8, "Cultural Resources." No lands on the project site are under Natural Resources Conservation Service conservation easements.

Agricultural and Forestry Resources

For the purposes of this analysis, agriculture and forestry resources are defined as follows:

- Important Farmland, which is defined in Appendix G of the CEQA Guidelines as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (California PRC Section 21060.1);
- Williamson Act lands that are under continuing-term and nonrenewal contracts; and
- Forest land, defined in California PRC Section 12220(g) as land with greater than 10 percent cover by any native tree species, including hardwoods, under natural conditions that allow for management of one or more forestry resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits.

Impacts from conversion of Important Farmland to a nonagricultural use are based on the designations for Prime Farmland, Farmland of Statewide Importance, and Unique Farmland as defined by the FMMP, pursuant to California PRC Section 21060.1 and the State CEQA Guidelines Appendix G. The Important Farmland Map for Yolo County, produced by the DOC Division of Land Resource Protection (2015), was used to evaluate the agricultural significance of the lands within the project site. GIS data were used to assist in identifying areas of existing agricultural lands that could be affected by project implementation—lands identified as Important Farmland, Williamson Act land, or forest land.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to land use and planning if they would do any of the following:

- physically divide an established community;
- conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, or result in changes to an applicable land use plan, policy, or regulation, adopted for the purpose of avoiding or mitigating one or more environmental effects (including but not limited to the

general plan, specific plan, local coastal program, or zoning ordinance) that would result in alterations of land uses or patterns of land use that would cause a substantial adverse physical environmental effect; or

- conflict with any applicable Habitat Conservation Plan or Natural Community Conservation Plan.

The alternatives under consideration were determined to result in a significant impact related to agricultural and forestry resources if they would do any of the following:

- convert a substantial amount of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Important Farmland), as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to nonagricultural use;

- convert a substantial amount of land in an area designated by existing zoning for agricultural use or under a Williamson Act contract, or in a Farmland Security Zone to an inconsistent use;

- convert to a nonforest or timberland use, or cause rezoning of, a substantial amount of land designated by existing zoning for, forest land (as defined in California PRC Section 12220[g]), timberland (as defined in California PRC Section 4526), or timberland zoned Timberland Production (as defined in California PRC Section 51104[g]);

- convert a substantial amount of forest land to a nonforest use; or

- involve other changes in the existing environment that, due to their location or nature, could result in substantial conversion of Farmland to nonagricultural use or substantial conversion of forest land to nonforest use.

DWR has met with and will continue to work with Yolo County to identify design features of the project and/or feasible mitigation measures that would minimize impacts to, if not benefit, both agriculture and natural resources. The reduction in agricultural acreages or uses, by itself, is not the only parameter that is evaluated with respect to agriculture. Other factors to be considered in determining the significance of changes in agricultural use on the environment include consistency with State and Federal laws and policies and adopted local and regional plans; whether there is a significant or irreversible change in the use of Important Farmland; whether the proposed use constitutes an irretrievable and permanent loss of the use of the land for agricultural purposes; current and future uses of the land; current and future environmental benefits provided by the agricultural land; outside factors contributing to use or nonuse of the land for agriculture, such as frequent flooding or availability of water for irrigation; adjacent land uses; Williamson Act contracts; and benefits to proximate agricultural land caused by the project, such as flood risk reduction.

Issues Not Discussed Further in this EIS/EIR

Physically Divide an Established Community—The project site is located in an unincorporated rural agricultural area of Yolo County with very limited housing. Nearly all of the rural residences in the project vicinity are located in the northeast corner of the Lower Elkhorn Basin, near I-5 and in the vicinity of Kiesel, east of the project site. The new setback levees and other related project components would be constructed west and south of these residences, and portions of County Roads 124 and 126 would be reconstructed as needed to provide continuous north-south and east-west access to the properties within the Lower Elkhorn Basin similar to existing conditions. Furthermore, there is no reasonably foreseeable future housing development at the project site that the project would affect.

Therefore, the project would not physically divide an established community and there would be no impact. This issue is not evaluated further in this EIS/EIR.

Conflict With an Applicable Habitat Conservation Plan or Natural Community Conservation Plan—This impact is evaluated in Section 4.4, "Biological Resources – Fish and Aquatic Organisms" and Section 4.5, "Biological Resources – Vegetation and Wildlife," The conclusion is that the project would not conflict with an applicable Habitat Conservation Plan or Natural Community Conservation Plan and therefore is not discussed further. DWR has met with and will continue to consult with Yolo County and the Yolo Habitat Conservancy on the preparation of the Yolo Habitat Conservation Plan/Natural Community Conservation Plan.

Conflict With or Convert Forestland or Timberland to Another Use—The project site is not zoned for forestland, timberland, or timberland production. Most of the project site consists of agricultural fields cultivated with row crops, and does not contain 10 percent native tree cover that would be classified as forestland under California PRC Section 12220(g). Furthermore, the Yolo County Board of Supervisors has determined that the County has no commercial forestland or timber resources (Yolo County 2009b). Therefore, no impact would occur, and this issue is not evaluated further in this EIS/EIR.

Potential impacts related to agricultural economics are evaluated in Section 4.19, "Socioeconomics (including Population, Housing, and Employment)," and therefore are not further evaluated in this section.

Potential conflicts between recreational uses in the Sacramento Bypass Wildlife Area and adjacent agricultural lands are addressed in Section 4.18, "Recreation," and therefore are not further evaluated in this section.

Impact Analysis

Table 4.15-1 provides a summary of land use and agricultural resources impacts and mitigation measures for all alternatives under consideration.

Table 4.15-1. Summary of Impacts and Mitigation Measures—Land Use and Planning, and Agricultural and Forestry Resources

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
LU-1: Project-related Alterations of Land Uses or Patterns of Land Use that Could Cause a Substantial Adverse Physical Environmental Effect	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
AG-1: Conversion of Substantial Amounts of Important Farmland to Nonagricultural Uses and Conversion of Land under Williamson Act Contracts to an Inconsistent Use	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	AG-1a: Preserve Agricultural Productivity of Important Farmland to the Extent Feasible AG-1b: Minimize Impacts on Williamson Act-Contracted Lands, Comply with California Government Code Sections 51290–51293, and Coordinate with Landowners and Agricultural Operators AG-1c: Establish Conservation Easements Where Potentially Significant Agricultural Land Use Impacts Remain after Implementation of Mitigation Measures	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact LU-1: Project-related Alterations of Land Uses or Patterns of Land Use that Could Cause a Substantial Adverse Physical Environmental Effect.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, “No Action/No Project Alternative,” under “Consequences of No Action.”

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** from project-related alterations of land uses.

Alternatives 2 through 5: All Action Alternatives

Project implementation would not alter the existing land uses at the project site, in the Lower Elkhorn Basin, or in the project region. The project site is located in an unincorporated rural agricultural area of Yolo County with very limited housing. Most of the Lower Elkhorn Basin is used for agricultural activities. Most of the project site is classified by DWR as Agriculture, with small areas of Native Classes located along existing waterways. The project components would not conflict with DWR’s Agriculture and Native Classes land use designations; rice could replace the existing row crops (i.e., land would be maintained in agriculture), and habitat plantings would take place in non-agricultural lands (such as in the footprint of the degraded levees).

The project site is zoned by Yolo County A-N (Agricultural Intensive). Nearly all of the rural residences in the project vicinity are located in the northeast corner of the Lower Elkhorn Basin, near I-5 and in the vicinity of Kiesel, east of the project site. Up to four isolated rural residences within the project site would be acquired by DWR and demolished. However, these residences are associated with on-site agricultural activities, which would continue after project implementation. Thus, the project would not substantially change the residential or agricultural land use patterns either within the project region or in the project vicinity. Furthermore, as required by the State of California Relocation Assistance Act (Chapter 16, Section 7260 et seq. of the California Government Code), before an offer is made to each property owner, all real property to be acquired would be appraised to determine its fair market value. DWR would assist eligible property occupants in finding comparable replacement housing and would pay for actual, reasonable moving costs consistent with applicable State and Federal law.

The same recreational activities associated with the Sacramento Bypass Wildlife Area, Elkhorn Regional Park, recreational bicycle use of Old River Road, fishing in the Tule Canal, and informal use of the levee crowns that are available now would also be available after project completion; therefore, these local recreational land uses would not change, nor would the proposed setback levees result in a pattern of change in regional recreational activities.

Alternatives 2 and 3 would be inconsistent with a portion of the local Specific Plan land use designation that has been applied in the northern portion of the Lower Elkhorn Basin in the Yolo County General Plan (Yolo County 2009a and 2013). Implementing these alternatives would result in the Yolo Bypass East Levee setback being constructed adjacent to and west of County Road 122, immediately south of I-5. Approximately 100 acres of the land designated as Specific Plan would be located within the Yolo Bypass at the conclusion of the project under these alternatives; therefore, it could not be developed with urban uses. Although urban uses could still be developed on the remainder of the land where the Specific Plan land use designation has been applied (i.e., approximately 300 acres), such development could not take place unless and until a 200-year level of urban flood protection were to be provided to the Specific Plan Area. This project does not provide a 200-year level of urban flood protection. Because this land size would still be suitable for future urban development under a Specific Plan (if a future development proposal were ever brought forth and approved by the County Board of Supervisors), project implementation would not prevent this land use from occurring and would not substantially alter a land use pattern such that an adverse environmental impact would occur. Therefore, the project components of any of the action alternatives would result in a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Impact AG-1: ***Conversion of Substantial Amounts of Important Farmland to Nonagricultural Uses and Conversion of Land under Williamson Act Contracts to an Inconsistent Use.***

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to the conversion of substantial amounts of agricultural land to nonagricultural uses or the conversion of land under Williamson Act contracts to an inconsistent use.

Alternatives 2 through 5: All Action Alternatives

As shown in Figure 4.15-1, the existing Yolo Bypass East Levee, Sacramento Bypass North Levee, and South Sacramento Bypass Training Levee are classified as Other Lands under the FMMP. Several public scoping comments received on the NOI and NOP suggested that potential effects on conversion of agricultural land from ecosystem project elements, such as habitat plantings should be minimized. DWR has minimized this effect to the maximum extent feasible by locating all of the non-agricultural ecosystem habitat plantings (with the exception of riparian plantings designed to function as wind-wave buffers against erosion of the new setback levees) within the footprints of the existing levees (plantings would occur after the levees are degraded). Because the existing levees are classified under the FMMP as Other Lands, ecosystem habitat plantings in these locations would not convert agricultural land to a nonagricultural use. Furthermore, the existing levee footprints are not held under Williamson Act contracts (although Figure 4.5-1 shows that a portion of the Yolo Bypass East Levee is held under a Williamson Act contract; this most likely is due to a mapping scale issue, since none of the levees are used for agricultural activities). Therefore, this project component, within the existing levee footprints, would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

Portions of County Roads 124 and 126 would require relocation within Prime Farmland and within land held under Williamson Act contracts. However, the existing portions of these roads that would be relocated are already within Prime Farmland and within Williamson Act contracts, and construction of public facility improvements (such as roadways) is considered a compatible use with the agricultural A-N zoning at the project site under the Yolo County Zoning Code (Yolo County 2015: Table 8-2.304[d]) and is considered a compatible use with Williamson Act contracts (Yolo County 2012). Installation of the proposed new agricultural irrigation canal on the east side of the proposed Yolo Bypass East Levee setback, which is necessary for continuing agricultural uses in the future, is also consistent with existing agricultural land uses, existing agricultural zoning, and the existing Williamson Act contracts (Yolo County 2012, 2015).

Construction-related activities associated with proposed facilities, including horizontal directional drilling for relocation of the Sacramento International Airport jet fuel pipeline, would include developing temporary facilities such as staging areas and access haul roads. Land at construction staging areas and access haul roads would be temporarily removed from agricultural production to accommodate preconstruction and construction activities. Construction staging areas and access haul roads would be located on Important Farmland, and may be located on land held under Williamson Act contracts. However, such temporary disturbance would not conflict with agricultural land uses because the temporary development of dirt roads or work areas is consistent with activities typically implemented as part of agricultural operations. Sites temporarily disturbed during project construction would be stabilized against erosion consistent with required storm water pollution prevention plans (SWPPPs) as described in Chapter 3, "Alternatives." These sites would be restored to pre-project conditions and would be returned to agricultural uses after construction is complete. Therefore, these project components would have a temporary, short-term **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Constructing the proposed flood risk reduction facilities would require a substantial amount of borrow material. As described in greater detail in Chapter 3, "Alternatives," most of the borrow material would be obtained from within the setback area, from degrading the existing levees, and potentially from the RD 785 and RD 537 cross levees. In the setback area, existing top soil would be scraped and set aside and then borrow material would be excavated and stockpiled using bulldozers. Following the completion of each of the two construction seasons, borrow sites would be hydroseeded with native grasses to reduce erosion during winter and to encourage their continued use as upland habitat. At the completion of material excavation, excavation sites within the setback area would be graded to depths appropriate for future agricultural use. The short-term and temporary on-site borrow activities would be conducted within Prime Farmland and may be conducted on land held under Williamson Act contracts. However, the borrow areas are designated by the Yolo County 2030 General Plan as Agriculture and are zoned A-

N (Agricultural Intensive) (Yolo County 2009a). Surface mining is considered a conditionally permitted compatible use with the A-N zoning under the Yolo County Zoning Code (Yolo County 2015: Table 8-2.304[d]) and is also considered a compatible use with Williamson Act contracts (Yolo County 2012). Furthermore, the topsoil at borrow sites in the setback area would be removed and set aside prior to commencement of borrow activities, and the topsoil would be replaced and agricultural uses would resume at the conclusion of borrow activities. Therefore, this project component would have a temporary, short-term **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Construction of the proposed setback levees, including the seepage berms, relief wells, cutoff walls, waterslide slope armoring, and adjacent permanent access roads for O&M activities; the ecosystem habitat plantings that would occur along the south side of the proposed Sacramento Bypass North Levee setback and the west side of the proposed Yolo Bypass East Levee setback within the construction disturbance footprint; and a permanent 30- by 15-foot concrete pad (.008 acre) installed on the west side of the south cross-canal to permit future access to the Sacramento International Airport jet fuel pipeline would directly and permanently convert agricultural land to a nonagricultural use (i.e., flood risk reduction facilities). These facilities would also be implemented on land held under Williamson Act contracts. Table 4.15-2 shows the acreages of each FMMP Important Farmland category that would be converted to a nonagricultural use under each project alternative within the proposed setback levee corridors.

Table 4.15-2. Estimated Acreage of Agricultural Land[1] Conversion in Levee Setback Corridors at the Project Site—All Action Alternatives

Agricultural Land Classification	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Prime Farmland	487.6	484.1	290.6	292.0
Unique Farmland	6.7	7.1	3.8	3.5

Note:

1 "Agricultural Land" encompasses the designations of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance pursuant to California Public Resources Code Section 21060.1 and the State CEQA Guidelines Appendix G. Only Prime Farmland and Unique Farmland are present on the project site.

Source: Data compiled by GEI Consultants, Inc. in 2017

Table 4.15-3 shows the acreages of active and nonrenewal Williamson Act contracts under each action alternative that are located within the proposed setback levee corridors, which include the flood risk reduction facilities, O&M areas, and ecosystem project elements (habitat plantings) that would occur within the construction disturbance footprint of the Sacramento Bypass North Levee setback.

Table 4.15-3. Estimated Acreage of Williamson Act Contracts in Levee Setback Corridors at the Project Site—All Action Alternatives

Williamson Act Status	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 4 (acres)	Alternative 5 (acres)
Active	267.6	258.0	193.4	200.8
Non-renewal	16.3	18.8	18.8	16.3

Source: Data compiled by GEI Consultants, Inc. in 2017, based on data provided by California Department of Water Resources in 2017

Construction of the proposed setback levees would not result in the creation of small, irregularly-shaped parcels and would not result in fragmentation of the surrounding agricultural land or fragmentation of land held under Williamson Act contracts. However, agricultural land in the setback area would be placed into the Yolo Bypass, where it would be subject to periodic inundation during flood events. Therefore, although agricultural uses would continue, the DOC may reclassify the land from “Prime Farmland” to “Unique Farmland,” which would not preclude the area from being actively farmed, although the type of crops grown would be anticipated to change. It is also possible that some portions of the setback area could be used for grazing after project construction. Impacts related to agricultural economics are evaluated in Section 4.19, “Socioeconomics (including Population, Housing, and Employment).” Land throughout the Yolo Bypass and in the Lower Elkhorn Basin is used for agricultural activities, and agricultural activities would continue to occur within the setback area after it becomes part of the Yolo Bypass regardless of whether it is designated as “Prime Farmland” or “Unique Farmland.” The placement of agricultural land into the Yolo Bypass, habitat plantings, and flood easements also would not affect the status of Williamson Act contracts. Therefore, project implementation would not result in indirect conversion of adjacent agricultural land or Williamson Act-contracted land to other uses, and thus would be **less than significant**.

Improvements to regional flood risk reduction provided by the proposed setback levees could also, in some areas, reduce the frequency and severity of flood events that adversely affect agricultural lands downstream. This could reduce the potential for conversion of agricultural land to other uses in some instances by reducing catastrophic losses that might lead to the abandonment of agricultural operations and conversion of the land to another purpose. Therefore, project implementation could have a beneficial effect. This beneficial effect cannot be quantified or reasonably estimated at this time because it is dependent on the site, magnitude, duration, timing, and severity of a future flood. Such future benefits may or may not compensate for project-related losses of agricultural land or the potential cancellation of Williamson Act contracts from an inconsistent use.

As described above and shown in Tables 4.15-3 and 4.15-4, construction of the proposed new Yolo Bypass East Levee setback and Sacramento Bypass North Levee setback for flood risk reduction would directly convert Important Farmland to nonagricultural uses and would likely be inconsistent with allowable land uses under existing Williamson Act contracts. Furthermore, this agricultural land conversion would occur within the Yolo County Resource Conservation District, which was created to assist local growers and landowners in implementing practices that protect, improve, and sustain the agricultural and natural resources of Yolo County. The proposed nonagricultural use constitutes an irretrievable and permanent loss of the use of the land for agricultural purposes. Therefore, these project components of all action alternatives would have a long-term permanent **significant** impact.

Mitigation Measure AG-1a: Preserve Agricultural Productivity of Important Farmland to the Extent Feasible.

In a May 4, 2005, memorandum to California Resources Agency departments, boards, and commissions, the Secretary stated that “in selecting and developing resource-related projects, departments under the Resources Agency should consider ways to reduce effects on productive agricultural lands” and encouraged departments to incorporate, where appropriate, the strategies identified in the CALFED Bay-Delta Program (CALFED) EIR to reduce the impact of the CALFED Ecosystem Restoration Program on agricultural land and water use.

The measures listed below include the applicable strategies identified in the CALFED EIR and some additional measures. These measures are also reflective of the mitigation strategy included in the 2012 Central Valley Flood Protection Plan (CVFPP) (DWR 2012a), the 2015 Bay-Delta Conservation Plan (DWR and U.S. Bureau of Reclamation 2015), and DWR's Agricultural Land Stewardship Framework and Strategies (DWR 2014). Not all measures listed below may be applicable for the project. Rather, these measures serve as an overlying framework to be used for specific discussions regarding mitigation between DWR and Yolo County. The applicability of measures listed below would vary based on input to DWR from Yolo County, as well as the location, timing, and nature of levee setback construction and operation.

Yolo County has an Agricultural Land Conservation and Mitigation Program (Yolo County Code Section 8-2.404) that specifies the types and ratios of mitigation for conversion of agricultural land that are to be applied to projects. However, the requirements of this program are not applicable to DWR.

DWR will ensure that the measures listed below are implemented as applicable and feasible to minimize effects and preserve agricultural productivity on Important Farmland.

- Coordinate with Yolo County to receive input regarding the nature and types of measures that could be implemented to reduce the project's conversion of agricultural land to nonagricultural uses.
- Site the project and project footprint to minimize the permanent conversion of Important Farmland to nonagricultural uses if feasible.
- Identify and implement feasible project design features that balance benefits from flood risk reduction, agriculture, and natural resources.
- Minimize the splitting or fragmentation of parcels that are to remain in agricultural use, when selecting the site(s) for the flood control facilities.
- Maximize contiguous parcels of agricultural land of a size sufficient to support their efficient use for continued agricultural production.
- Maintain a means of reasonably convenient access to these agricultural properties as part of project design, construction, and implementation, where the construction or operation of the project could limit access to ongoing agricultural operations.
- Remove and stockpile, at a minimum, the upper 1 foot of topsoil of borrow sites and replace the topsoil after project completion as part of borrow site reclamation. Borrow site reclamation for agricultural production will also take into account the potential unique characteristics of soils to produce certain crops (e.g., clay pan soils for rice).
- Make topsoil available in areas permanently disturbed by project activities, and where topsoil is removed as part of project construction (e.g., stripping topsoil under a levee foundation) and not reused as part of the project. The topsoil will be made available to less productive agricultural lands that could benefit from the introduction of good-quality soil. By agreement between DWR and the recipient(s) of the topsoil, the recipient(s) would use the topsoil for agricultural purposes.

- Relocate and/or replace wells, pipelines, power lines, drainage systems, and other infrastructure that are needed for ongoing agricultural uses and would be affected by project construction or operation.

- Minimize disturbance of Important Farmland and continuing agricultural operations during construction by implementing the following measures:

  - Locate construction laydown and staging areas on sites that are fallow, already developed or disturbed, or to be discontinued for use as agricultural land, to the extent possible.

  - Use existing roads to access construction areas to the extent possible.

  - Coordinate with growers to develop appropriate construction practices to minimize construction-related impairment of agricultural productivity. Practices may include coordinating the movement of heavy equipment and implementing traffic control measures.

  - Support the testing and application of alternative crops (i.e., agroforestry or energy crops) on idle farmland.

Timing: Before, during, and after project construction activities.

Responsibility: California Department of Water Resources.

Mitigation Measure AG-1b: Minimize Impacts on Williamson Act-contracted Lands, Comply with California Government Code Sections 51290–51293, and Coordinate with Landowners and Agricultural Operators.

DWR will consider the measures described below and implement them, as applicable, to reduce effects on lands under Williamson Act contracts.

- DWR will comply with applicable provisions of California Government Code Sections 51290–51295 with regard to acquiring lands under Williamson Act contract. Sections 51290(a) and 51290(b) specify that State policy, consistent with the purpose of the Williamson Act to preserve and protect agricultural land, is to avoid locating public improvements and any public utilities improvements in agricultural preserves, whenever practicable. If such improvements must be located within a preserve, they will be located on land that is not under contract, if practicable.

- More specifically, DWR will comply with the following basic requirements stated in the California Government Code:

- Whenever it appears that land within a preserve or under contract may be required for a public improvement, DOC and Yolo County will be notified (Section 51291[b]).

- Within 30 days of being notified, DOC and Yolo County must forward comments, which will be considered by DWR (Section 51291[b]).

- A public improvement may not be located within an agricultural preserve unless findings are made that (1) the location is not based primarily on the lower cost of acquiring land in an agricultural preserve, and (2) for agricultural land covered under a contract for any public improvement, no other land exists within or outside the preserve where it is reasonably feasible to locate the public improvement (Sections 51291[a] and 51291[b]). If the land is acquired for the purpose of flood damage reduction measures, DWR is exempt from the findings required in California Government Code Section 51292 (Section 51293[e][1]).

- The contract is normally terminated for lands acquired by eminent domain or in lieu of eminent domain (Section 51295).
- DOC will be notified within 10 working days upon completion of the acquisition (Section 51291[c]).
- DOC and Yolo County will be notified before completion of any proposed work of any significant changes related to the project (Section 51291[d]).
- If, after acquisition, DWR determines that the acquired property would not be used for the proposed flood control facilities, DOC and Yolo County will be notified before the land is returned to private ownership. The land will be reenrolled in a new contract or encumbered by an enforceable restriction at least as restrictive as that provided by the Williamson Act (Section 51295).
- DWR will coordinate with landowners and agricultural operators to sustain existing agricultural operations, at the landowners' discretion, until the individual agricultural parcels are needed for project construction.

Timing: Before, during, and after project construction activities.

Responsibility: California Department of Water Resources.

Mitigation Measure AG-1c: Establish Conservation Easements Where Potentially Significant Agricultural Land Use Impacts Remain after Implementation of Mitigation Measures AG-1a and AG-1b.

As discussed in Mitigation Measure AG-1a, in general, where there is a reduction or termination of agricultural activities to undertake flood risk reduction, environmental protection, or other conservation measures, DWR will consider other measures before considering purchasing conservation easements or other measures of compensation (collectively referred to as "easements" below). If after implementing all other applicable measures such as those listed above in Mitigation Measure AG-1a, the project could still result in a potentially significant environmental impact, easements will be considered. Easements are most likely appropriate where there would be serious degradation or elimination of the physical conditions or natural processes that provide the land's resource qualities for agriculture. In this situation, there would normally also be other impacts on the environment. As part of Mitigation Measure AG-1b, DWR will consult with Yolo County regarding the potential for easements. Where easements are applicable, the factors listed below will be considered.

- Where easements are considered for other resources such as terrestrial biological resources, purchase of easements should be coordinated where possible so that agricultural resources are also addressed. For example, if it were determined that the project would permanently terminate agricultural activities on a piece of land that served as Swainson's hawk foraging habitat, if an easement on another property were determined appropriate to address losses of Swainson's hawk foraging habitat, the replacement land could also support the same kind of agricultural activity as the original converted property.

- Applicable methods established in the area of the specific project activity will be considered. Methods for compensation may include but are not limited to establishing agricultural conservation easements, paying in-lieu fees toward agricultural conservation easements, supporting agricultural land trusts, and participating in habitat conservation plans or natural community conservation plans that include conservation of agricultural lands. The appropriate ratio of purchase or establishment of agricultural conservation easements relative to conversion of Important Farmland will be established by DWR following consultation with Yolo County. Depending on the specifics of the impact, available agricultural conservation programs in various locations, and local or regional regulatory standards, there are some circumstances where less than a 1-to-1 compensation ratio may be appropriate, and other circumstances where greater ratios may be required. Where conservation easements are established by DWR, they may be held by land trusts, local governments, or other appropriate agencies that are responsible for ensuring that these lands are maintained in agricultural use.

When determining whether effects on agricultural land warrant purchase of an easement, the factors below will be considered.

- Whether the change would affect the use of the land for agricultural purposes (i.e., ceasing agricultural activities and allowing land to be fallowed or be used for resource restoration in such a way that land could be returned to agricultural production).
- Whether the change would permanently take land out of production (i.e., construction of a new facility such that the land could no longer be farmed).
- Whether the land could be used for agricultural production but has not been or is not likely to be able to be used for such purposes because of flooding, bad soils, lack of dependable water supplies, or other reasons.
- Whether the land is currently being used for agricultural production and would not be able to be used for similar purposes in the future because of the project, but the project would provide benefits to nearby or other land that could be or is being used for agricultural purposes.
- Whether the land is currently being used for agricultural production and would not be able to be used for similar purposes in the future because of physical changes brought about by the project, and the land is Prime Farmland, Unique Farmland, or Farmland of Statewide Importance.
- Whether the land would be converted to a use that would reduce ancillary environmental benefits.

Timing: Before, during, and after project construction activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measures AG-1a, AG-1b, and AG-1c would reduce permanent long-term effects on conversion of Important Farmland to a nonagricultural use and conversion of land under Williamson Act contracts to an inconsistent use under all action alternatives. The impacts related to Williamson Act contracts would be less than significant. However, the permanent long-term effects on conversion of Important Farmland to nonagricultural, under each action alternative, would be a potentially **significant and unavoidable** impact. Even with the implementation of Mitigation Measures AG-1a, AG-1b, and AG-1c, some agricultural lands likely will be taken out of production permanently within the footprints of the new setback levees and likely cannot be fully mitigated.

Residual Significant Impacts

The impact from project-related alterations in land uses or land use patterns (Impact LU-1) would be less than significant. Therefore, no residual significant impacts would occur.

The impacts from inconsistency with Williamson Act contracts would be significant. However, these impacts would be reduced to a less-than-significant level following implementation of Mitigation Measures AG-1a, AG-1b, and AG-1c.

The impacts from conversion of Important Farmland to a nonagricultural use on a permanent basis result in a potential residual significant and unavoidable impact.

Numerous additional project alternatives that would reduce agricultural impacts were evaluated by DWR. The project must be located at the project site to meet the project objectives; no feasible offsite alternatives are available to meet the project's purpose or objectives. Expanding the floodplain in the Yolo and Sacramento Bypasses requires a setback levee; there are no other alternatives. Within the project site, DWR evaluated several alternative alignments, including shortened alignments that minimize environmental impacts associated with conversion of Important Farmland to a nonagricultural use. A reasonable range of alternatives including four alternative levee alignments were evaluated in this EIS/EIR to minimize agricultural impacts.

DWR also has concluded that there are no feasible mitigation measures available to reduce agricultural impacts to a less-than-significant level. Mitigation Measures AG-1a, AG-1b, and AG-1c all involve meeting with Yolo County to explore various ways to further mitigate agricultural impacts. The potential exists that elements of these three mitigation measures could be developed during the review of the DEIS/DEIR that reduce agricultural impacts to less-than-significant levels, but that conclusion remains uncertain. Yolo County has proposed rice farming in the expanded floodway created by both the Yolo Bypass East Levee setback, and the Sacramento Bypass North Levee setback (to retain existing agricultural production at this site). Yolo County has also proposed introducing agricultural uses in the existing Sacramento Bypass Wildlife Area to offset agricultural production lost to the footprint of the new setback levees.

DWR has designed the Yolo Bypass East Levee setback to minimize impacts to agriculture to the greatest extent feasible and agrees with Yolo County that planting the acreage in rice to maintain agricultural productivity, as well as increase habitat values for fish and wildlife, is desirable and is proposed. However, the existing Sacramento Bypass floodplain is maintained by CDFW as a wildlife area; this area includes important Swainson's hawk foraging habitat, nesting raptors, western pond turtle, riparian vegetation, and jurisdictional wetland habitat; and includes sandy loam soils not conducive to rice farming. Most importantly, CDFW desires to maintain habitat complexity and diversity in the Yolo Bypass, and converting any natural habitats to rice farming is not deemed beneficial at this site by CDFW. Significant biological impacts, as well as recreational impacts, would likely occur from Yolo County's proposal. Therefore, DWR does not agree that rice farming within the Sacramento Bypass floodplain is a viable or feasible mitigation measure or design feature because CDFW manages the lands presently and at least through 2027, if not longer, and is not supportive at this time.

Although DWR is not subject to local policies, the project appears consistent with the following relevant policies from the *Yolo 2030 Countywide General Plan* Conservation and Open Space element and Health and Safety Element (Yolo County 2009).

- **Policy CO-1.28.** Balance the needs of agriculture with recreation, flood management, and habitat, within the Yolo Bypass.
- **Policy CO-2.8.** Encourage all public land management agencies to protect, restore, and enhance the fish habitat within their jurisdiction.
- **Policy CO-2.9.** Protect riparian areas to maintain and balance wildlife values.
- **Policy CO-2.10.** Encourage the restoration of native habitat.
- **Policy CO-2.24.** Promote floodplain management techniques that increase the area of naturally inundated floodplains and the frequency of inundated floodplain habitat, restore some natural flooding processes, river meanders, and widen riparian vegetation, where feasible.
- **Policy HS-2.1.** Manage the development review process to protect people, structures, and personal property from unreasonable risk from flooding and flood hazards.
- **Policy HS-2.2.** Ensure and enhance the maintenance and integrity of flood control levees.
- **Policy HS-2.8.** Consider and allow for the ecological benefits of flooding while balancing public safety and the protection of property.
- **Action HS-A5.** Require a minimum of 100-year flood protection for new construction, and strive to achieve 200-year flood protection for unincorporated communities.
- **Action HS-A22.** Ensure that the upgrade, expansion, or construction of any flood control levee demonstrates that it will not adversely divert flood water or increase flooding.

Although DWR is not subject to local policies, DWR considers the project to be consistent with the following policy from the *Yolo 2030 Countywide General Plan* Conservation and Open Space element and Health and Safety Element (Yolo County 2009).

- **Policy CO-2.5.** Protect, restore and enhance habitat for sensitive fish species, so long as it does not result in the large-scale conversion of existing agricultural resources.

Although the project does include both restoration of habitat for sensitive fish species and conversion of agricultural resources, habitat restoration for sensitive fish species would occur within the footprint of the existing levees and would not directly convert agricultural lands. Although future agricultural use in the project footprint could also be designed to be compatible with fish habitat, this compatibility would not convert these agricultural uses. Furthermore, given the project's primary purpose to reduce flood risks in both Sacramento and Yolo Counties, Policy CO-2.5 does not appear to directly apply to the project as do other County policies that address flood management. For instance, Policy CO-1.28 encourages the balancing of agriculture with flood management and habitat in the Yolo Bypass, which more directly applies to the project's purpose; therefore, the project as designed and mitigated, balances agriculture, management, and habitat in the Yolo Bypass and thereby meets all applicable local policies.

4.16 Mineral Resources

4.16.1 Environmental Setting

Natural Gas

As shown in Figure 4.16-1, numerous natural gas fields are scattered throughout the region. The project site is located within portions of Conway Ranch, Sacramento International Airport, and Sacramento Bypass Gas Fields, the latter of which has been abandoned. Prior to the 1940s, there was a natural gas surplus in California. Since that time, the situation has changed to one of inadequate supply because of growth in population and industry. Thus, California must import gas every year. Natural gas production in California has been steadily declining since the turn of the century, from approximately 366,764 million cubic feet (MMcf)/year[1] in 2001 to approximately 239,517 MMcf/year in 2014 (U.S. Energy Information Administration 2016a). In 2014, the natural gas supplies in California met approximately 10 percent of the State's demand (U.S. Energy Information Administration 2016b).

Natural gas production in Yolo County has also declined over time, from a high of approximately 28 MMcf[1] in 1979 at the height of the well-drilling boom, to approximately 1.1 MMcf as of June 2016. Of the approximately 1,400 wells in Yolo County, 23 are actively producing natural gas. Most of the natural gas currently produced in the County is obtained from the Pleasant Creek Gas Field at the western edge of the Sacramento Valley, northwest of Winters. (DrillingEdge 2016.)

Construction Aggregate

The loss of access to regionally important mineral deposits as a result of land uses that preclude mining is one of the problems that the California Surface Mining and Reclamation Act of 1975 (SMARA) was framed to address. SMARA mandates a two-phased mineral resource conservation process called classification-designation. Under SMARA, the State Mining and Geology Board may designate certain mineral deposits as being regionally significant to satisfy future needs. The Board's decision to designate an area is based on a classification report prepared by the California Geological Survey (CGS) and on input from agencies and the public.

CGS' priority for mineral land classification studies is based on areas that are most likely to urbanize in the future, with the goal of establishing an awareness of the availability of important resources by communicating with the appropriate lead agencies regarding the presence, location, and significance of mineral deposits within a particular region. The Elkhorn Basin (both upper and lower) is in an agricultural area of Yolo County that has not been identified by CGS as an area likely to urbanize; therefore, CGS has not prepared a mineral land classification study. The absence of a mineral land classification study does not mean that no important mineral resources are present; rather, it means that the area in question has not yet been classified by CGS.

Active construction aggregate (i.e., sand and gravel) production areas in the region are located primarily along Cache Creek northwest of Woodland, and in active and ancestral channels of the American River in Sacramento County and the City of Rancho Cordova (Dupras 1988, 1999). The Cache Creek deposits consist of alluvium derived primarily from the Coast Ranges to the northwest. However, most of the Portland cement concrete (PCC)-grade aggregate in the region comes from the Riverbank Formation, which underlies the project site at depth. The Riverbank Formation does not contain consistently high grade aggregate throughout its extent. In some areas, the presence of friable rock, clay lenses, and

1 MMcf and Mcf are gas standards equivalent to approximately 1,000,000 cubic feet and 1,000 cubic feet, respectively.

excessive amounts of silica-iron cemented hardpan results in rock that does not meet PCC aggregate specifications. To a lesser extent, PCC-grade aggregate in the region also comes from the Modesto Formation, Holocene-age river channel deposits, and dredge tailings. These formations were all derived from the Sierra Nevada mountain range to the east (Dupras 1988).

4.16.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to mineral resources apply to the alternatives under consideration.

State

The following State plans, policies, regulations, or laws related to mineral resources apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- California Surface Mining and Reclamation Act – Applies to the impact analysis.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances laws related to mineral resources are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County Municipal Code Title 10, Surface Mining and Reclamation – Relevant to the impact analysis.
- Yolo County General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding mineral resources are relevant to project design, construction, and/or the impact analysis of the project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

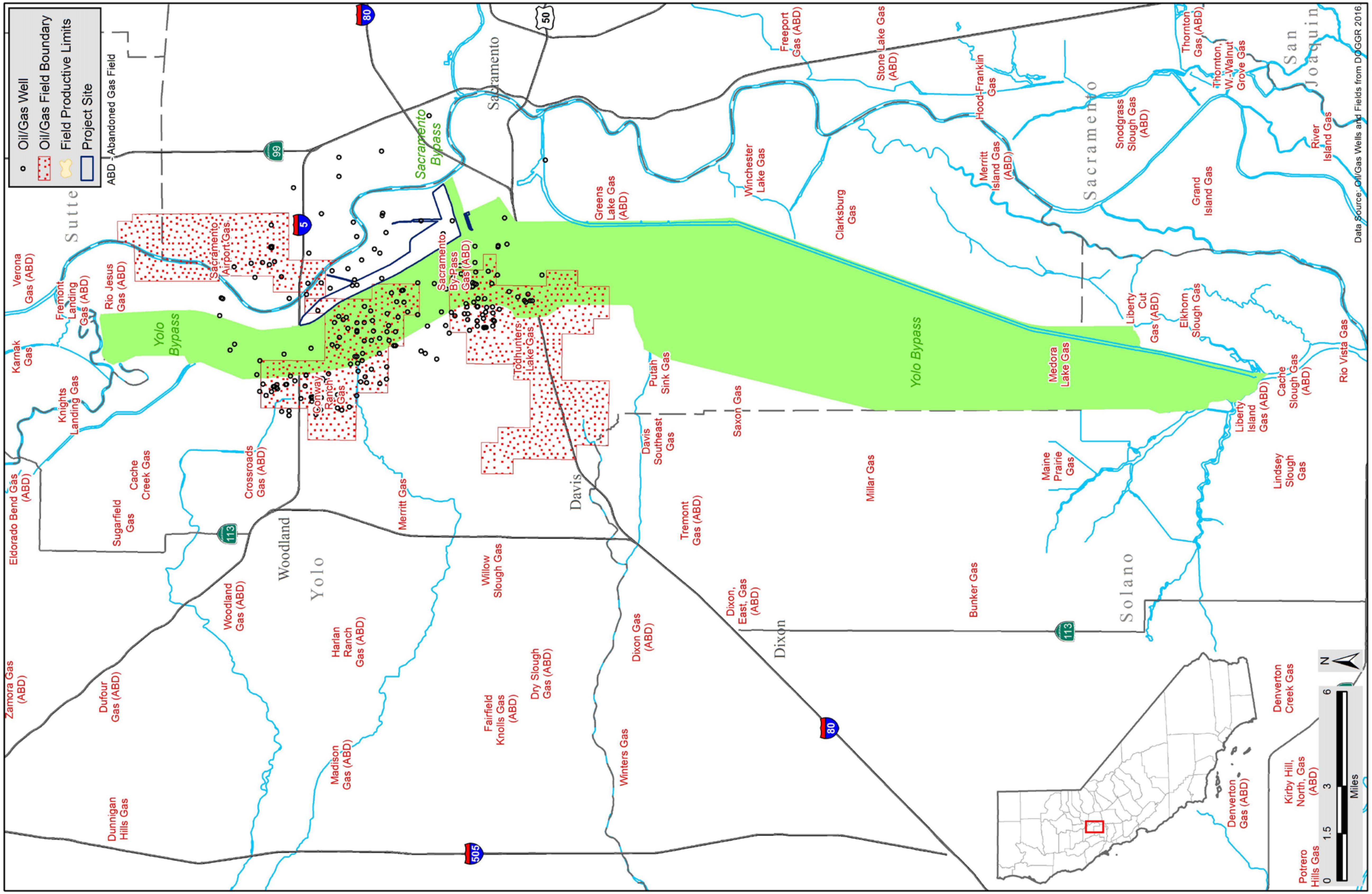
4.16.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

The analysis of potential impacts on mineral resources was based on a review of mineral land classification studies and geologic maps prepared by CGS, the California Division of Oil, Gas, and Geothermal Resources (DOGGR), and the Conservation and Open Space Element of the Yolo County General Plan.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. No comments related to mineral resources were received.

Figure 4.16-1. Natural Gas Fields in the Project Site and Region



Sources: California Division of Oil, Gas, and Geothermal Resources 2007, 2009, 2010

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Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to minerals if they would do any of the following:

- 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; or

- 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.

Impact Analysis

Table 4.16-1 provides a summary of mineral resource impacts and mitigation measures for all alternatives under consideration.

Table 4.16-1. Summary of Impacts and Mitigation Measures—Mineral Resources

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
MIN-1: Loss of Availability of Regionally or Locally Important Natural Gas Resources	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
MIN-2: Loss of Availability of Regionally or Locally Important Aggregate Resources	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact Analysis

Impact MIN-1: Loss of Availability of Regionally or Locally Important Natural Gas Resources.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

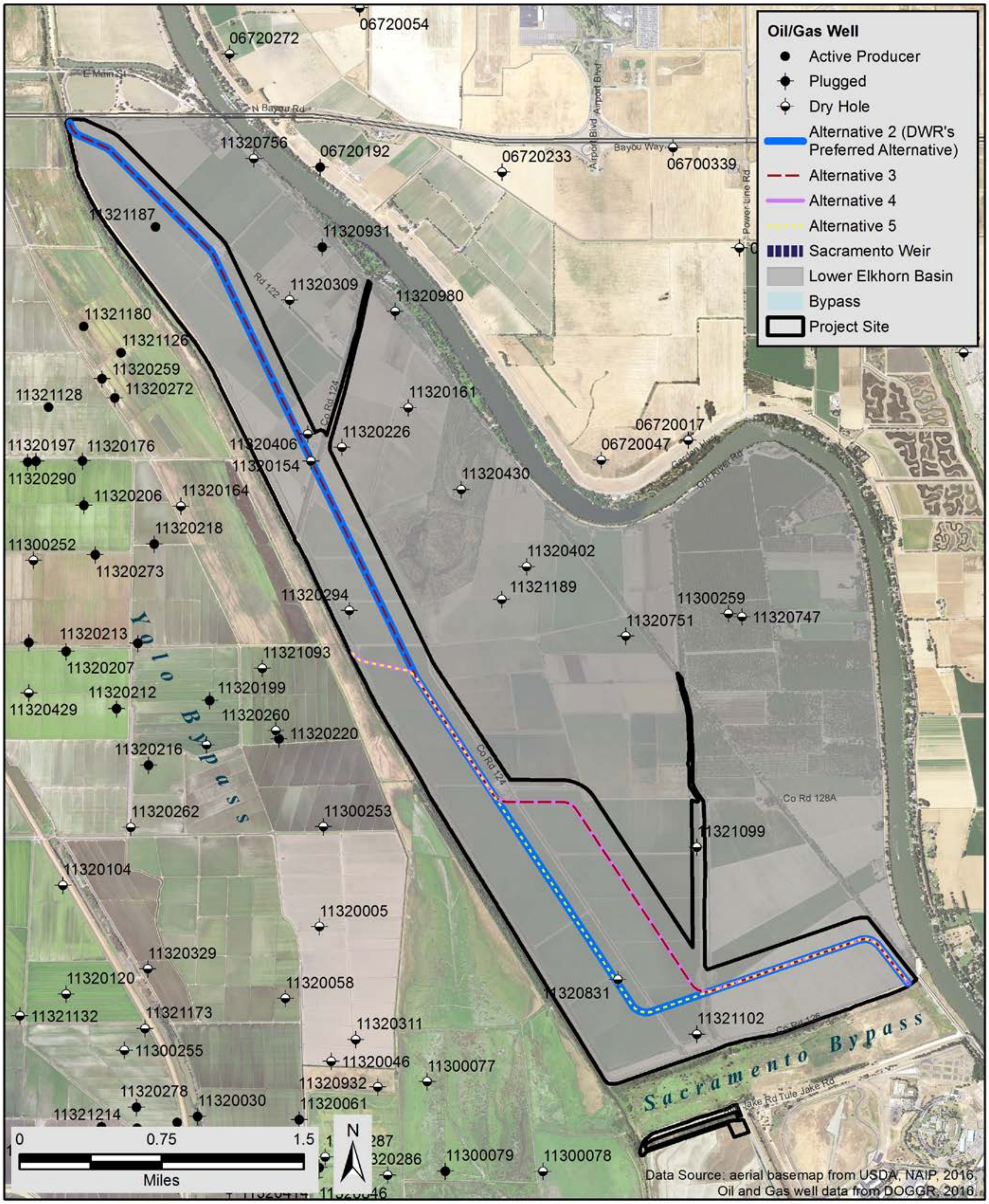
With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to the loss of availability of regionally or locally important natural gas resources.

Alternatives 2 and 3: DWR's Preferred Alternative (7-Mile Setback Partial Degrade), 7-Mile Expanded Setback Full Degrade

As shown on Figure 4.16-1, the project site includes portions of Conway Ranch, Sacramento International Airport, and Sacramento Bypass natural gas fields. The Sacramento Bypass gas field is abandoned. Table 4.16-2 presents relevant data regarding the natural gas wells that are present on the project site and within the Lower Elkhorn Basin. Based on data available from DOGGR (2016a), all but one of the gas wells drilled on the project site were dry holes, meaning they either did not produce natural gas, or they did not produce this commodity in paying quantities. The locations of the wells discussed below are shown in Figure 4.16-2.

As indicated in Table 4.16-2, all but two of the natural gas wells drilled in the Lower Elkhorn Basin were dry holes that have been plugged and abandoned for 20–40 years. Well No. 11320931, located approximately 0.8 mile east of the project site in the Sacramento Airport Gas Field, produced natural gas for a 6-year period between 1989 and 1995, but was abandoned and plugged in late 1995. Well No. 11321187, located in the northern portion of the project site in the Conway Ranch Gas Field, is the only natural gas well in the Lower Elkhorn Basin that has not been plugged and abandoned. This well produced 33,242 Mcf (thousand cubic feet) of natural gas in 2002; 57,701 Mcf in 2003; and 276 Mcf (for 1 month) in 2004; these yields were large in proportion to a typical active natural gas well in the project vicinity today (compare with 8,688 Mcf produced in 2015 for Todhunters Lake Gas Field active Well No. 11320042, approximately 2.25 miles southwest of the project site) (DOGGR 2016a). However, Well No. 11321187 has been idle since 2004. No natural gas has been produced by the Conway Ranch Gas Field or the Sacramento Airport Gas Field in the past 4 years (DOGGR 2016b, 2014a, 2014b, and 2013). Many of the natural gas wells in the Yolo Bypass to the northwest, west, and southwest of the project site have been plugged and abandoned. All of the natural gas wells in the Upper Elkhorn Basin, north of the project site, have been plugged and abandoned. (DOGGR 2016a.)

Figure 4.16-2. Natural Gas Wells in the Project Site and Vicinity



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Source: California Division of Oil, Gas, and Geothermal Resources 2016a

Table 4.16-2. Natural Gas Wells in the Project Site and Lower Elkhorn Basin

API Well No.	Well Type	Status	Date Well Was Drilled	Date of Last Activity	Name of Well Operator	Name of Well Field
Natural Gas Wells on the Project Site[1]						
11321187	Active producer	Idle	4/3/2001	1/2004	California Resources Production Corporation	Conway Ranch Gas
11320406	Dry hole	Plugged and abandoned	7/20/1976	7/26/1976	Nahama & Weagant Energy	N/A
11320154	Dry hole	Plugged and abandoned	8/28/1972	9/1/1972	Natoma Oil Company	N/A
11320294	Dry hole	Plugged and abandoned	9/26/1974	10/2/1974	Atlantic Oil Company	N/A
11320831	Dry hole	Plugged and abandoned	9/30/1985	10/5/1985	Northern Michigan Exploration Company	N/A
11321102	Dry hole	Plugged and abandoned	7/25/1997	8/2/1997	Production Specialties Company	N/A
Other Natural Gas Wells in the Lower Elkhorn Basin[2]						
11320756	Dry hole	Plugged and abandoned	10/15/1983	10/19/1983	Samson Resources Company	Sacramento Airport Gas
11320931	Active producer	Plugged and abandoned	9/9/1989	11/4/1995	Two Bay Petroleum	Sacramento Airport Gas
11320309	Dry hole	Plugged and abandoned	11/27/1974	12/10/1974	Atlantic Oil Company	N/A
11320980	Dry hole	Plugged and abandoned	11/6/1990	11/11/1990	Two Bay Petroleum	N/A
11320161	Dry hole	Plugged and abandoned	9/25/1972	10/3/1972	Natoma Oil Company	N/A
11320226	Dry hole	Plugged and abandoned	10/26/1973	11/3/1973	Natoma Oil Company	N/A
11320430	Dry hole	Plugged and abandoned	1/18/1977	1/22/1977	Nahama & Weagant Energy Company	N/A
11320402	Dry hole	Plugged and abandoned	5/27/1976	6/1/1976	Atlantic Oil Company	N/A
11321189	Dry hole	Plugged and abandoned	5/11/2001	5/15/2001	Venoco, Inc.	N/A
11320751	Dry hole	Plugged and abandoned	9/21/1983	9/26/1983	Northern Michigan Exploration Company	N/A
11300259	Dry hole	Plugged and abandoned	7/13/1963	8/9/1963	ARCO Western Energy	N/A
11300747	Dry hole	Plugged and abandoned	7/29/1983	8/1/1983	Russell H. Green, Jr.	N/A
11321099	Dry hole	Plugged and abandoned	7/9/1997	7/18/1997	Production Specialties Company	N/A

Notes: API = American Petroleum Institute; N/A = not applicable
1 Listed in order from north to south.
2 East of the project site, listed in order from north to south.
Source: California Division of Oil, Gas, and Geothermal Resources 2016a

The Conservation and Open Space Element of the Yolo County General Plan (Yolo County 2009) indicates that Conway Ranch and Sacramento Airport Gas Fields (along with many of the other natural gas fields shown on Figure 4.16-1) are important local natural gas resources.

Since DOGGR data show that (1) nearly all of the natural gas wells in the project vicinity have been plugged and abandoned, (2) all but two of the exploratory wells in the Lower Elkhorn Basin were dry holes (and one of those two has been plugged and abandoned), and (3) no natural gas has been produced in either the Conway Ranch or Sacramento Airport Gas Fields over the past 4 years, it is unlikely that any new commercially viable sources of natural gas are present in the Lower Elkhorn Basin.

The northern portion of the proposed new Yolo Bypass East Levee setback would be located approximately 650 feet east of the active (but currently idle) natural gas Well No. 11321187. Although this well is idle, it could be brought back into production by the operator at any time. Since the proposed new setback levee and associated O&M corridor would be located approximately 650 feet east of the well, natural gas could still be obtained from this well. Furthermore, the proposed slurry cutoff walls would not be deep enough to reduce the flow of natural gas into any wells in the project vicinity since well logs show that natural gas in the project vicinity is located within the Upper Cretaceous-age Martinez (aka Mokelumne River), Starkey, and Winters Formations at depths ranging from 2,850 to 5,300 feet below the ground surface (Campion and Johnson 1980). Finally, riparian plantings and continued agricultural production west and south of the proposed new setback levees would not impede the ability of any mining interest in the future from drilling and operating new wells. Project operations and maintenance would also have no effect on natural gas resources.

Therefore, Alternatives 2 and 3 would have a **less-than-significant** impact. (Hazards from accidental destruction of abandoned well plugs and from subjecting active natural gas Well No. 11321187 to flood flows within the expanded Yolo Bypass are evaluated in Impact HAZ-3 in Section 4.13, “Hazards and Hazardous Materials.”)

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade, 5-Mile Setback Full Degrade

Alternatives 4 and 5 would entail construction of the same types of facilities as Alternative 2, but the northern end of the Yolo Bypass East Levee setback would terminate south of the north cross-canal. Thus, under Alternatives 4 and 5, a setback levee in the vicinity of active (but currently idle) natural gas Well No. 11321187 would not be constructed. As discussed above, the other wells in the Lower Elkhorn Basin and many of the wells in the project vicinity were dry holes, and many of the active producers have been plugged and abandoned, indicating a lack of future commercially viable natural gas resources in the Lower Elkhorn Basin. Furthermore, the proposed slurry cutoff walls would not be deep enough to reduce the flow of natural gas into wells since well logs show that natural gas in the project vicinity is located 2,850–5,300 feet below the ground surface (Campion and Johnson 1980). Finally, riparian plantings and continued agricultural production west and south of the proposed new setback levees would not impede the ability of any mining interest in the future from drilling and operating new wells. Therefore, Alternatives 4 and 5would have a **less-than-significant** impact. (Hazards from accidental destruction of abandoned well plugs are evaluated in Impact HAZ-3 in Section 4.13, “Hazards and Hazardous Materials.”)

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Impact MIN-2: Loss of Availability of Regionally or Locally Important Aggregate Resources.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to the loss of availability of regionally or locally important aggregate resources.

Alternative 2: DWR's Preferred Alternative (7-Mile Setback Partial Degrade)

The Elkhorn Basin (both upper and lower) is in an agricultural area of Yolo County that has not been identified by CGS as an area likely to urbanize; therefore, CGS has not prepared a mineral land classification study. Thus, project-related activities, under Alternative 2, would not take place in an area designated by CGS as having known significant mineral deposits (i.e., designated Mineral Resource Zone [MRZ]-2 by CGS).

Individual counties retain the authority to designate locally important mineral resources within their general plans, which may include additional areas not addressed by CGS in mineral land classification studies. The Conservation and Open Space Element of the Yolo County General Plan (Yolo County 2009) indicates that the only locally designated important aggregate resources in the County are located along Cache Creek, northwest of the project site.

The Riverbank Formation, which underlies the project site at depth, has been known to produce PCC-grade aggregate in Sacramento County (east of the project site). However, the Riverbank Formation does not contain consistently high-grade aggregate throughout its extent (Dupras 1988). In 1999, Dupras determined that all of the areas along the east side of the Sacramento River throughout Sacramento County should be classified as MRZ-1: areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence. The project site is located in Yolo County on the west side of the Sacramento River; however, a review of regional geologic maps (e.g., Dupras 1999; Gutierrez 2011; Helley and Harwood 1985) indicates that the same rock formations are present on both the east and west sides of the river. It is presently unknown whether or not the project site contains economically valuable deposits of aggregate mineral resources.

As discussed in Chapter 3, "Alternatives," borrow material would be obtained from the setback area (between the existing levees and the proposed new setback levees), and from the Cross Levees along the north and south cross-canals in the Lower Elkhorn Basin. This material would be blended with imported material to make the excavated soils suitable for reuse in levee setback construction. The suitability and available quantities of borrow material from on-site sources would be investigated further and confirmed as part of project design. DWR prefers to reduce the overall amount of imported borrow material by maximizing the use of on-site excavated soils as feasible. If future investigations demonstrate the need for additional supplemental borrow sites, there are sites throughout the project region that have been used or are bring used for ongoing levee improvement projects (see Chapter 3, “Alternatives”). Necessary aggregate base and rock revetment material would likely be obtained from permitted sand and gravel operations in the region (see Chapter 3, “Alternatives,” for additional details). The use of aggregate mineral resources for setback levee construction and road base would be an appropriate use of any aggregate mineral resources that may be present at the project site. Based on the provisions of California Public Resources Code (PRC) Section 2714(b), the on-site borrow activities are exempt from the SMARA permitting requirements.

If any economically valuable aggregate resources are present under the ground surface within the project site, mining of such deposits underneath the existing Yolo Bypass East Levee and Sacramento Bypass North Levee is precluded by the presence of these existing levees. Construction of new setback levees farther to the east and north would be accompanied by degradation of the existing levees; thus, the ability to obtain aggregate resources (if any are present) would not change from the current situation. Furthermore, similar to current conditions, aggregate mining operations could take place in any of the locations where agricultural activities would occur at the completion of the project. Therefore, because project implementation would not impede the ability of a mine operator to obtain aggregate resources in the future (if any economically important resources are present), Alternative 2 would have a **less-than-significant** impact on aggregate mineral resources.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Alternative 3: 7-Mile Expanded Setback Full Degrade

Alternative 3 would entail construction of the same facilities as Alternative 2, with a different Yolo Bypass East Levee setback alignment in the southern portion of the project site located farther to the east. The use of aggregate mineral resources for new setback levee construction and road base would be an appropriate use of any aggregate mineral resources that may be present at the project site. Based on the provisions of California PRC Section 2714(b), the on-site borrow activities are exempt from the SMARA permitting requirements.

If any economically valuable aggregate resources are present under the ground surface within the project site, mining of such deposits underneath the existing Yolo Bypass East Levee and Sacramento Bypass North Levee is precluded by the presence of these existing levees. Construction of new setback levees further to the east and north would be accompanied by degradation of the existing levees; thus, the ability to obtain aggregate resources (if any are present) would not change from the current situation. Furthermore, similar to current conditions, aggregate mining operations could take place in any of the locations where agricultural activities would occur at the completion of the project. Therefore, because project implementation would not impede the ability of a mine operator to obtain aggregate resources in the future (if any economically important resources are present), Alternative 3 would have a **less-than-significant** impact on aggregate mineral resources.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

<u>Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade, 5-Mile Setback Full Degrade</u>

Alternatives 4 and 5 would entail construction of the same types of facilities as Alternative 2, except the Yolo Bypass East Levee setback would be shorter and would be set back farther east. In addition, borrow material would not be obtained from the Reclamation District 784 Cross Levee. The use of aggregate mineral resources for setback levee construction and road base would be an appropriate use of any aggregate mineral resources that may be present at the project site. Based on the provisions of California PRC Section 2714(b), the on-site borrow activities are exempt from the SMARA permitting requirements.

If any economically valuable aggregate resources are present under the ground surface within the project site, mining of such deposits underneath the existing Yolo Bypass East Levee and Sacramento Bypass North Levee is precluded by the presence of these existing levees. Construction of new setback levees farther to the east and north would be accompanied by degradation of the existing levees; thus, the ability to obtain aggregate resources (if any are present) would not change from the current situation. Furthermore, similar to current conditions, aggregate mining operations could take place in any of the locations where agricultural activities would occur at the completion of the project. Therefore, because project implementation would not impede the ability of a mine operator to obtain aggregate resources in the future (if any economically important resources are present), Alternatives 4 and 5would have a **less-than-significant** impact on aggregate mineral resources.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Residual Significant Impacts

The environmental impacts from potential loss of availability of regionally or locally important natural gas resources and aggregate mineral resources (Impacts MIN-1 and MIN-2) would all be less than significant. Therefore, residual significant impacts would not occur.

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4.17 Noise and Vibration

4.17.1 Environmental Setting

Acoustical Fundamentals and Terminology

Sound is the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium, such as air. Noise is defined as sound that is unwanted (loud, unexpected, or annoying). Acoustics is the physics of sound. Excessive exposure to noise can result in adverse physical and psychological responses (e.g., hearing loss and other health effects, anger, and frustration); interfere with sleep, speech, and concentration; or diminish the quality of life.

The amplitude of pressure waves generated by a sound source determines the perceived loudness of that source. A logarithmic scale is used to describe sound pressure level in terms of decibels (dB). The threshold of human hearing (near-total silence) is approximately 0 dB. A doubling of sound energy corresponds to an increase of 3 dB. In other words, when two sources at a given location are each producing sound of the same loudness, the resulting sound level at a given distance from that location is approximately 3 dB higher than the sound level produced by only one of the sources. For example, if one automobile produces a sound pressure level of 70 dB when it passes an observer, two cars passing simultaneously do not produce 140 dB; rather, they combine to produce 73 dB.

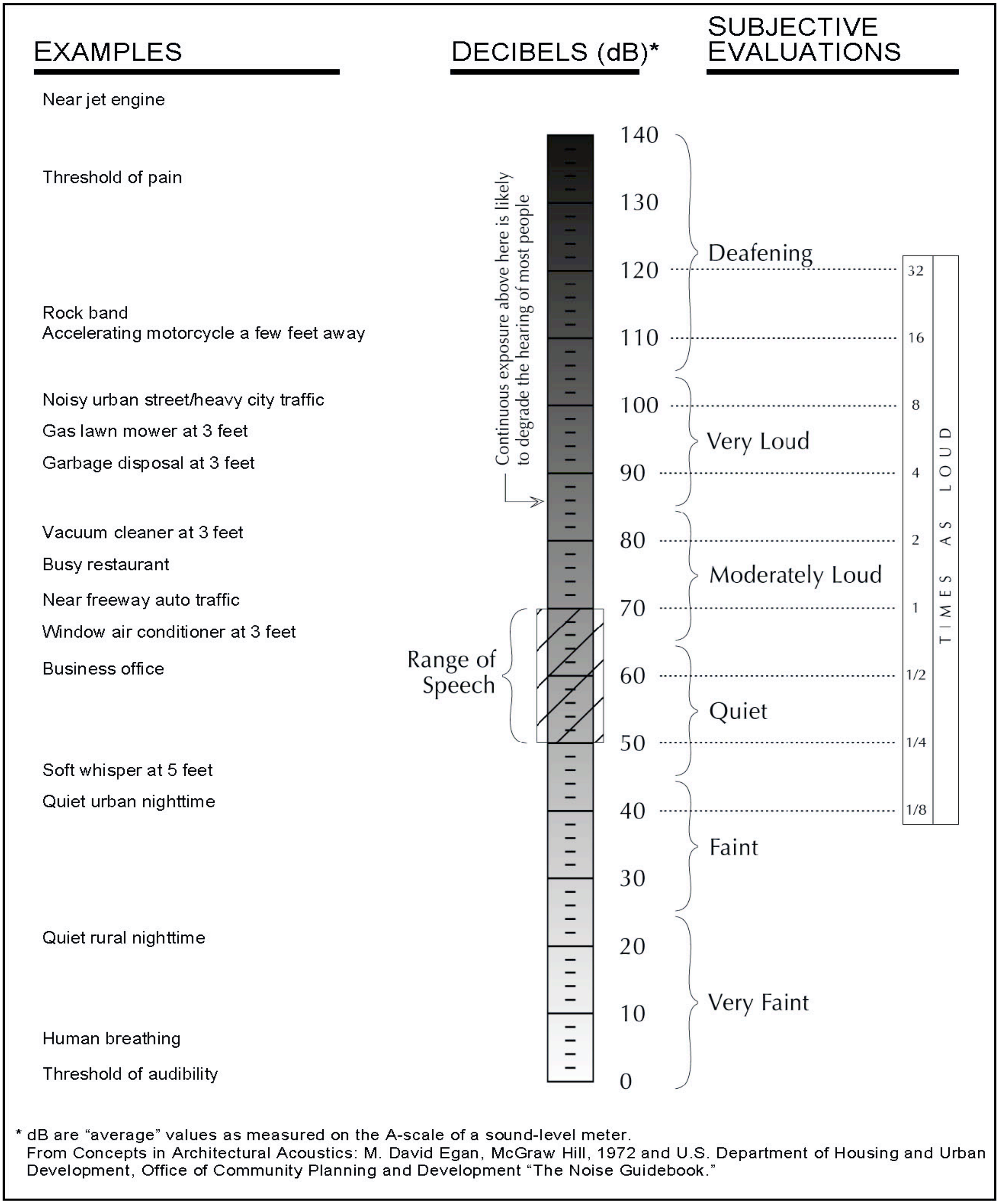
The perceived loudness of sounds depends on many factors, including sound pressure level and frequency content. However, within the usual range of environmental sound levels, perception of loudness is relatively predictable, and can be approximated through frequency filtering using the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard descriptor for environmental noise assessment. All noise levels reported in this section are in terms of A-weighting. Figure 4.17-1 illustrates sound levels associated with common sound sources.

As discussed above, a doubling of the sound energy results in a 3-dB increase in sound. In typical noisy environments, the healthy human ear generally does not perceive noise-level changes of 1–2 dB. However, people can begin to detect 3-dB increases in noise levels. An increase of 5 dB is generally perceived as distinctly noticeable and a 10-dB increase is generally perceived as a doubling of loudness.

The following terms are the sound level descriptors most commonly used in environmental noise analyses.

- **Equivalent sound level (L_{eq}) –** An average of the sound energy occurring over a specified time period. In effect, the L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour, A-weighted equivalent sound level ($L_{eq[h]}$) is the energy average of A-weighted sound levels occurring during a 1-hour period.
- **Maximum sound level (L_{max}) –** The highest instantaneous sound level measured during a specified period.
- **Percentile-exceeded sound level (L_n) –** The sound level exceeded "n" percentage of a specified period. For example, L_{10} is the sound level exceeded 10 percent of the time and L_{90} is the sound level exceeded 90 percent of the time.

Figure 4.17-1. Decibel Scale and Common Noise Sources



Source: Based on Egan 1988

- **Day-night average level (L_{dn}) –** The energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during nighttime hours (10 p.m.–7 a.m.).

- **Community noise equivalent level (CNEL) –** The energy-average of the A-weighted sound levels occurring over a 24-hour period, with penalties of 10 dB and 5 dB, respectively, applied to A-weighted sound levels occurring during the nighttime hours (10 p.m.–7 a.m.) and the evening hours (7 p.m.–10 p.m.). The CNEL is similar to L_{dn}—it is usually within 1 dB of the L_{dn}—and for all intents and purposes, the two measurements are interchangeable. Because it is easier to compute and of more common use, the L_{dn} is used as the long-term noise measurement in this study.[1]

Sound from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (decreases) at a rate of 6 dB (hard ground)[2] to 7.5 dB (soft ground)[3] for each doubling of distance from a point/stationary source. Roadways and highways and, to some extent, moving trains consist of several localized noise sources on a defined path; these are treated as “line” sources, which approximate the effect of several point sources. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source. Therefore, noise from a line source attenuates less with distance than noise from a point source.

Groundborne Vibration

Vibration is an oscillatory motion that can be described in terms of displacement, velocity, or acceleration. Vibration is typically described by its peak and root-mean-square amplitudes. The root-mean-square value can be considered an average value over a given time interval. The peak vibration velocity is the same as the “peak particle velocity” (PPV), generally presented in units of inches per second. PPV is the maximum instantaneous positive or negative peak of the vibration signal and is generally used to assess the potential for damage to buildings and structures. The root-mean-square amplitude is typically used to assess human annoyance caused by vibration.

4.17.2 Affected Environment

The project site is located within Yolo County, as are local access haul routes, as shown in Figure 3-9 in Chapter 3, “Alternatives.” Some local access haul routes would extend into the City of West Sacramento. Materials for project construction may come from within 50 miles of the project site. The origin locations of these haul trips is not known at this time; however, it is expected that vehicles would travel on highways (primarily I-5 and I-80) to access the project site.

Land uses at and adjacent to the project site are agricultural with scattered rural residences. Land uses as defined by Federal, State, and local regulations as noise-sensitive vary slightly but typically include schools, hospitals, rest homes, places of worship, long-term care facilities, mental care facilities, residences, convalescent (nursing) homes, hotels, certain parks, and other similar land uses. The closest noise-sensitive land uses are rural residential properties generally within approximately 1,300 feet of potential construction areas, with two residences close to the construction area (within approximately

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1 L_{dn} and CNEL values rarely differ by more than 1 dB. L_{dn} and CNEL values are considered equivalent as a matter of practice, and this assessment treats them as such.

2 Any highly reflective surface in which the phase of the sound energy is essentially preserved upon reflection; examples include water, asphalt, and concrete (Federal Highway Administration 2011).

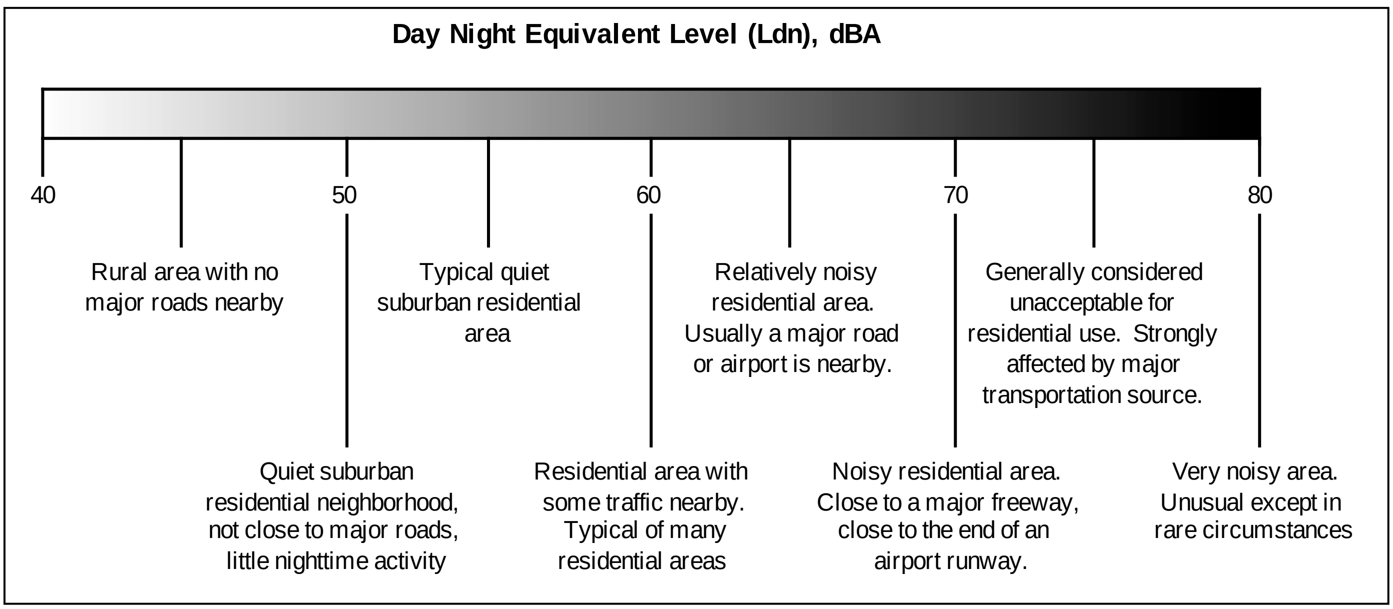
3 Any highly absorptive surface in which the phase of the sound energy is changed upon reflection (FHWA 2011).

100 to 200 feet). Residential uses along local haul routes are also noise-sensitive uses potentially affected by the project.

The primary existing noise sources at the project site and vicinity are on-road mobile sources (automobile and truck traffic), aircraft over flights, and agricultural activities. There are two train routes to the south of the project site (Union Pacific Railroad [UPRR] from West Sacramento to Davis), and the Sacramento River Train which runs north from West Sacramento generally along the Sacramento River and close to the project site. Although they may be audible, the existing train lines are not expected to contribute substantially to existing sound levels due to distance for the UPRR line and low frequency of use for the Sacramento River Train. Agricultural activities can generate sound levels similar to construction equipment but are typically dispersed and intermittent in nature. Typical noise levels from tractors as measured at a distance of 50 feet range from about 78 dBA to 106 dBA L_{max}, with an average of about 84 dBA L_{max} (Yolo County 2009).

Figure 4.17-2 shows L_{dn} sound levels typical of different types of communities. While the community surrounding the project site is rural in nature, Sacramento International Airport aircraft operations likely affect sound levels sufficiently to have levels more typical of a quiet suburban neighborhood. Portions of the project site close to I-5 and Old River Road are also likely to have higher existing sound levels.

Figure 4.17-2. Typical Community Noise Levels in Terms of Day-Night Average Level (L_{dn})



Source: Federal Transit Authority 1995

Roadway Traffic Noise

The primary roads that would be used by project-related traffic to enter the regional roadway network (i.e. haul truck routes) are shown in Figure 3-9 in Chapter 3, "Alternatives," and include:

- I-80
- I-5
- Old River Road
- North Harbor Boulevard
- Reed Avenue

- Tule Jake Road
- County Road 118
- County Road 124
- County Road 126

Average Daily Traffic (ADT) volumes for a portion of these roads are shown in Table 4.17-1. Roads for which data are not shown are less traveled and do not currently have estimated noise contours. For less traveled roads, the existing 60 dB L_{dn} noise contour can be expected to be within 50 feet of the road centerline.

Table 4.17-1. Traffic Noise Contours under Existing Conditions at the Project Site

Roadway	Roadway Segment	ADT	Distance to L_{dn} Contours, feet		
			70 dB	65 dB	60 dB
I-80	U.S. 50 to County Road 32A	55,400	189	402	864
I-5	Sacramento County Line to County Road 102	21,100	101	212	455
Old River Road	County Road 127 to County Road 118	3,900	<50	<50	80
North Harbor Boulevard	Reed Ave to Riverbank Road/Riverbank to County Line	3,800/ 3,500	<50	<50	55
Reed Avenue	I-80 Ramps to Sunset Avenue	6,400	<50	<50	<50

Notes: dB = A-weighted decibels; L_{dn} = day-night average sound level; ADT = Average Daily Traffic
Sources: Yolo County 2009; West Sacramento 2016

Airports

Sacramento International Airport is a large, commercial airport located approximately 2 miles northeast of the project site in Sacramento County. The airport serves hundreds of daily aircraft departures. Noise contours for the airport show the 60 dB CNEL noise contour reaching just to the intersection of Power Line Road and the Sacramento River to the east of the project site (Sacramento County Airport System 2004). Noise contours lower than 60 dB CNEL are not modeled for land use planning purposes. However, the 55 and 50 dB CNEL contours are likely to extend well into the project site and are also likely to be one of the dominant existing sound sources.

Existing Vibration Environment

The existing vibration environment on the project site is dominated by local agricultural operations and transportation-related vibration from roads, highways and, to a lesser degree, rail used by UPRR and the Sacramento River Train. The existing vibration environment is expected to be low with infrequent noticeable vibration sources.

4.17.3 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to noise and vibration apply to the alternatives under consideration, as described below.

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency's (EPA's) Office of Noise Abatement and Control was established to coordinate Federal noise control activities. The Office of Noise Abatement and Control subsequently established programs and guidelines in response to the Federal Noise Control Act of 1972 to identify and address the effects of noise on public health and welfare, and the environment. Table 4.17-2 summarizes EPA's recommended guidelines for noise levels considered safe for community exposure (EPA 1974). The yearly average L_{eq} equivalent noise level (see "Affected Environment" subsection above), for a person seeking to avoid hearing loss over his or her lifetime should not exceed 70 dB. To minimize interference and annoyance, noise levels should not exceed 55 dB L_{dn} (day-night average level) at outdoor activity areas and 45 dB L_{dn} within residential structures. The act applies to the impact analysis and project construction.

Table 4.17-2. Summary of U.S. Environmental Protection Agency-recommended Noise Level Standards

Effect	Sound Level	Area
Hearing loss	$L_{eq(24)} \leq 70$ dB	All areas
Interference with and annoyance during outdoor activities	$L_{dn} \leq 55$ dB	Outdoor areas of residences and farms, and other areas where people spend widely varying amounts of time or where quiet is a basis for use
	$L_{eq(24)} \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards and playgrounds
Interference with and annoyance during indoor activities	$L_{dn} \leq 45$ dB	Indoor residential areas
	$L_{eq(24)} \leq 45$ dB	Other indoor areas with human activities, such as schools

Notes: dB = decibels; L_{dn} = day-night average level; $L_{eq(24)}$ = equivalent noise level (the sound energy averaged over a 24-hour period)
Source: U.S. Environmental Protection Agency 1974:3

Groundborne Vibration

The Federal Transit Administration (FTA) (FTA 2006) has developed guidelines for assessing the significance of vibration produced by transportation sources and construction activity. To address human response (annoyance) to groundborne vibration, FTA has established maximum-acceptable vibration thresholds for different land uses. These guidelines recommend 72 VdB for residential uses and buildings where people normally sleep when the source of vibrations is frequent in nature. These levels are calculated based on the measured Root Mean Square velocity amplitude relative to a reference velocity amplitude of 1 micro inch per second (μin/sec) (FTA 2006).

FTA guidelines also provide criteria for groundborne vibration effects with respect to building damage during construction activities (FTA 2006). According to FTA guidelines, a vibration-damage criterion of 0.20 in/sec PPV (Peak Particle Velocity) should be considered for non-engineered timber and masonry buildings such as those expected in the project site, therefore these guidelines apply to the impact analysis and project construction.

State

The following State plans, policies, regulations, or laws related to noise and vibration apply to the alternatives under consideration, as listed below.

- Caltrans guidelines (Caltrans 2013) – Caltrans has developed guidelines for assessing the significance of vibration produced by transportation and construction sources. The Caltrans guidelines are similar to the FTA guidelines for transient sources such as construction activities. – Applies to the impact analysis and project construction.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to noise and vibration are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County 2030 General Plan – Noise Element (Yolo County 2009) – Relevant to the impact analysis. Yolo County does not have specifically applicable noise regulations or ordinances. The noise policies generally apply to land development activities and are not applicable to a construction project that would not substantially alter the land uses in an area. The noise policy that is potentially relevant to the impact analysis and project construction is provided in Appendix C, "Summaries of Applicable Laws, Regulations, Policies, and Plans").

- West Sacramento County Noise Ordinance (West Sacramento 1993) – Relevant to the impact analysis. The project would include truck haul routes and traffic effects on some roadways in the City of West Sacramento. The City of West Sacramento has a zoning ordinance that includes maximum allowable noise level exposure from transportation noise sources. The maximum allowable L_{dn}/CNEL level for outdoor activity areas of residential properties is 60 dB. However, the maximum allowable noise exposures are targeted to requiring reductions and controls for outdoor exposure areas, not for limiting traffic volumes. These zoning standards are not directly applicable to a temporary increase in traffic on surface streets, but can be used in understanding the magnitude of project effects.

4.17.4 Environmental Consequences and Mitigation Measures

Analysis Methodology

Methodology

The data used as the basis for the noise and vibration impact analysis are based on the construction schedule, number of trucks, anticipated hauling routes, and workers anticipated for each construction phase of the project described in Chapter 3, "Alternatives." These data were used as the basis for the noise and vibration impacts analysis. Two scenarios were analyzed – a "long haul" scenario requiring a large volume of the levee fill to come from off-site borrow sources, and a "reuse" scenario where most of the levee fill material can be reused from on-site soils. The long haul scenario requires substantially more truck haul trips to move borrow materials.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. No comments related to noise or vibration were received.

Construction Noise

The project would generate construction noise from equipment operating at each work location, and from the transport of construction workers, construction materials, and equipment to and from each work location. The list of construction equipment that would be used for project construction activities is shown in Table 4.17-3 with typical noise levels generated at 50 feet from the equipment (reference levels).

Table 4.17-3. Construction Equipment and Typical Equipment Noise Levels

Type of Equipment	Noise Levels	
	L_{max} at 50 Feet	L_{eq} at 50 Feet
Equipment/Supply Transport Trucks	84	80
Hydraulic Excavator	85	81
Long-stick Excavator	85	81
Front-end Loader	80	76
Bulldozer	85	81
Highway Dump Truck	84	80
Grader	85	81
Water Truck	84	80
Self-propelled Sheepsfoot or Tamping Roller	85	78
Vibratory Smooth-wheel Compactor	80	73
Forklift	85	78
Deep Mixing Method Rig	84	80
Bulk Material and Hydration Silos	84	80
Truck-mounted Crane	85	77
Concrete Transit Truck	84	80
Lubricating Truck	84	80
Pick-up Truck	55	51
Drill Rig (Truck-mounted)	85	78
Hydro-seed Truck	84	80

Notes:
L_{max} = maximum instantaneous sound level; L_{eq} = 1-hour equivalent sound level (the sound energy averaged over a continuous 1-hour period)
Source: Construction equipment list based on Federal Highway Administration 2006, adapted by GEI Consultants, Inc. in 2016 and 2017

Project construction would occur in 13 phases in the proposed construction areas. Construction is expected to occur primarily during the period of April 15 through October 31 of each year. Operation of heavy-duty construction equipment would be intermittent throughout the day during construction. During some construction phases, construction equipment may operate 7 days a week/24-hours per day to ensure levee construction is completed on schedule.

The expected worst-case noise levels were estimated for each construction phase assuming all equipment expected to operate during that phase of construction operates simultaneously. Construction is expected to occur over a 1- to 2-year period. To provide a conservative estimate of the potential construction effects, an accelerated construction schedule was defined for Alternatives 2 and 3 of 17 months, and for Alternatives 4 and 5 of 9 months. To estimate the combined potential worst-case noise effect, the month with the maximum combined noise for concurrent construction phases was used to estimate effects at project site residences, and along access haul routes.

Noise associated with project construction was calculated using the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) and heavy equipment/equipment usage factors for assumed worst-case construction operations (FHWA and FTA 2006). Combined noise-levels were calculated at 50 feet and 1,000 feet. The closest residences to the project construction area are within approximately 1,300 feet with the exception of two residences located within 100 to 200 feet of the construction areas.

Haul truck traffic noise on local streets was assessed using expected peak-hour truck traffic volumes generated by the action alternatives and allocating half of the peak-hour volume to each potential haul route. This should provide a conservative estimate of potential construction traffic impacts. The traffic noise calculations used the FHWA Traffic Noise Model, Version 2.5. Haul trucks operating on the construction site are assumed to travel at a maximum of 10 mph. Haul trucks operating on local access routes are assumed to travel at a maximum of 25 mph.

Construction Groundborne Vibration

A screening analysis was performed for potential groundborne vibration associated with project-related construction activities. The distance to the approximate 72 VdB ground vibration zone for construction activities within construction area was estimated. If construction activities occur no closer to residences than this estimated distance, then groundborne vibration levels are expected to be below FTA guidelines for human annoyance and structural damage. With the exception of two residences located within 100 to 200 feet of the construction areas, construction activities are not expected to occur in close proximity to building structures.

Project-related construction vibration levels were calculated using FTA’s guidelines for environmental impact assessment to calculate a screening distance for vibration effects. The calculated screening distance is based on FTA’s reference vibration levels for construction equipment (shown in Table 4.17-4). For purposes of this impact analysis, project-related activities were conservatively based on the reference vibration level for a vibratory roller, approximately 94 VdB (0.210 inch per second PPV) at a distance of 25 feet (Caltrans 2013; FTA 2006).

Table 4.17-4. Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 feet (in/sec)	Approximate VdB at 25 feet
Clam Shovel Drop (Slurry Wall)	0.202	94
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drilling	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

Notes: PPV = peak particle velocity; in/sec = inches per second; VdB = vibration decibels
Source: Federal Transit Administration 2006

Unless there are substantial discontinuities in local roads, groundborne vibration generated by traffic traveling on roadways is usually below the threshold of human perception. The project-generated traffic would use established roadways and potential project impacts from groundborne vibration from traffic is not expected cause significant impacts.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to noise and vibration if they would do any of the following:

- expose people to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- expose people to or generate excessive groundborne vibration or groundborne noise levels;
- produce a substantial permanent increase in noise levels relative to the ambient condition in the project vicinity;
- produce a substantial temporary or periodic increase in noise levels relative to the ambient condition in the project vicinity;
- expose people residing or working in the project site to excessive aircraft noise levels from airports (applicable to projects located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public-use airport); or
- expose people residing or working at the project site to excessive aircraft noise levels from airstrips.

Issues Not Discussed Further in this EIS/EIR

Project Operations and Maintenance—Project-related O&M would not substantially change from existing conditions and, therefore, would not cause substantial increases in ambient noise levels. Additionally, project O&M would not generate a new permanent source of noise at the project site. O&M-related inspections would mainly consist of a patrol car traveling along the levee, and for weed abatement would include weed whacker/trimmer; these activities would only occur periodically, as occurs under existing conditions. Therefore, noise and vibration impacts generated by O&M activities are not evaluated further in this EIS/EIR.

Expose People Residing or Working at the Project Site to Excessive Aircraft Noise Levels from Airstrips—This threshold is only applicable to projects located within the vicinity of a private airstrip, which is not applicable to this project. Additionally, the project would not construct new residences near a public-use airport; therefore, this issue is not addressed further in this EIS/EIR.

Impact Analysis

Construction Equipment Noise, Traffic Noise, and Vibration

Construction noise impacts depend on the distance between the construction location and the noise-sensitive land uses, and on the type of equipment used during construction. The distance between the closest noise-sensitive land uses and the construction areas for the project would be approximately 1,300 feet for all but two residences located within approximately 100 to 200 feet of the construction areas. Construction equipment noise, vibration, and construction traffic noise generated by the project at the closest distances protective of sensitive uses are discussed below.

Construction Equipment Noise

Table 4.17-5 tabulates the calculated worst-case noise levels for each phase of construction assuming all construction equipment needed for the phase operates simultaneously. Noise levels shown for 50 feet are for a single construction area. Noise levels shown for 1,000 feet combine the construction area noise with noise from haul trucks operating on the construction site to move materials to different locations, on to, or off-site. The combined equipment noise levels at 1,000 feet are a conservative estimate of the exposure of most residential uses in the construction areas, and are representative of the levels that would be likely at the two closest residences once construction activity in the immediate vicinity is complete. During construction in the immediate vicinity of the two residences within 100 to 200 feet of project construction, the noise levels at 50 feet represent a conservative estimate of noise exposure.

Table 4.17-5. Construction Phases and Combined Noise Levels from Equipment Associated with Project Phases – All Action Alternatives

Project Phase	Combined Noise Level for All Pieces of Equipment Used under Each Project Phase (dBA)		
	L_{max} at 50 Feet	L_{eq} at 50 Feet	L_{eq} at 1,000 Feet
Site Preparation/Stripping	84	88	62
Structure Demolition	84	84	58
Existing Road Removal	90	86	60
Trench Excavation and Force Main Installation	83	83	57
New Road Construction	85	89	63
New Levee/Seepage Berm and Soil Borrow Extraction[a]	85	92	66
Off-site Borrow Material Transport[a]	76	86	63
Cutoff Wall Installation	84	86	60
Erosion Protection Installation	82	85	59
Existing Pump Station Removal	82	82	56
Existing Levee Degrade	84	89	63
Ecosystem Project Elements	84	86	60
Site Restoration and Demobilization	85	84	58

Notes: L_{max} = maximum instantaneous sound level; dBA = A-weighted decibels; L_{eq} = equivalent sound level

[a] Sound levels calculated at 50 feet include construction equipment that would work in a localized location. Sound levels at 1,000 feet include both localized equipment and the sound contribution from extensive material hauling for these project phases.

Source: Data provided by California Department of Water Resources in 2016

Several of the construction phases may occur simultaneously. A conservative estimate of the overall worst-case combined noise levels from all of the construction phases, and onsite haul truck traffic that may occur simultaneously, was calculated assuming the new levee/seepage berm and soil borrow extraction construction activities occur at the same time as the cutoff wall installation, erosion protection installation, the existing levee degrade, and the site restoration phases. The overall worst-case combined noise levels are estimated to be close to 70 dBA $L_{eq[h]}$ at 1,000 feet, and up to 86 dBA $L_{eq[h]}$ at the residences within 100 to 200 feet during the nearest peak construction activity. The results represent worst-case, conservative noise exposure because they do not consider noise attenuation associated with shielding from the intervening topography, and assume all noise sources operate simultaneously. Therefore, actual construction noise levels would likely be less.

Construction Traffic Noise

In addition to noise from the construction equipment that would primarily affect residences adjacent to the project construction areas, noise from haul trucks operating on local access roads would potentially increase noise levels along the haul routes. The haul truck trips vary by action alternative and vary substantially depending on how much borrow material must be imported from off-site versus reusing on-site materials. Table 4.17-6 shows the potential haul truck traffic on any individual haul route under the action alternatives, and the calculated noise level at 50 feet from the roadway centerline resulting from the traffic. This is a conservative estimate of potential noise effects that could occur along any local access route to the levee construction areas.

Table 4.17-6. Summary of Maximum Construction Volumes and Traffic Noise Levels Along Access Haul Routes by Action Alternative

Alternative	Hourly Truck Volumes/Calculated Noise Level at 50 Feet (dBA, L_{eq})	
	Long Haul Scenario	Reuse Scenario
2 and 3	304/69	150/66
4 and 5	353/70	113/65

Notes: dBA = A-weighted decibels; $L_{eq[h]}$ = 1-hour equivalent sound level (the sound energy averaged over a continuous 1-hour period)
Source: Data provided by California Department of Water Resources in 2016

Impact Analysis

Table 4.17-7 provides a summary of noise and vibration impacts and mitigation measures for all alternatives under consideration.

Table 4.17-7. Summary of Impacts and Mitigation Measures—Noise and Vibration

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
NOI-1: Potential Exposure of Persons to or Generation of Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance, or in Other Applicable Local, State, or Federal Standards	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	NOI-1: Implement Feasible Measures to Reduce Construction Noise Effects	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
NOI-2: Potential Exposure of Persons to or Generation of Excessive Groundborne Vibration or Groundborne Noise Levels	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	NOI-2: Perform a Vibration Evaluation if Construction Occurs within 200 feet of a Residential Structure, and Implement Feasible Measures	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
NOI-3: Potential for Substantial Temporary or Periodic Increase in Ambient Noise Levels in the Project Vicinity Above Levels Existing without the Project	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	NOI-1: Implement Feasible Measures to Reduce Construction Noise Effects	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
NOI-4: Possible Exposure of Construction Workers to Aircraft Noise during Construction Activities	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

IMPACT NOI-1: Potential Exposure of Persons to or Generation of Noise Levels in Excess of Standards Established in the Local General Plan or Noise Ordinance, or in Other Applicable Local, State, or Federal Standards.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for the Cities of Woodland, West Sacramento, and Sacramento. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to potential exposure of persons to or the generation of noise levels in excess of applicable County, City, or other applicable standards during construction.

Alternatives 2 through 5: All Action Alternatives

Construction Equipment Noise

The maximum construction-related noise level at the closest residential uses in the project construction areas from construction activities under all action alternatives would be below 70 dBA $L_{eq[h]}$. This includes haul truck traffic associated with the construction areas, with the exception of the two residences that are within 100–200 feet of the construction areas which may experience noise levels up to 86 dBA $L_{eq[h]}$ during peak nearby construction periods. With an assumed existing nighttime $L_{eq[h]}$ of 40 dBA and an evening $L_{eq[h]}$ of 50 dBA, this would result in an expected L_{dn} for construction effects of approximately 65 dBA for most residences, and potentially higher for the two nearest residences. These sound levels would be approximately 10 dBA higher than EPA's guideline of 55 dBA L_{dn} for compatible land use with outdoor areas of residences. Therefore, temporary and short-term noise impacts from project construction are expected to be a **significant** impact under all action alternatives. Mitigation Measure NOI-1, described below, has been identified to address this impact.

Construction Traffic Noise

Construction traffic noise levels from the activities associated with project construction activities under all action alternatives are shown in Table 4.17-5. The haul route noise levels shown in Table 4.17-6 are hourly L_{eq} levels. The West Sacramento Noise Ordinance maximum allowable level of 60 dBA is an L_{dn} value. The L_{dn} resulting from haul route traffic would depend on the hours of operation for haul trucks and whether trucks would operate during nighttime hours of 10 p.m. to 7 a.m. For all operations during daytime hours, the L_{dn} could be expected to be approximately 65 dBA. In addition, with the long haul scenario haul truck volumes, the distance to the 60 dB L_{dn} contour would extend to 200 to 400 feet from the roadway centerline. When compared to existing distances to the 60 dBA contours in Table 4.17-1, this would substantially increase the areas adjacent to haul routes that would experience these higher sound levels. This effect would occur along all haul routes with the possible exception of I-5 and I-80, under all action alternatives. Therefore, temporary and short-term noise impacts from construction haul route traffic would be a **significant** impact under all action alternatives. Mitigation Measure NOI-1, described below, has been identified to address this impact.

Mitigation Measure NOI-1: Implement Feasible Measures to Reduce Construction Noise Effects.

DWR will require that its primary contractor(s) for engineering design and construction implement the following measures to avoid and minimize construction noise effects on sensitive receptors. The measures listed below will be consistent with DWR's standard contract specifications for noise control.

To the extent feasible and practicable, the primary construction contractor(s) will employ noise-reducing construction practices such that noise effects are limited to the maximum degree practical during construction. Measures that will be used to limit noise will include, but not be limited to, the measures listed below.

- No construction will be performed within 1,000 feet of an occupied dwelling unit on Sundays, legal holidays, or between the hours of 10 p.m. and 6 a.m. on other days without the approval of the DWR construction project manager.
- All equipment used will have sound-control devices no less effective than those provided on the original equipment. No equipment will have unmuffled exhaust.
- All equipment will comply with pertinent equipment noise standards of EPA and the State of California.
- Construction and haul routes will be planned to minimize traffic during nighttime hours and to route haul traffic away from residential receptors.
- A disturbance coordinator will be designated. The disturbance coordinator's phone number will be conspicuously posted around the project site, in adjacent public spaces, and in construction notifications. The disturbance coordinator will be responsible for responding to any complaints about construction activities. The disturbance coordinator will receive all public complaints about construction disturbances and be responsible for determining the cause of the complaint and implement any feasible measures to be taken to alleviate the problem. The disturbance coordinator will have the authority to halt noise-generating activity if necessary to protect public health.

Timing: Before and during construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementing Mitigation Measure NOI-1 would reduce noise impacts under all action alternatives, but not to a less-than-significant level, because the timing and site-specific conditions for the different project components at the time of their implementation are currently unknown. Therefore, the feasibility of implementing these measures and the quantitative effect of their implementation cannot be determined. In addition, the construction schedule of most of the project components would be governed by weather conditions and the terms of permits for work in sensitive habitats or the habitats of protected species. For these reasons, it is not known whether construction-related noise impacts can be reduced to a less-than-significant level, and therefore this impact would be **significant and unavoidable**.

Impact NOI-2: ***Potential Exposure of Persons to or Generation of Excessive Groundborne Vibration or Groundborne Noise Levels.***

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for the Cities of Woodland, West Sacramento, and Sacramento. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to potential exposure of persons to or the generation of excessive groundborne vibration or groundborne noise levels during construction.

Alternatives 2 through 5: All Action Alternatives

Groundborne vibration can sometimes be of concern for construction projects. The construction activities, under all action alternatives, are not planned near structures. Although damage to buildings occurs at much higher vibration levels than human annoyance, there are no construction activities planned near structures. Based on construction assumptions of no pile driving, and the use of vibratory compaction equipment, vibration effects would be well below thresholds for human annoyance unless construction operations occur within 150 to 200 feet of a residence or structure. If construction occurs within 200 feet of a structure, a detailed vibration assessment should be performed, and mitigation developed to maintain vibration levels below FTA and Caltrans guidance for structure damage In addition, vibration levels over annoyance thresholds should be limited to daytime hours. Vibration effects above annoyance thresholds may occur at the two nearest residential structures for limited time periods. The balance of residential structures are over 1,000 feet from the expected construction areas and vibration impacts are not expected. Therefore, this would be a **potentially significant** impact at limited locations under all action alternatives. Mitigation Measure NOI-2, described below, has been identified to address this impact.

Mitigation Measure NOI-2: Perform a Vibration Evaluation if Construction Occurs within 200 feet of a Residential Structure, and Implement Feasible Measures.

DWR will perform a vibration evaluation for any construction that occurs within 200 feet of an existing residential structure. All feasible measures identified in the evaluation to reduce groundborne vibration or groundborne noise levels to levels below appropriate FTA and Caltrans guidance levels for appropriate type of residential structure will be implemented.

Timing: Before and during construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementing Mitigation Measure NOI-2 would reduce potentially significant groundborne vibration and groundborne noise effects under all action alternatives, if construction were to occur within 200 feet of any residence, to a **less-than-significant** level.

Impact NOI-3: Potential for Substantial Temporary or Periodic Increase in Ambient Noise Levels in the Project Vicinity above Levels Existing without the Project.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for the Cities of Woodland, West Sacramento, and Sacramento. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to the potential for substantial temporary or period increases in ambient noise in the project vicinity, above existing levels during construction.

Alternatives 2 through 5: All Action Alternatives

Construction Equipment Noise

As shown in Table 4.17-6, construction noise levels for each construction phase are calculated to range from 56 to 66 dBA $L_{eq[h]}$. When the noise levels from construction phases that may occur concurrently are combined, the maximum construction-related noise level at the majority of residential uses to the construction site would be below 70 dBA $L_{eq[h]}$, including haul truck traffic associated with the construction areas, under all action alternatives. With an assumed existing nighttime $L_{eq[h]}$ of 40 dBA and an evening $L_{eq[h]}$ of 50 dBA, this would result in an expected L_{dn} for construction effects of approximately 65 dBA. In addition, at the two closest residences within 100 to 200 feet of the construction areas, noise levels may be as high as 86 dBA $L_{eq[h]}$ during periods when construction is adjacent to the residences. This represents a potential increase of approximately 10 to 20 dBA L_{dn} over likely existing sound levels under all action alternatives for most residences in the construction area, and potentially higher noise levels at two residences. This amount of sound level increase at the project site would be perceived by most people as a doubling to quadrupling of noise. These sound level increases would be expected to be highly annoying to local residents. Therefore, construction noise from levee construction would be a **potentially significant** impact. Mitigation Measure NOI-1, described below, has been identified to address this impact.

Construction Traffic Noise

Construction traffic noise levels from the activities associated with proposed components are shown in Table 4.17-7. The haul route noise levels shown in Table 4.17-7 are hourly L_{eq} levels. The West Sacramento Noise Ordinance maximum allowable level of 60 dBA is an L_{dn} value. The L_{dn} that would result from haul route traffic would depend on the hours of operation for the haul truck and whether trucks would operate during nighttime hours of 10 p.m. to 7 a.m. For all operations during daytime hours, the L_{dn} could be expected to be approximately 65 dBA. In addition, with the long haul scenario haul truck volumes, the distance to the 60 dB L_{dn} contour would extend to 200 to 400 feet from the roadway centerline. When compared to existing distances to the 60 dBA contours in Table 4.17-1, this would substantially increase the areas adjacent to haul routes that would experience these higher sound levels. This impact would occur along all haul routes with the possible exception of I-5 and I-80. Therefore, construction haul route traffic noise impacts under all action alternatives would be a **potentially significant** impact. Mitigation Measure NOI-1, described below, has been identified to address this impact.

> **Mitigation Measure NOI-1: Feasible Measures to Reduce Construction Noise Effects.**
>
> Please refer to the first appearance earlier in this section for the full text of this mitigation measure.
>
> **Significance after Mitigation:** Implementing Mitigation Measure NOI-1 would reduce noise impacts under all action alternatives, but not to a less-than-significant level because the timing and site-specific conditions for the different project components at the time of their implementation are currently unknown. Therefore, the feasibility of implementing these measures and the quantitative effect of their implementation cannot be determined. In addition, the schedule of most of the project components would be governed by weather conditions and the terms of permits for work in sensitive habitats or the habitats of protected species. For these reasons, it is not known whether construction-related noise impacts can be reduced to a less-than-significant level; therefore, this impact would be potentially **significant and unavoidable**.

Impact NOI-4: Possible Exposure of Construction Workers to Aircraft Noise during Construction Activities.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for the Cities of Woodland, West Sacramento, and Sacramento. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, “No Action/No Project Alternative,” under “Consequences of No Action.”

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to potential exposure of construction workers to aircraft noise during construction.

Alternatives 2 through 5: All Action Alternatives

No new noise-sensitive receivers would be added to the project site under any of the action alternatives. Sacramento International Airport is located approximately 2 miles northeast of the project site. Noise contours for the airport show the 60 dB CNEL noise contour reaching just to the intersection of Power Line Road and the Sacramento River to the east of the project site (Sacramento County Airport System 2004). Construction workers at the project site would not be exposed to unacceptable levels of aircraft noise during construction. Therefore, possible aircraft noise exposure under all action alternatives would be a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Residual Significant Impacts

Impacts associated with the potential exposure of persons to or the generation of noise levels in excess of adopted noise standards (Impact NOI-1), and the potential exposure of persons to substantial temporary or periodic increases in ambient noise levels above existing conditions (Impact NOI-3), would be potentially significant. Even with implementation of Mitigation Measure NOI-1, this impact cannot be reduced to a less-than-significant level because the timing and site-specific conditions for the different project components at the time of their implementation are currently unknown. Therefore, the feasibility of implementing these measures and the quantitative effect of their implementation cannot be determined; therefore, the residual impacts would be potentially significant and unavoidable.

Impacts related to the potential exposure of persons to or generation of excessive groundborne vibration or noise levels (Impact NOI-2) would be potentially significant at two residences. Mitigation Measure NOI-2 has been recommended to reduce this impact by performing a vibration evaluation and implementing any feasible measures if construction occurs within 200 feet of an existing residence. Therefore, no residual significant impacts would occur for this impact.

Impacts related to the possible exposure of construction works to aircraft noise during construction (NOI-4) would be less than significant, because airport contours would not reach the project site; therefore, this impact would be less than significant. No residual significant impacts would occur for this impact.

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4.18 Recreation

4.18.1 Environmental Setting

Elkhorn Regional Park

Elkhorn Regional Park, which is administered by Yolo County, is located at 18989 Old River Road, approximately 1.75 miles south of the I-5 overcrossing. This facility on the west side of the Sacramento River contains an estimated 55 acres of riparian vegetation. Recreational opportunities include fishing, picnicking, birding, nature study, wildlife viewing, and boating. The park has a paved boat launch ramp and parking lot; a landscaped, shaded picnic area; and restrooms. (Yolo County Parks Department 2016.)

Sacramento River

Recreation opportunities along the Sacramento River include boating, waterskiing, fishing, hunting, RV/tent/group camping, birding, wildlife viewing, picnicking, and hiking. Most of the land along both sides of the river between the I-5 overcrossing and the Sacramento Bypass is privately owned. However, there are two public parks that provide river access and recreation opportunities along the stretch of the river adjacent to the Lower Elkhorn Basin.

- The Elkhorn Boat Launch Facility, operated by the Sacramento County Parks Department, is located at 5827 Garden Highway at the I-5 overcrossing. This facility on the east side of the Sacramento River includes a landscaped, shaded picnic area; paved parking lot and boat launch ramp; and restrooms.

- Elkhorn Regional Park (described above).

The California Department of Boating and Waterways (CDBW) (CDBW 2002) *California Boating Facilities Needs Assessment*, which included a survey of over 4,000 boaters, indicated that in the year 2000 there were 160,490 registered recreational boats in the Sacramento Basin, approximately 12,000 of which were personal watercraft (such as jet skis). There were also an estimated 97,000 additional unregistered, undocumented boats in the State in 2000, mostly hand-powered craft for which no registration or documentation was required and for which no official data exist. Surveys indicated that most of the boat usage in the Sacramento Basin occurred during June, July, and August. The most commonly cited reasons for use of particular boat launch access facilities were first, close proximity to home, and second, good fishing opportunities. The Sacramento River ranked fourth in terms of the most frequently used waterway among boaters with vessels under 26 feet, and it ranked second in terms of the most frequently used waterway for fishing. Boat and bank fishing opportunities in the project vicinity include striped bass, sturgeon, salmon, catfish, and black bass.

Old River Road

Old River Road (County Road 22) is a Yolo County locally designated scenic roadway (Yolo County 2009). Old River Road runs along the west bank of the Sacramento River for approximately 10 miles, between the I-5 overcrossing and the West Sacramento City limits at the southern end of the Sacramento Bypass. This two-lane rural roadway provides motorists and bicyclists with scenic views of the Sacramento River to the east, and open agricultural land to the west. The road is lined with mature shade trees for most of its length. Old River Road has a wide, paved shoulder on both sides of the road, separated from the main roadway by white striping. Old River Road is frequently used by recreational cyclists.

Sacramento River Train

A portion of the Sierra Northern Railway railroad tracks are located on top of the Sacramento Weir, on the west side of Old River Road. The Sierra Northern Railway operates the Sacramento River Train, which offers dinner excursion trips along the 16-mile-long "Woodland Branch Line" between Woodland and West Sacramento. The excursion ride begins at North Harbor Boulevard in West Sacramento, immediately north of the I-80 Bridge overcrossing (across the river from Sand Cove Park), and travels north at slow speeds along the Sacramento River, through the Sacramento Bypass and across the Sacramento Weir, then through the Lower Elkhorn Basin north to the Fremont Bridge (north of I-5), where it turns west towards Woodland. (Sierra Northern Railway 2016.)

Tule Canal

The Tule Canal runs along the east side of the Yolo Bypass and forms the western boundary of the project site. It discharges into the Toe Drain (below the City of Sacramento), and thence to Prospect Slough and Cache Slough, and ultimately to Delta channels. The Tule Canal provides fishing opportunities for white sturgeon, white catfish, black bass, and black crappie (CDFW 2016a). The canal, which is approximately 170 feet wide, is lined with riparian vegetation on both sides, and is accessible to fisherman from the adjacent dirt road on top of the levee crown and from County Road 124. The east side of the Tule Canal is bounded by the Yolo Bypass East Levee. Although the levee crown does not contain an officially designated trail, it is used as a pedestrian and bicycle path.

Sacramento Bypass Wildlife Area

The approximately 360-acre Sacramento Bypass Wildlife Area, which is immediately adjacent to and south of the project site, is an important cover and feeding area for wildlife during late fall, winter, and early spring. Vegetation varies throughout the area from mature cottonwood trees, willows, and valley oaks in some locations to a sparsely-covered sandy soil area on the eastern end. Game birds, raptors, songbirds, and native mammals are present. Recreational activities include fishing; wildlife viewing; birding; and hunting for waterfowl (when the area is flooded), ring-necked pheasant, mourning dove, California quail, wild turkey, cottontail rabbit, tree squirrel, and jackrabbit. Hunting activities are permitted from September 1 through January 31. The wildlife area is administered by the California Department of Fish and Wildlife (CDFW).

Access to the Sacramento Bypass Wildlife Area is provided informally along County Roads 126 and 127 (see Figure 3-9 in Chapter 3, "Alternatives"). County Road 126 travels along the top of Sacramento Bypass North Levee; it is paved for 1 mile before encountering a gate, which restricts further vehicle access along the levee to the west, although pedestrian and bicycle travel are allowed beyond the gate. County Road 127 (also known as Tule Jake Road) travels along the top of the South Sacramento Bypass Levee; there is a gate at the intersection of County Road 127 and Old River Road that prevents vehicular travel, but pedestrian and bicycle travel are allowed. There is no officially designed parking area for recreationists using the wildlife area; rather, parking occurs informally in the vicinity, generally along the gravel shoulders of County Road 126. Access is limited to foot traffic within the wildlife area. (CDFW 2016a.)

The north and south sides of the Sacramento Bypass Wildlife Area are bounded by levees. Although the levee crowns do not contain any officially designated trails, they are used as pedestrian and bicycle paths.

Yolo Bypass Wildlife Area

The south Sacramento Bypass Training Levee is approximately 1 mile northeast of the northeastern corner of the Causeway Unit of the Yolo Bypass Wildlife Area. The Yolo Bypass Wildlife Area encompasses more than 17,000 acres within the Yolo Bypass; this area provides hunting, hiking, wildlife viewing, and other recreational and educational opportunities. Because of its location within the Pacific Flyway, the Yolo Bypass Wildlife Area offers unique opportunities for birding. The land within the wildlife area consists of flat agricultural fields, many of which are flooded with water for rice cultivation, interspersed with tall trees and stands of riparian vegetation. The wildlife area is managed primarily for flood control and wildlife habitat, in addition to recreational and educational uses. The wildlife area is accessed from County Road 32A via I-80 at the western approach to the Yolo Causeway, and several small local roads provide additional access. Hunting is permitted between September 1 and January 31. Game species include waterfowl (when the area is flooded), ring-necked pheasant, and mourning dove. (CDFW 2016b.)

4.18.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to recreation apply to the alternatives under consideration.

State

No State plans, policies, regulations, or laws related to recreation apply to the alternatives under consideration.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to recreation are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding recreation are relevant to project design, construction, and/or the impact analysis of the project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

- Yolo County Parks & Open Space Master Plan (Yolo County 2006) – Relevant to the impact analysis.

4.18.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

Potential recreation impacts were evaluated by identifying existing parks and recreation facilities and determining the duration and extent to which these facilities would be affected by implementation of the alternatives under consideration.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. One comment requested the addition of new recreational facilities as part of the project, specifically a new formally designated trail on top of the Sacramento River bank levee that would promote fishing access to the mainstem Sacramento River and provide for new pedestrian and bicycle recreation activities. USACE and DWR note that the primary purpose of the project is to reduce flood risk, and the project does not entail work related to the Sacramento River bank levees. Existing recreational activities, including Elkhorn Regional Park, the Sacramento Bypass Wildlife Area, and fishing and boating along the Sacramento River, are already available.

Several comments also requested inclusion of a public access easement on the waterside toe road of the proposed Sacramento Bypass North Levee setback for continued recreational access to the Sacramento Bypass Wildlife Area, and consideration of project impacts on the Yolo Bypass Wildlife Area. Other comments requested consideration of project impacts on Elkhorn Regional Park. These comments are addressed in the impact analyses below.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to recreation if they would do any of the following:

- increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated, or
- include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

The following additional criteria were used to evaluate the significance of construction- and operation-related effects. Impacts on recreation were considered significant if the alternatives under consideration would:

- substantially restrict or reduce the availability, access, or quality of existing recreational opportunities in the project site or vicinity; or
- implement activities that would cause a substantial long-term disruption of any institutionally recognized recreational activities.

Issues Not Discussed Further in this EIS/EIR

Increase the Use of Existing Neighborhood and Regional Parks or Other Recreational Facilities Such that Substantial Physical Deterioration of the Facility Would Occur or be Accelerated—The project does not involve the construction of any new housing that would generate new residents who would increase the use of existing recreational facilities. Furthermore, although some recreationists using the Tule Canal and the crowns of the Yolo Bypass East Levee in the Lower Elkhorn Basin and the Sacramento Bypass North Levee and Sacramento Bypass Training Levee would be displaced on a short-term, temporary basis during project construction, there are numerous other recreational facilities available for public use in the region (such as the Sacramento River and the Yolo Bypass Wildlife Area). Therefore, the project would not affect existing recreational facilities such that substantial physical deterioration of any facilities would occur or be accelerated. Thus, this impact is not evaluated further in this EIS/EIR.

Include Recreational Facilities or Require the Construction or Expansion of Recreational Facilities that Might Have an Adverse Physical Effect on the Environment—The project does not include or require the construction of new recreational facilities. Thus, this impact is not evaluated further in this EIS/EIR.

West Sacramento Regional Trails Initiative

The City of West Sacramento is developing a regional trails initiative which could provide recreational opportunities in the project area. No NOP has been issued for this project, so it is not part of the cumulative context considered in this EIS/EIR. However, the analysis in this EIS/EIR covering footprint impacts could potentially be applicable to the trails initiative. Consistent with the CVFPP and the concept of multi-benefit projects, DWR will coordinate with the City of West Sacramento and FloodProtect to support recreational opportunities. Appendix J provides further information on this initiative.

Impact Analysis

Table 4.18-1 provides a summary of recreation impacts and mitigation measures for all alternatives under consideration.

Table 4.18-1. Summary of Impacts and Mitigation Measures—Recreation

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
REC-1: Temporary and Short-term Changes in Recreational Opportunities during Project Construction Activities	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	REC-1: Prepare and Implement a Bicycle Detour Plan for On-street Bicycle Routes, Provide Construction Period Information on Closures	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
REC-2: Implement Activities that Would Cause a Substantial Long-term Disruption of any Institutionally Recognized Recreational Activities	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	REC-2: Provide Access to Sacramento Bypass Wildlife Area and Install Restrictive Signage	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact Analysis

Impact REC-1: Temporary and Short-term Changes in Recreational Opportunities during Project Construction Activities.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to temporary and short-term changes in recreational opportunities during construction.

Alternatives 2 and 3: DWR's Preferred Alternative (7-Mile Setback Partial Degrade), 7-Mile Expanded Setback Full Degrade

At the closest point, project-related work under Alternatives 2 and 3 would occur approximately 500 feet west of the Sacramento River (in the southeastern corner of the project site). Most project-related work would take place approximately 0.5–2.3 miles west of the river. Project-related work associated with installation of erosion protection along the south Sacramento Bypass Training Levee and horizontal directional drilling (HDD) associated with rerouting of the Sacramento International Airport jet fuel pipeline would occur approximately 1 mile from the northeastern corner of the Causeway Unit of the Yolo Bypass Wildlife Area, and therefore would not affect access to or use of the Yolo Bypass Wildlife Area. Finally, project-related work would not require closure of the Sierra Northern Railway, which hosts the Sacramento River Train dinner excursion trips from Sacramento to Woodland. Therefore, project-related construction activity under Alternatives 2 and 3 would have **no impact** on Sacramento River-oriented recreational opportunities, recreationists at the Yolo Bypass Wildlife Area, or recreationists on the Sacramento River Train.

Mitigation Measure: No compensatory mitigation measures are required.

Borrow materials may be obtained from the Reclamation District (RD) 785 Cross Levee on the south side of the north cross canal. The eastern end of the canal is approximately 150 feet west of Elkhorn Regional Park. However, all activities associated with obtaining borrow materials would be conducted from within the project site, west of Elkhorn Regional Park. Haul trucks transporting the borrow material obtained from this location would travel west along the drainage canal to other portions of the project site, farther west of Elkhorn Regional Park. The canal is separated from the park by tall mature shade trees and riparian vegetation at the east end of the canal, by the elevated berm containing the Sierra Northern Railway railroad tracks (east of the canal) which also has tall mature shade trees on both sides of the tracks, and by Old River Road (east of the railroad tracks) which also has tall mature shade trees on both sides of the road. Finally, the western edge of the park itself is heavily vegetated. However, recreationists using Elkhorn Regional Park may experience a temporary and short-term reduction in the quality of recreational opportunities as a result of noise and dust from borrow activities along the north cross-canal. These effects would be temporary and short-term in nature, lasting up to approximately 7 months during the course of two summer construction seasons. Recreational access to Elkhorn Regional Park would not be affected.

There are no officially designated pedestrian or bicycle trails within the project site. Degrading the existing Sacramento Bypass North Levee, HDD to relocate the Sacramento International Airport jet fuel pipeline, and installation of erosion protection along the south Sacramento Bypass Training Levee would take place immediately adjacent to the Sacramento Bypass Wildlife Area. The approximately 360-acre Sacramento Bypass Wildlife Area is open for hunting of game birds each year from September 1 through January 31. Most hunting activities take place on weekends. As noted in Chapter 3, "Alternatives," the project would be built during two consecutive construction seasons, each lasting April 1–October 31. Although project-related construction is generally not anticipated during weekends, it may occur on some Saturdays. Therefore, construction activities associated with degrading the existing Sacramento Bypass North Levee could occur on a maximum of eight Saturdays during the Sacramento Bypass Wildlife Area game bird hunting season, in September and October. Opportunities for hunting game birds during the same season are also provided in the Yolo Bypass Wildlife Area, although the Yolo Bypass Wildlife Area is available only 3 days per week and a fee is assessed. The Green's Lake unit, approximately 2.3 miles southwest of the Sacramento Bypass Wildlife Area and a 10-minute drive, is the closest location within the Yolo Bypass Wildlife Area where game bird hunting is allowed. Additional hunting is permitted in the 4-Riser, Mace, Parker, Putah Creek, Treehouse, Fortis, Twin Lakes, Trestles, Slaviches, and Martins units farther to the south (CDFW 2015). The assigned hunting blind area (located in the 4-Riser Unit) can accommodate up to 64 people, while the free roam area accommodates up to 45 people, for a total of 109 hunters on any given day during the hunting season.

With the exception of the south Sacramento Bypass Training Levee, which would be closed to recreational access using standard construction fencing and signage during construction of erosion protection, the Sacramento Bypass Wildlife Area would not require closure and would still be accessible during project-related construction activities. However, recreationists using the Sacramento Bypass Wildlife Area may experience a temporary and short-term reduction in the quality of recreational opportunities as a result of noise, dust, traffic, and visual disturbance during construction activities. Effects from degrading the Sacramento Bypass North Levee, from installation of erosion protection along the south Sacramento Bypass Training Levee, and from HDD to relocate the Sacramento International Airport pipeline would be temporary and short-term in nature, lasting up to approximately 7 months during the course of two summer construction seasons. Recreationists may elect to use nearby recreational facilities in the vicinity of the project site that provide similar amenities, such as the Yolo Bypass Wildlife Area. Therefore, these project components under Alternatives 2 and 3 would have a temporary, short-term **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Temporary road closures and/or road detours may limit bicycle access to the west side of Old River Road in the vicinity of the Sacramento Weir and the intersection with County Road 126. Temporary closures and/or road detours in other locations on paved roadways used as haul routes for construction equipment and materials may also be required, which could affect bicycle travel on those roadways. These impacts would be **less than significant** under Alternatives 2 and 3 because of the short-term and temporary nature of the closures. However, Mitigation Measure REC-1, described below, has been identified to further reduce this impact.

Mitigation Measure REC-1: Prepare and Implement a Bicycle Detour Plan for On-street Bicycle Routes, Provide Construction Period Information on Closures.

DWR will implement the following measures to reduce temporary, short-term construction effects on bicycle facilities created in the project vicinity.

- Prepare and implement a bicycle detour plan for all affected on-road bicycle routes in consultation with the Yolo County Parks Department at least 10 days before the start of construction activities, as applicable. The detour plan will include posted signs at major entry points for on-road bicycle facilities clearly indicating closure routes, roadway markings to designate temporary bike lanes, information signs to notify motorists to share the road with bicyclists, and a contact number to call for questions or concerns. DWR will maintain and implement the detour plan throughout the construction period and during all construction seasons. Public information through the media and on the DWR's website regarding detours and alternative access routes to bicycle facilities affected by project construction will also be provided. DWR will coordinate with Yolo County to make available information to the public regarding detours at least 10 days before the start of construction activities. DWR will continue to provide public information regarding bicycle detours throughout the construction period.

Timing:	Prepare bicycle detour plan and coordinate with primary construction contractor(s) before the start of construction activities; implement the bicycle plan and provide construction-period information on bicycle and recreation facility closures prior to and during construction; coordinate with the Yolo County Parks Department after construction to restore access.
Responsibility:	California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure REC-1 would reduce temporary, short-term effects on bicycle facilities resulting from construction activities under Alternatives 2 and 3 to a **less-than-significant** level by preparing and implementing bicycle detour routes, and providing public information regarding detours and alternative access routes.

Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade, 5-Mile Setback Full Degrade

Alternatives 4 and 5 would entail the same types of construction activities as Alternative 2, but the Yolo Bypass East Levee setback would be shorter and would be located farther east. Furthermore, under Alternatives 4 and 5, the RD 785 Cross Levee would not be used as a source of borrow material, and therefore the temporary, short-term effects from noise and dust at Elkhorn Regional Park would be avoided. For the same reasons discussed above under Alternative 2, project-related construction activity under Alternatives 4 and 5 would have **no impact** on Sacramento River-oriented recreational opportunities, or recreationists at the Yolo Bypass Wildlife Area, Elkhorn Regional Park, or the Sacramento River Train.

Mitigation Measure: No compensatory mitigation measures are required.

Degrading the existing Sacramento Bypass North Levee, and installing erosion protection and HDD to relocate the Sacramento International Airport jet fuel pipeline along the south Sacramento Bypass Training Levee, would take place immediately adjacent to the Sacramento Bypass Wildlife Area under

Alternatives 4 and 5. For the same reasons discussed above under Alternative 2, these project components would have a short-term, temporary construction-related **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures were identified to further reduce this impact.

Because the Yolo Bypass East Levee setback would be shorter as compared to Alternative 2, construction would occur over a smaller area. However, temporary road closures and/or road detours may still affect bicycle access to Old River Road in the vicinity of the Sacramento Weir and the intersection with County Road 126. Temporary closures and/or road detours in other locations on paved roadways used as haul routes for construction equipment and materials may also be required, which could affect bicycle travel on those roadways. Therefore, for the same reasons discussed above under Alternative 2, these project components under Alternatives 4 and 5 would have a **less-than-significant** temporary, short-term construction-related impact. Mitigation Measure REC-1, described below, has been identified to further reduce this impact.

Mitigation Measure REC-1: Prepare and Implement a Bicycle Detour Plan for On-street Bicycle Routes, Provide Construction Period Information on Closures.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measure REC-1 would reduce temporary, short-term effects on bicycle facilities resulting from construction activities under Alternatives 4 and 5 to a **less-than-significant** level by preparing and implementing bicycle detour routes, providing public information regarding detours and alternative access routes.

Impact REC-2: ***Implement Activities that Would Cause a Substantial Long-term Disruption of any Institutionally Recognized Recreational Activities.***

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, “No Action/No Project Alternative,” under “Consequences of No Action.”

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to substantial, long-term disruption of any institutionally recognized recreational activities.

Alternatives 2 through 5: All Action Alternatives

Under all action alternatives, the Tule Canal, as well as the crowns of the new Yolo Bypass East Levee and Sacramento Bypass North Levee setbacks, would continue to be available to recreationists at the completion of project-related activities, and long-term use of the Class II bicycle lanes on Old River Road would continue post-construction. Furthermore, creation of the drainage canal on the east side of the Yolo Bypass East Levee setback, relocation of the Sacramento International Airport pipeline (underground), and installation of erosion protection along the south Sacramento Bypass Training Levee would not cause a long-term disruption in recreational access or use. Therefore, these project components, under all action alternatives, would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

County Road 126 (which is currently on top of the existing Sacramento Bypass North Levee) is used for recreational access to the Sacramento Bypass Wildlife Area because there is parking available on the road shoulders and because the road currently extends approximately 1.1 miles to the west allowing easier recreational access to the more heavily wooded and vegetated sections of the wildlife area (which are the preferred areas of use). When the existing Sacramento Bypass North Levee is degraded and County Road 126 is realigned approximately 0.37 mile to the north (on the north side of the Sacramento Bypass North Levee setback), parking for recreationists using the Sacramento Bypass Wildlife Area would no longer be available adjacent the Wildlife Area.

In addition, at the present time, the existing Sacramento Bypass North Levee serves as a barrier that clearly delineates the wildlife area boundaries where access and use by recreationists are permitted, from the private agricultural land to the north. Once the Sacramento Bypass North Levee has been degraded, there would be open space (i.e., a combination of riparian plantings and agricultural land uses such as rice production or row crops) immediately adjacent to the Sacramento Bypass Wildlife Area. Thus, conflicts between recreationists and adjacent landowners could arise.

Therefore, for the reasons set forth above, these project components under all action alternatives would have a long-term permanent **significant** impact. Mitigation Measure REC-2, described below, has been identified to address this impact.

Mitigation Measure REC-2: Provide Access to Sacramento Bypass Wildlife Area and Install Restrictive Signage.

In consultation with CDFW, DWR will identify an access route or routes from County Road 126 to the Sacramento Bypass Wildlife Area to allow continued recreational access to this facility. DWR will also install signage notifying recreationists in the Sacramento Bypass Wildlife Area that land to the north is in private ownership, and that no trespassing is allowed. Restrictive signage shall also be installed on both sides of relocated County Road 126.

Timing:	During project design and at the completion of project construction activities.
Responsibility:	California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure REC-2 would reduce permanent long-term impacts from disruption of recreational activities under the action alternatives to a **less-than-significant** level because access to the Sacramento Bypass Wildlife Area from County Road 126 would be maintained, and because restrictive signage will be installed providing notice of private land.

Residual Significant Impacts

Impacts from temporary, short-term changes in recreational opportunities during project construction (Impact REC-1), and long-term permanent disruption of institutionally recognized recreational activities during project operation (Impact REC-2), would be significant. However, implementation of Mitigation Measures REC-1 and REC-2 would reduce these impacts to a less-than-significant level. Therefore, no residual significant impacts would occur.

4.19 Socioeconomics (including Population, Housing, and Employment)

4.19.1 Environmental Setting

The term "socioeconomics" describes basic attributes and resources associated with the human environment, with particular emphasis on population, housing, and employment. Substantial changes in these fundamental socioeconomic indicators may in turn influence related variables such as provision of community services and utilities, and cost of available housing. The project site is located in an unincorporated area of Yolo County. The cities closest to the project site—West Sacramento (0.35 mile south) and Woodland (2.5 miles west)—are also in Yolo County. Because of the often wide-ranging, interdependent nature of socioeconomic resources, economic effects of the project would likely be dispersed over a regional area. Therefore, the following discussion includes a description of socioeconomics conditions, including population, housing, and employment for Yolo County as well as the Cities of Woodland and West Sacramento, since these areas would likely contribute goods and services during the construction period.

Population

The Cities of Woodland and West Sacramento, and Yolo County as a whole, have experienced population growth in the past, and this growth is forecasted to continue. California Department of Finance (DOF) population estimates for the 10-year period 2006–2016 and the percent change are shown in Table 4.19-1. Projected future population growth is shown in Table 4.19-2. The unincorporated areas of Yolo County are primarily agricultural, and since the Yolo County General Plan (Yolo County 2009) indicates that agricultural land uses will continue through the foreseeable future, growth is primarily projected to occur in the incorporated cities and specific, defined unincorporated community areas. Thus, the projected rate of population change will be considerably greater in the Cities of Woodland and West Sacramento, as compared to Yolo County as a whole (see Table 4.19-2).

Table 4.19-1. Historic Population Growth in the Project Region, 2006–2016

Demographic Area	2006 Population	2016 Population	Population Change	Percent Change
Yolo County	189,078	214,555	+ 25,477	+ 13.5
City of Woodland	51,919	57,526	+ 5,607	+ 10.8
City of West Sacramento	43,331	53,082	+ 9,751	+ 22.5

Sources: California Department of Finance 2012a, 2016a

Table 4.19-2. Projected Future Population Growth in the Project Region, 2016–2020

Demographic Area	2016 Population	Projected 2020 Population	Projected Population Change	Projected Percent Change
Yolo County	214,555	223,520	+ 8,965	+ 4.1
City of Woodland	57,526	66,000	+ 8,474	+ 14.7
City of West Sacramento	53,082	59,353	+ 6,271	+ 11.8

Sources: California Department of Finance 2016a, City of Woodland 2002, City of West Sacramento 2009

Housing

The number of housing units and the average household size in the Cities of Woodland and West Sacramento, and Yolo County as a whole, have increased over time. The vacancy rate (i.e., the percentage of housing units that are unoccupied) in Yolo County as a whole and the City of Woodland has increased over time, while the vacancy rate in the City of West Sacramento has declined. The majority of housing units continue to be single-family homes, although the percentage of single-family homes has exhibited a downward trend over the last 10 years. DOF housing data for the 10-year period 2006–2016 are shown in Table 4.19-3.

Table 4.19-3. Historic Housing Data in the Project Region, 2006–2016

	Housing Units		Vacancy Rate		Percentage of Single-family Homes		Household Size (persons per unit)	
Demographic Area	2006	2016	2006	2016	2006	2016	2006	2016
Yolo County	70,979	75,869	4.7	5.0	64.6	60.4	2.69	2.81
City of Woodland	18,550	20,277	4.2	6.3	68.4	63.8	2.86	2.98
City of West Sacramento	16,872	19,715	6.5	6.0	68.4	61.9	2.73	2.85

Sources: California Department of Finance 2012b, 2016b

Employment

Employment has a close relationship to housing. The types of local employers and the jobs they offer determine the income potential of those who live and work in the cities and County. In turn, earning capacity determines the type, size, and quality of housing that a household can afford. Employment in the project vicinity, along with most of unincorporated areas of Yolo County, consists of agricultural-related occupations. Nonfarm occupations (e.g., construction, retail trades, finance, medical, government) are generally available within urban centers such as the Cities of Woodland and West Sacramento. The California Employment Development Department (EDD) civilian labor force and industry employment data for the 10-year period 2005–2015 are shown in Table 4.19-4.

Table 4.19-4. Civilian Industry Employment and Labor Force in the Project Region, 2005–2015

	2005 Industry Employment			2015 Industry Employment		
Geographic Area	Farm	Nonfarm	2005 Labor Force	Farm	Nonfarm	2015 Labor Force
Yolo County	3,800	96,500	92,400	5,900	99,600	103,900
City of Woodland	N/A	N/A	29,200	N/A	N/A	29,300[1]
City of West Sacramento	N/A	N/A	24,900	N/A	N/A	25,500[1]

Notes: N/A = not applicable, because farming activities generally do not occur within city limits
[1] 2010 data; historical data for these cities is only available through 2010.
Sources: California Employment Development Department 2015a, 2015b

EDD projects that between 2012 and 2022, the fastest-growing occupations in Yolo County (i.e., greater than 50 percent increase in employment opportunities) will consist primarily of the various construction trades, as well as personal care aides (EDD 2014).

Income

Table 4.19-5 shows the industry earnings as well as personal income for Yolo County, which provides a measure of consumer consumption. (Total personal income consists of total earnings, adjusted for place of residence, plus dividends, interest and rent, and transfer payments received by the residents.)

Table 4.19-5. Total Industry Earning and Personal Income, 2014

	Employee Earnings by Industry			Personal Income			
Geographic Area	Farm	Non-farm	Total Industry Earnings	Farm	Non-farm	Total Personal Income	Per-capita Personal Income
Yolo County	$258,029	$7,799,687	$8,057,716	$251,101	$9,117,947	$9,369,048	$45,132

Source: U.S. Bureau of Economic Analysis 2015

Countywide, the personal income associated with farm employment in 2014 represented approximately 2.7 percent of the total personal income, and employee earnings from farming-related industry represented approximately 3.2 percent of the total employee industry earnings (U.S. Bureau of Economic Analysis 2015).

Table 4.19-6 shows the median household income in Census Tract (CT) 101.02—which is composed of the Upper and Lower Elkhorn Basin (including the project site), along with a portion of the City of West Sacramento—as compared to the nearby Cities of Woodland and West Sacramento, and Yolo County as a whole. CT 101.02 has a considerably lower median household income as compared to the surrounding area (EDD 2015c).

Table 4.19-6. Median Household Income, 2014

	Census Tract 101.02[1]	City of Woodland	City of West Sacramento	Yolo County
Median Household Income	$39,748	$54,532	$53,307	$55,508

Note:
[1] Consists of the Upper and Lower Elkhorn Basin (including the project site) and a portion of the City of West Sacramento.
Source: California Employment Development Department 2015c

Agricultural-related Economics

Crops recently grown on the project site include safflower, corn, Sudan grass, beans, sunflower, grain and hay, winter wheat, alfalfa, melons, squash, cucumbers, onions, garlic, tomatoes, and walnuts. The estimated crop revenue is approximately $8.8 million annually. (DWR 2017.)

Yolo County farmlands support a variety of crops, including grains, fruits, nuts, seeds, field crops, alfalfa, and vegetables. Other agricultural land uses include livestock grazing, agricultural industrial uses, agricultural commercial uses, and farm-based tourism (e.g., hunting, fishing, wildlife study, educational experiences, festivals, tours, wine-tasting rooms, inns, and “pick-your-own” operations). Approximately 40 percent of the County’s land area is designated as Prime Farmland under the Farmland Mapping and Monitoring Program (FMMP), and over 60 percent of the County’s land area is held in Williamson Act contracts (Yolo County 2009). Agricultural products from Yolo County are exported to 93 countries around the world. The top five Yolo County export partners are Japan, Korea, Mexico, China, and Australia (Yolo County 2016).

The County's leading agricultural commodities consist of processing tomatoes, nuts, field crops, seed crops, rangeland (cattle and lamb), wine grapes, and organic production. Yolo County is among the top dozen wine producers in the State. There are three Federally designated wine appellations in Yolo County, located in Clarksburg (64,640 acres south of the City of West Sacramento), Dunnigan Hills (89,000 acres), and Capay Valley (150 square miles). Known as "American Viticulture Areas," these areas denote a winegrowing region with officially recognized boundaries. Yolo County is also one of the top five organic producers in the State. The value of organic crops has tripled in Yolo County since 1998. (Yolo County 2009.) These leading crops are grown throughout the County, in some cases on non-prime farmland. Many of these crops, such as organic crops, seed crops, and wine grapes, are important to the County's economy as a foundation for related value-added processing and support businesses, as well as agricultural tourism. Table 4.19-7 lists the acreage, yield, and dollar value of most of Yolo County's agricultural products in 2015.

Table 4.19-7. Production Value of Selected Yolo County Agricultural Commodities, 2015

Crop	Harvested Acreage	Yield (tons per acre)	Total Yield (tons)	Value Per Ton	Total Value
Tomatoes, Processing	37,178	46.78	1,739,187	$80	$139,135,000
Other Vegetable Crops[1]	7,976	N/A	N/A	N/A	$23,563,000
Sunflower Seeds	25,665	N/A	N/A	N/A	$36,059,000
Safflower	7,360	1.4	10,630	$494	$5,251,000
Almonds (Meats)	21,108	1.0	20,190	$4,423	$89,300,000
Wine Grapes (Red and White)	13,277	6.71 (average)	100,165	$901 (Red) $717 (White)	$70,462,000
Walnuts	14,004	1.5	21,006	$1,751	$36,782,000
Rice	23,000	4.2	96,000	$375	$36,000,000
Wheat	22,100	2.8	60,800	$177	$10,762,000
Olives (Oil)	3,355	4.9	16,331	$576	$9,410,000
Plums (Dried)	1,000	2.7	2,800	$1,640	$4,592,000
Field Corn	3,292	5.0	16,587	$180	$2,986,000
Cattle and Calves	19,300 (head)	N/A	113,870 (live weight per cwt)	$181 (per cwt)	$20,610,000
Hay					
Hay, Alfalfa	33,600	5.8	194,880	$180	$35,078,000
Hay, Grain	18,500	2.7	49,800	$100	$4,980,000
Organic					
Production, Organic	41,831	N/A	N/A	N/A	$37,097,000
Fresh Market, Organic	825	N/A	N/A	N/A	$14,076,000

Notes: N/A = data not available; cwt = hundredweight

[1] Includes asparagus, broccoli, cabbage, cantaloupe, cucumber, garbanzo, garlic, lettuce, melon (including honeydew), onion, peppers, pumpkin, squash, sweet corn, tomato (fresh), watermelon, and other truck crops.

Source: Yolo County 2016

Processing tomatoes continue to be Yolo County's leading commodity, with a gross value in 2015 of $139,135,000. Almonds, wine grapes, organic production, and walnuts are among the top five commodities according to 2015 gross value. Sunflower seed, rice, alfalfa, cattle, and nursery products round out the top ten commodities for 2015. The gross value of Yolo County's total agricultural production for 2015 was $661,752,000. This represents a 17 percent decrease (i.e., $135,211,000) from the County's total 2014 production value of $796,963,000. The majority of this decline was due to continued severe drought conditions coupled with overall lower commodity prices. (Yolo County 2016.)

Despite the closure of sugar beet mills and tomato canneries in recent years, Yolo County remains home to a large share of the region's top food-processing companies. Current agricultural processing facilities include one tomato processor (in Williams); several rice mills (in Woodland); numerous wineries (including in Clarksburg, Winters, Zamora, Brooks, Woodland, and Davis); one dairy (in Cache Creek); a prune processor (in Winters); and eight nut and oil processors and 16 seed labelers (scattered throughout the County).

Agricultural operations generate direct, indirect, and induced employment in the local and regional economy. Direct employment is generated through crop-related cultivation and harvesting activities. The expenditures on goods and services related to agricultural operations indirectly generate additional employment in businesses supplying goods and services. Consumer spending by employees who are directly and indirectly affected by agricultural operations also contributes to induced regional employment. As shown in Table 4.19-4, approximately 5,900 people were employed on Yolo County farms in 2015—approximately 5.6 percent of the civilian jobs in the County—which is double the State average. To the extent that farm inputs are provided locally and outputs are processed locally, they generate additional income and employment for the County. Related uses such as agricultural support businesses, agricultural industrial uses, farm worker camps, stores selling items grown and manufactured in Yolo County, bed and breakfast lodges, and wineries are also important contributors to the local economy. Agricultural property and business activity make up an important portion of the tax base in Yolo County. Although the tax revenues generated by the agricultural industry are generally lower than would be created by other uses on the same land, the cost to provide government services to farms is also lower (Yolo County 2009).

4.19.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to socioeconomics (including population, housing, and employment) apply to the alternatives under consideration.

State

No State plans, policies, regulations, or laws related to socioeconomics (including population, housing, and employment) apply to the alternatives under consideration.

Regional and Local

No regional or local plans, policies, regulations, or ordinances related to socioeconomics (including population, housing, and employment) are relevant to the analysis of the alternatives under consideration.

4.19.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

National Environmental Policy Act Analysis

Under NEPA, economic or social effects must be discussed if they are interrelated to the natural or physical environmental effects of a project (40 Code of Federal Regulations [CFR] 1508.14). Since agricultural economic effects of the project are related to the physical environmental effects of the project, a socioeconomics analysis is required. The agricultural economic effects discussed in this section are not considered physical effects on the environment; however, economic effects can be used to judge the significance of physical effects. For this analysis, the magnitude of agricultural economic effects resulting from project implementation were identified and used to help characterize the socioeconomic effects resulting from the conversion of Important Farmland to other types of land uses.

This socioeconomic analysis focuses on changes in socioeconomic conditions that would occur in eastern Yolo County from implementation of the project. Where possible, a quantitative comparison was used to determine the agricultural economic effects of the project on future conditions.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. Comments were received regarding agricultural economics, and are considered in this analysis. No comments were received relative to population, housing, and employment.

Agricultural Economics

The analysis of agricultural economics compared the crop conditions on the project site as of summer 2016 with forecasted future conditions (when the remaining agricultural land on the project site would be located outside of the Lower Elkhorn Basin levees). The project site, under forecasted conditions, would be subject to more frequent inundation. The analysis considers the change in value-per-acre based on assumptions of crop type transitions), and also the loss of agricultural land that would be converted to non-agricultural uses (i.e., land within the footprint of the proposed new setback levees and associated improvements). The analysis does not identify losses based on potential planting delays due to continued inundation of the Bypasses.

Population, Housing, and Employment

Population and employment effects were evaluated based on changes to population and employment from temporary and permanent residents associated with construction and O&M activities. Housing effects were assessed based on estimated housing needs resulting from population changes expected as a result of the project’s construction and O&M activities.

California Environmental Quality Act Analysis

Economic and social impacts, including agricultural economics, are outside of the purview of CEQA and are therefore not analyzed except to the extent that such impacts may result in a reasonably foreseeable indirect environmental impact, such as urban decay or deterioration. The project would not cause or contribute to any urban decay or deterioration; therefore, these types of impacts are not considered further under CEQA.

The State CEQA Guidelines require analyses of population and housing, which are addressed as stated above under “Population, Housing, and Employment.”

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). Where appropriate, the significance thresholds between NEPA and CEQA are delineated below. The alternatives under consideration were determined to result in a significant impact related to socioeconomics, including population, housing, and employment, if they would do any of the following:

- induce substantial population growth in an area, either directly (by proposed new homes and businesses) or indirectly (through the extension of roads or other infrastructure) (NEPA and CEQA) (see Impact SOCIO-1);
- place a substantial burden on the existing housing stock within the local community because of an increased housing demand created by nonlocal project employees (NEPA and CEQA) (see Impact SOCIO-1);
- displace substantial numbers of people or housing, necessitating the construction of replacement housing elsewhere (NEPA and CEQA) (see Impact SOCIO-1);
- require sizeable numbers of new workers in a particular employment sector from outside the local area during construction or operation (NEPA only) (see Impact SOCIO-1);
- cause a substantial decrease in the number of opportunities for temporary or long-term direct, indirect, or induced employment, including agricultural-related employment opportunities (NEPA only) (see Impact SOCIO-3);
- cause a substantial decrease in the number of opportunities for temporary or long-term increases in personal and/or disposable incomes (NEPA only) (see Impact SOCIO-3); or
- cause a substantial decrease in total agricultural production values (NEPA only) (see Impact SOCIO-2).

DWR has estimated the loss of employment (including direct loss of full-time, part-time, and seasonal agricultural jobs, as well as indirect and induced changes to overall employment) at between 13.8 and 29 full-time, part-time, or seasonal jobs, depending on the alternative. Farm employment in Yolo County was estimated at 5,900 in 2015, with non-farm employment at 99,600 in 2015 (see Table 4.19-4).

Impact Analysis

Table 4.19-8 provides a summary of socioeconomics, including population, housing, and employment impacts and mitigation measures for all alternatives under consideration.

Table 4.19-8. Summary of Impacts and Mitigation Measures—Socioeconomics (including Population, Housing, and Employment)

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
SOCIO-1: Increases in Population and Housing Demand, and Employment Changes (NEPA and CEQA)	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
SOCIO-2: Cause a Substantial Decrease in Total Agricultural Production Values (NEPA Only)	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	None	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
SOCIO-3: Cause a Loss of Agricultural Employment or Reduced Opportunity for Income Increases (NEPA Only)	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact SOCIO-1: Increases in Population and Housing Demand, and Employment Changes. (NEPA and CEQA)

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** from project-related increases in population and housing demand.

Alternatives 2 and 3: DWR's Preferred Alternative (7-Mile Setback Partial Degrade) and 7-Mile Expanded Setback Full Degrade

EDD estimates that approximately 3,500 residents in Yolo County and approximately 30,700 residents in neighboring Sacramento County were employed in the construction industry in 2015 (EDD 2015a, 2015d). These existing residents who are employed in the construction industry would likely be sufficient to meet the demand for construction workers that would be generated by the project under Alternatives 2 and 3. Furthermore, EDD estimates that between 2012 and 2022, the various construction trades will experience a greater than 50 percent increase in employment opportunities (EDD 2014). If some non-local construction workers were employed for the project, the temporary and short-term nature of the work supports the conclusion that these workers would not typically change residences when assigned to a new construction site. Therefore, it is likely that an adequate number of construction workers for project construction could be found within the local area under Alternatives 2 and 3. Because workers serving the project could be expected to come from nearby communities and cities in Yolo County, neither substantial population growth nor an increase in housing demand in the region is anticipated as a result of these jobs. Therefore, temporary and short-term impacts from increases in population and housing demand from construction of the project components under Alternatives 2 and 3 would be **less than significant**.

Under Alternatives 2 and 3, up to four residences (three residences under Alternative 2 and four residences under Alternative 3) located within the proposed Yolo Bypass East Levee setback alignment would be acquired from the current owners and subsequently demolished. Therefore, implementation of Alternatives 2 and 3 would require three households to obtain new long-term permanent housing. As shown in Table 4.19-3, the vacancy rates of housing stock in Yolo County as a whole, and in the Cities of Woodland and West Sacramento, ranged from 5.0 to 6.3 percent in 2016. Therefore, the project region has sufficient capacity to absorb the need for up to four new long-term residential housing units that would be required from project operation. Furthermore, as required by the State of California Relocation Assistance Act (Chapter 16, Section 7260 et seq. of the California Government Code), before an offer is made to each property owner, all real property to be acquired will be appraised to determine its fair market value. DWR will assist eligible property occupants in finding comparable replacement housing and will pay for actual, reasonable moving costs consistent with applicable State and Federal law.

The project would not entail the construction of new housing or commercial development, create long-term permanent new jobs from project operation, or directly induce substantial population growth. The project would benefit areas identified for future growth anticipated in the vicinity of urban areas downstream. However, local land use decisions are within the jurisdiction of the individual cities and the County, which have adopted general plans consistent with State law. The project would not allow additional growth to occur other than what has already been planned, nor would it change the locations where this growth is planned to occur. Consequently, project implementation under Alternatives 2 and 3 would not affect current and/or projected population growth patterns as already evaluated and planned for in any city or county general plan, and therefore would not indirectly induce substantial population growth. The project would reduce flood risks by improving levees to meet engineering standards associated with the National Flood Insurance Program; it would not alter protection for the 100-year event nor does it transfer any such risk to other areas. The project would not directly or indirectly support development in the base floodplain. (See Chapter 6, “Other Statutory Requirements,” for a discussion of growth-inducement.) Thus, permanent and long-term impacts from increases in population and housing demand from project operations under Alternatives 2 and 3 would be **less than significant**.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Alternatives 4 and 5: 5-Mile Expanded Setback Partial Degrade and 5-Mile Setback Full Degrade

Alternatives 4 and 5 would entail the same types of construction activities as Alternatives 2 and 3, but the new Yolo Bypass East Levee setback would be shorter and would be located farther east under Alternatives 4 and 5. In addition, borrow materials would not be obtained from the Reclamation District 537 Cross Levee. Because Alternatives 4 and 5 involve a lesser amount of construction activities as compared to Alternatives 2 and 3, fewer construction workers would be required over a shorter construction period. Because workers serving the project under Alternatives 4 and 5 could be expected to come from nearby communities and cities in Yolo County and neighboring Sacramento County, neither substantial population growth nor an increase in housing demand in the region is anticipated as a result of these jobs. Therefore, for the same reasons discussed above under Alternatives 2 and 3, temporary and short-term impacts from increases in population and housing demand from construction of the project components under Alternatives 4 and 5 would be **less than significant**.

Because the proposed new Yolo Bypass East Levee setback would be shorter under Alternatives 4 and 5, up to two residences would be demolished (two residences under Alternative 4 and one residence under Alternative 5). Thus, up to two households would be required to obtain new long-term permanent housing. As required by the State of California Relocation Assistance Act (Chapter 16, Section 7260 et seq. of the California Government Code), before an offer is made to each property owner, all real property to be acquired will be appraised to determine its fair market value. DWR will assist eligible property occupants in finding comparable replacement housing and will pay for actual, reasonable moving costs consistent with applicable State and Federal law. Alternatives 4 and 5 would not entail the construction of new housing or creation of long-term permanent new jobs from project operation, and therefore would not create new long-term population increases. Thus, for the same reasons discussed above under Alternative 2, permanent and long-term impacts from increases in population and housing demand from operation of the project components under Alternatives 4 and 5 would be **less than significant**.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Impact SOCIO-2: Cause a Substantial Decrease in Total Agricultural Production Values. (NEPA Only)

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no impact from project-related changes to agricultural production and hence, would not cause a substantial decrease in total agricultural production values. There would be **no impact** on agricultural production values.

Alternatives 2 through 5: All Action Alternatives

Implementing any of the action alternatives would remove land within the footprint of the proposed new setback levee and associated improvements (including seepage berm, road, toe drain, and irrigation canal) from agricultural cultivation. Implementing any of the action alternatives would also place areas that are currently in agricultural use outside the Lower Elkhorn Basin levees, subjecting them to the potential for more frequent inundation and changing the agricultural production of these lands to a different crop type, primarily rice. Table 4.19-9 presents the estimated acreages of agricultural land which would be permanently removed from production, by action alternative. Note that the acreages provided for land which would be removed from *active* agricultural use differ slightly from acreages of Important Farmland that would be converted to other uses, as presented in Section 4.15, "Land Use and Planning, and Agricultural and Forestry Resources." This difference includes areas of non-Important Farmland that are nevertheless being farmed, as well as areas of Important Farmland that are not currently in active agricultural use. See Section 4.15, "Land Use and Planning, and Agricultural and Forestry Resources," for additional information regarding agricultural land conversion.

The analysis of agricultural economics (revenues) compared the crop conditions on the project site as of summer 2016 with forecasted future conditions (when the remaining agricultural land on the project site would be located outside of the Lower Elkhorn Basin levees, and agricultural crops types would be shifted). The project site, under forecasted conditions, would be subject to more frequent inundation. After implementing one of the action alternatives, the net revenue would decline between 12 percent (in Alternative 5) and 18 percent (in Alternative 3).

Table 4.19-9. Agricultural Revenue Changes, All Action Alternatives

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Acreage in Agricultural Use	5,874	5,382	5,385	5,578	5,575
Change from Existing	--	(492)	(489)	(296)	(299)
Total Crop Revenue	$11,458,213	$10,183,014	$9,755,092	$10,256,507	$10,684,576
Change from Existing	--	($1,275,199)	($1,703,121)	($1,201,706)	($773,637)
Net Crop Revenue	$3,719,230	$3,140,757	$3,037,533	$3,151,611	$3,254,906
Change from Existing	--	($578,473)	($681,676)	($567,619)	($464,323)

Note: All totals may not add to 100 percent due to rounding
Source: Data provided by California Department of Water Resources in 2017

The analysis does not identify economic losses based on potential planting delays due to continued inundation of the Bypasses, because such inundation is difficult to predict, and therefore too speculative for meaningful consideration. The analysis also does not identify potential indirect economic effects of these agricultural uses.

Implementing any one of the action alternatives would result in a loss of agricultural productivity in the Lower Elkhorn Basin, ranging from about 6 percent for Alternative 5 to approximately 15 percent for Alternative 3. Therefore, this impact to total agricultural production values under all action alternatives would be a **significant** impact under NEPA. Mitigation Measures AG-1a, AG-1b, and AG-1c have been identified to address the loss of agricultural production (see Section 4.15, “Land Use and Planning, and Agricultural and Forestry Resources,” for mitigation measure description), which minimizes decreases in total agricultural production values.

Mitigation Measure AG-1a: Preserve Agricultural Productivity of Important Farmland to the Extent Feasible.

Please refer to Impact AG-1 in Section 4.15, “Land Use and Planning, and Agricultural and Forestry Resources,” for the full text of this mitigation measure.

Mitigation Measure AG-1b: Minimize Impacts on Williamson Act-contracted Lands, Comply with California Government Code Sections 51290–51293, and Coordinate with Landowners and Agricultural Operators.

Please refer to Impact AG-1 in Section 4.15, “Land Use and Planning, and Agricultural and Forestry Resources,” for the full text of this mitigation measure.

Mitigation Measure AG-1c: Establish Conservation Easements Where Potentially Significant Agricultural Land Use Impacts Remain after Implementation of Mitigation Measures AG-1a and AG-1b.

Please refer to Impact AG-1 in Section 4.15, “Land Use and Planning, and Agricultural and Forestry Resources,” for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measures AG-1a, AG-1b, and AG-1c would reduce permanent long-term effects on changes in agricultural production and hence, minimize revenue losses thereof under all action alternatives. Even with the implementation of Mitigation Measures AG-1a, AG-1b, and AG-1c, however, some agricultural lands likely will be taken out of production permanently within the footprints of the new setback levees, and crop shifts to rice would further reduce the net revenue. USACE does not have the authority to require implementation of additional measures to further reduce this economic impact. Therefore, revenue losses would occur as described above. USACE considers this impact to be **significant and unavoidable**.

Impact SOCIO-3: Cause a Loss of Agricultural Employment or Reduced Opportunity for Income Increases. (NEPA Only)

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along approximately 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have no impact from project-related changes to agricultural employment or income and hence, would not cause a substantial decrease in agricultural employment or reduced opportunity for income increases. There would be **no impact**.

Alternatives 2 through 5: All Action Alternatives

Implementing any of the action alternatives would remove land within the footprint of the proposed new setback levee and associated improvements (including seepage berm, road, toe drain, and irrigation canal) from agricultural cultivation, and change agricultural production values (see Impact SOCIO-2) due to changes in crop type.

DWR conducted an IMPLAN secondary impact analysis to evaluate the indirect, induced, and total effects of total annual crop revenue changes (See Appendix H). DWR's IMPLAN analysis estimated the loss of employment (including direct loss of full-time, part-time, and seasonal agricultural jobs, as well as indirect and induced changes to overall employment) at between 13.8 and 29 full-time, part-time, or seasonal jobs, depending on the alternative (Table 4.19-10). Farm employment in Yolo County was estimated at 5,900 in 2015, with non-farm employment at 99,600 in 2015 (see Table 4.19-4). The estimated total job loss would be less than 0.5 percent of the farm employment in Yolo County in all of the alternatives, and would have a marginal impact on incomes. The employment changes include part-time and seasonal jobs as well as full-time jobs, and would affect both farm- and non-farm employment, further reducing the relative magnitude of the effects related to both job losses and income. This impact would be **less than significant**.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Table 4.19-10. Agricultural Employment[1] Changes, All Action Alternatives

	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Direct[2]	(14.6)	(19.6)	(8.9)	(8.9)
Indirect[3]	(5.2)	(6.6)	(4.9)	(3.6)
Induced[4]	(2.3)	(3.0)	(1.6)	(1.4)
Total	**(22.1)**	**(29.0)**	**(15.4)**	**(13.8)**

Notes:
[1] Employment includes full-time, part-time, and seasonal jobs
[2] Effect of initial production changes by growers
[3] Effect of growers buying goods and services from other businesses
[4] Effect of growers and workers re-spending income in the economy
Source: Data provided by California Department of Water Resources in 2017

Residual Significant Impacts

Impacts SOCIO-1 and SOCIO-3 would be less than significant, and no compensatory mitigation would be required. With respect to Impact SOCIO-2, as discussed in detail in "Residual Significant Impacts," in Section 4.15, "Land Use and Planning, and Agricultural and Forestry Resources," there is no feasible, available mitigation to reduce agricultural production acreage impacts to a less-than-significant level. Consequently, agricultural production values and revenue losses would occur as described above for Impact SOCIO-2. USACE considers this impact to be significant. Because USACE does not have the authority to require implementation of additional measures to further reduce this economic impact, a residual significant and unavoidable impact would occur.

4.20 Traffic and Transportation

4.20.1 Environmental Setting

Roadways

Data on traffic volumes are available for the identified potential haul routes. Traffic volumes are described using average daily trips and peak-hour trips for the morning and evening peak hours. The use of limited access roadways and ramps in the project site and vicinity can also be characterized in terms of Level of Service (LOS). LOS is a qualitative description of operation of a roadway segment based on delay and maneuverability. LOS can range from “A,” representing free-flow conditions, to “F,” representing gridlock.

The key roadways that would be used by project-related traffic to enter the regional roadway network (i.e., haul truck routes), including local roadways marked with an asterisk below, are shown in Figure 3-9 in Chapter 3, “Alternatives,” and include:

- I-5
- I-80
- County Road 118*
- County Road 124*
- County Road 126*
- North Harbor Boulevard
- Old River Road
- Reed Avenue
- Tule Jake Road*

With the exception of local roadways (marked with an asterisk), existing daily traffic volumes, peak-hour volumes, and peak-hour LOS for these roadways are provided in Tables 4.20-1 through 4.20-3. These roadways currently operate acceptably based on Caltrans, Yolo County, and City of West Sacramento standards. Regional access to the project site is provided by I-5 and I-80.

Table 4.20-1. Peak-Hour Volumes and Level of Service for Limited Access Highways

Roadway	Location	Lanes	A.M. Peak-Hour Volume (P.M. Peak-Hour Volume)	A.M. Level of Service (P.M. Level of Service)
I-5 Northbound	Sacramento County Line to County Road 102	2	1,820 (1,710)	B (B)
I-5 Southbound	County Road 102 to Sacramento County Line	2	1,690 (2,110)	B (C)
I-80 Eastbound	U.S. 50 to Reed Avenue	3	2,576 (3,817)	B (C)
I-80 Eastbound	Reed Avenue to West El Camino Avenue	3	2,257 (4,081)	B (C)
I-80 Westbound	West El Camino Avenue to Reed Avenue	3	4,315 (2,725)	D (B)
I-80 Westbound	Reed Avenue to U.S. 50	3	2,576 (3,817)	B (C)

Note: Data are for 2014.
Sources: West Sacramento 2016b, Yolo County 2009

Table 4.20-2. Average Daily Traffic Counts, Peak-Hour Trips, and Level of Service for Roadways in West Sacramento

Roadway	Location	Classification	Average Daily Traffic	A.M. Peak Hour Trips (P.M. Peak Hour Trips)	A.M. Peak-Hour LOS (P.M. Peak Hour LOS)
North Harbor Boulevard	Reed Avenue to Riverbank Road	Arterial (2 Lanes)	4,529	467 (484)	N/A
Reed Avenue	I-80 Off-ramp to Harbor Boulevard	Arterial (4 Lanes)	15,930	1,036 (1,229)	N/A
I-80 Eastbound Entrance	Reed Avenue	One Lane Merge	N/A	368 (789)	B(C)
I-80 Westbound Entrance	Reed Avenue	One Lane Merge	N/A	281 (772)	B(B)
I-80 Eastbound Exit	Reed Avenue	One Lane Diverge	N/A	660 (520)	C(C)
I-80 Westbound Exit	Reed Avenue	One Lane Diverge	N/A	872 (549)	D(C)

Notes: LOS = Level of Service; N/A = not available
West Sacramento no longer calculates LOS for local roadway segments. Although the West Sacramento General Plan EIR includes traffic counts for local roadway segments (North Harbor Boulevard and Reed Avenue), earlier traffic counts from 2005 (Reed Avenue) and 2007 (North Harbor Boulevard) are presented here and used in the analysis; these numbers are more conservative than the West Sacramento General Plan EIR and include peak-hour trips as well as average daily traffic.
Sources: City of West Sacramento 2016a, City of West Sacramento 2016b

Table 4.20-3. Traffic Data for Roadways in Yolo County

Roadway	Location	Classification	P.M. Peak-Hour Trips
Old River Road	County Road 118 to County Road 126	Major Two-Lane County Road	(390)

Source: Yolo County 2009

The City of West Sacramento no longer uses LOS standards for roadway segments. Instead, the City of West Sacramento identifies Average Daily Traffic (ADT) thresholds which may be used to determine whether intersection LOS analysis or roadway expansion is required. (City of West Sacramento 2016.) For two-lane arterials with low access control (such as North Harbor Boulevard), this Maximum Desirable Daily Volume is 12,000 ADT. For four-lane arterials (such as Reed Avenue) with medium access control, this Maximum Desirable Daily Volume would be 28,800 ADT.

Pedestrian and Bicycle Facilities

Although Old River Road is not currently marked with signage for a Class II Bike Lane, this roadway has paved shoulders and is identified as a future Class II Bike Lane in the Yolo County Bicycle Transportation Plan (Yolo County 2013).

4.20.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to traffic and transportation apply to the alternatives under consideration.

State

The following State plans, policies, regulations, or laws related to traffic and transportation apply to the alternatives under consideration, as listed below.

- Caltrans Roadway Concepts – Applies to the impact analysis.
- California Vehicle Code Division 15 – Could apply to project material hauling.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to traffic and transportation are relevant to the analysis of the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for applicable policies).

- Yolo County 2030 General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding traffic and transportation are relevant to project design, construction, and/or the impact analysis of the project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- West Sacramento General Plan – Several policies from the West Sacramento General Plan regarding traffic and transportation are relevant to project design, construction, and/or the impact analysis of the project (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Yolo County Encroachment Permits – Relevant to project construction.

4.20.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

Methodology

Available literature, including documents published by Federal, State, County, and City agencies that document traffic conditions, were reviewed for this analysis. The information obtained from these sources was reviewed and summarized to establish existing conditions and to identify potential environmental effects based on the significance criteria presented below. LOS standards are typically used to evaluate long-term (operational) traffic effects resulting from residential, employment-generating, industrial, and institutional development projects. The project is not a land use development project. Long-term operation of the project would require a similar level of maintenance and monitoring as under existing conditions. Therefore, operational LOS standards were not used in this analysis because they are typically employed to evaluate long-term operational traffic congestion that would result from a project. Instead, this analysis focuses on construction-related traffic effects and the effects of implementing the project on existing roadways. The analysis of project-related construction traffic included review of existing peak-hour traffic volumes and consideration of both the addition of project construction traffic to existing peak-hour traffic levels and the capacity of the road to handle the additional construction-related traffic.

Truck trip estimates were based on the amount of new material that would be imported. It is estimated that project construction activities would occur over a period of approximately 9 months (April to December) during the first construction year, with activities continuing over 8 months (April to November) during the second construction year for Alternatives 2 and 3 with the longer setback levees. The daily truck volumes were estimated using the total number of haul trucks provided for the project for each phase and the number of days during the peak month of construction activity for each phase. The number of trucks from one hour to another hour on a given day might slightly vary, depending on site access and restrictions. However, this analysis assumes that construction trucks would operate throughout the day for up to 10 hours, exporting and importing materials to and from the project site. Therefore, truck trips were evenly distributed throughout the day (during the 10-hour construction work window) to obtain the hourly haul truck volumes for the assigned route segments. Construction worker commute trips were only applied to peak hours in the morning and in the afternoon, assuming worker trips would occur once in the morning to get to the project construction site and once in the afternoon to leave the project construction site. Roadway segments were evaluated by comparing existing available roadway segment volumes with existing plus project construction volumes for each roadway segment.

To assess the effect of truck trips generated by construction of these project components, a heavy-vehicle factor known as a passenger car equivalent (PCE) value was applied to the project-generated truck traffic. This heavy-vehicle factor was used to account for the additional space occupied, reduced speed, and reduced maneuverability associated with having these vehicles, rather than standard automobiles, on the roadway. A PCE value of 2.0 was applied to the construction equipment truck trip generation estimates as recommended by the *Highway Capacity Manual 2000* (Transportation Research Board 2000).

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. The EPA comment letter recommended including a mitigation measure to develop and implement a construction traffic and parking management plan to minimize traffic interference and maintain traffic flow. Such a plan is included in the mitigation measures described below. Yolo County's letter identified concerns related to impacts of heavy truck traffic on County roads. These impacts are addressed in the analysis and in the mitigation measures described below.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to traffic and transportation if they would do any of the following:

- cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system;

- exceed, either individually or cumulatively, an LOS standard established by the county congestion management agency for designated roads or highways;
- result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- substantially increase hazards due to a design feature or incompatible uses;
- result in inadequate emergency access; or
- conflict with adopted policies, plans, or programs supporting alternative transportation (i.e., public transit, bicycle, or pedestrian facilities) or otherwise decrease the performance or safety of such facilities.

This analysis used the recommended screening criterion from the Institute of Transportation Engineers (ITE) (1988) for assessing the effects of construction projects that create temporary traffic increases. To account for the large percentage of heavy trucks associated with typical construction projects, ITE recommends a threshold level of 50 or more new peak-direction truck trips during the peak-hour. Therefore, the project would cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system, and result in a significant effect related to traffic, if they would result in 50 or more new truck trips (100 PCE trips) during the a.m. or p.m. peak hours. This is considered an "industry standard" and is the most current guidance.

Issues Not Discussed Further in this EIS/EIR

Exceed, Either Individually or Cumulatively, an LOS Standard Established for Designated Roads or Highways—As discussed in the "Methodology" subsection above, LOS is primarily used for analyzing long-term effects of projects on traffic flow. Because long-term project O&M activities would be similar to existing O&M, the project would not result in substantial changes to long-term operational traffic effects and therefore an analysis of traffic effects using LOS was not necessary or performed for long-term project O&M activities. Thus, this issue is not discussed further in this EIS/EIR.

Result in a Change to Air Traffic Patterns, Including Either an Increase in Traffic Levels or a Change in Location that Results in Substantial Safety Risks—The project would not change existing land uses. Heavy equipment would be operated approximately 1.95 miles from Sacramento International Airport and would not be tall enough to present an aircraft safety hazard. Therefore, the project would not affect air traffic patterns at nearby airports, and this issue is not addressed further in this EIS/EIR. (Hazards associated with birdstrike are evaluated in Section 4.13, "Hazards and Hazardous Materials.")

As previously stated, project O&M would not substantially change from existing conditions, and the project would not introduce any new land uses or activities to the area that would generate long-term increases in traffic volumes. Thus, there would be no traffic effects from project O&M.

Impact Analysis

Table 4.20-4 provides a summary of traffic and transportation impacts and mitigation measures for all alternatives under consideration.

Table 4.20-4. Summary of Impacts and Mitigation Measures—Traffic and Transportation

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
TR-1: Increase in Traffic Volumes or Decrease in Capacity along Designated Roadways in the Project Site and Vicinity	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	TR-1: Prepare and Implement a Traffic Control and Road Maintenance Plan	SU
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
TR-2: Potential for Increased Emergency Response Times or Inadequate Emergency Access	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	TR-2: Provide Pre-notification of Road Closures and Detours to Emergency Service Providers, and Maintain Emergency Access	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
TR-3: Decreased Performance or Safety of Alternative Modes of Transportation	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	S	REC-1: Prepare and Implement a Bicycle Detour Plan for On-street Bicycle Routes, Provide Construction Period Information on Bicycle Facility Closures	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
TR-4: Possible Increased Hazards Due to a Design Feature or Incompatible Uses	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	TR-1: Prepare and Implement a Traffic Control and Road Maintenance Plan	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

The project would consist of constructing new setback levees and associated improvements in the Lower Elkhorn Basin. Because of the earthwork involved and the need for material deliveries, construction would generate substantial traffic volumes. Once construction is completed, maintenance needs would be similar to existing conditions. The project would not introduce any new land uses or activities to the area that would generate long-term increases in traffic volumes; therefore, the following discussion considers only the effects of construction-related activities associated with the project. Consideration of potential traffic increases and construction-related delays is limited to those increases caused by temporary and short-term project-related construction activities. The key effects were identified and evaluated based on the environmental characteristics of the project site and vicinity and the magnitude, intensity, and duration of activities related to project construction.

Project trips would be generated during the construction phases as haul trucks and workers travel to and from the construction sites. Construction would generally occur during a 10-hour workday, but 24-hour construction could occur, as needed. Anticipated haul routes, construction schedule, as well as the number of trucks and workers anticipated for each project component are discussed in Chapter 3, “Alternatives.” The potential haul routes are shown in Figure 3-9 in Chapter 3, “Alternatives.”

Two scenarios were used to evaluate setback levee construction: long haul and reuse. Under the “long haul scenario,” approximately 75 percent of the material used to construct the new setback levee, seepage berm, cutoff wall, and associated project components would be imported material from locations within 50 miles of the project site. Under the “reuse scenario,” virtually all material used to construct the new setback levee and associated project components would be obtained on the project site, with import of select materials. Specific assumptions regarding materials hauling are identified in Appendix D, “Air Quality and Greenhouse Gases,” and Appendix I, “Traffic and Transportation Data.”

Impact TR-1: Increase in Traffic Volumes or Decrease in Capacity along Designated Roadways in the Project Site and Vicinity.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, “No Action/No Project Alternative,” under “Consequences of No Action.”

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** from project-related construction traffic.

Alternatives 2 through 5: All Action Alternatives

Implementation of the project under all action alternatives, would require hauling construction equipment/materials and transporting construction workers to and from the project site along major highways and over local surface streets. Many of the construction-generated trips would involve heavy duty trucks, which would further affect highway traffic. Construction-generated traffic would temporarily increase the daily and peak-hour traffic along specified routes; however, traffic levels on haul route roads would return to normal levels once construction is completed.

As shown on Figure 3-9 in Chapter 3, “Alternatives,” access to the project site would be provided by I-5 (via County Road 118, Old River Road, and County Roads 124 and 126) or I-80 (via Reed Avenue, North Harbor Boulevard, Old River Road, and County Roads 124 and 126). Tables 4.20-5 and 4.20-6 present the peak-hour trips for the reuse and long haul scenarios under all action alternatives, and total roadway volumes including project-generated trips.

The trip totals in Tables 4.20-5 and 4.20-6 include construction trucks that would be used to import or remove the required materials (with a PCE value of 2.0 applied to these truck trips as described above in the “Methodology” subsection). The trip totals in Tables 4.20-5 and 4.20-6 also include total daily trips for construction workers (assuming two trips per day by each worker: one trip inbound to the levee reconstruction sites in the morning and one trip outbound at the end of the day). These construction worker trips are all assumed to take place during the morning or afternoon peak hours.

In total, project-related activities (during the peak construction month in which most phases overlap) under all action alternatives may result in as many as approximately 1,475 equivalent vehicle trips during the peak hour, distributed over the roadways used to access the project site.

As shown in Tables 4.20-5 and 4.20-6, the project-related increase in traffic volumes along the affected roadways would exceed the threshold of 50 trucks per hour on all roadways evaluated. This level of traffic activity could degrade traffic operations along any or all of the roadways used by haul trucks in the vicinity of the project site under all action alternatives. Therefore, this project component would have a **significant** impact under all action alternatives.

Furthermore, project construction would also require temporary closures on local roadways in the Lower Elkhorn Basin, including County Roads 124, 126, and 127. Because these short-term closures would temporarily reduce (in the event of a partial closure) or remove the capacity of the roadway, a temporary roadway closure is considered to represent a **significant** impact under all action alternatives.

The heavy truck traffic generated by the project under all action alternatives also has the potential to adversely affect the conditions of the roadways and pavements being used to transport materials. This impact would be **significant**.

Mitigation Measure TR-1, described below, has been identified to address this impact.

Mitigation Measure TR-1: Prepare and Implement a Traffic Control and Road Maintenance Plan.

Before the start of project-related construction activities, DWR will prepare and implement a plan to manage expected construction-related traffic to the extent feasible, and to avoid and minimize potential traffic congestion during project-related construction. The traffic control plan will outline the phasing of activities and the use of specific routes to and from the work site and borrow site locations to minimize the daily amount of traffic on individual roadways. The items listed below will be included as terms of the construction contracts.

Table 4.20-5. Peak-Hour Volumes and Project Impacts for the "Reuse Scenario"

Roadway	Location	Max Peak-Hour Volume	Alt 2 or 3 "Reuse Scenario" Max Peak-Hour Trips	Alt 4 or 5 "Reuse Scenario" Max Peak-Hour Trips	Max Peak-Hour Volume with Alt 2 or 3 "Reuse Scenario"	Max Peak-Hour Volume with Alt 4 or 5 "Reuse Scenario"
I-5 Northbound	Sacramento County Line to County Road 102	1,820	207	515	2,027	2,335
I-5 Southbound	County Road 102 to Sacramento County Line	2,110	207	515	2,317	2,625
I-80 Eastbound	U.S. 50 to Reed Avenue	3,817	638	515	4,455	4,332
I-80 Eastbound	Reed Avenue to West El Camino Avenue	4,081	638	515	4,719	4,596
I-80 Westbound	West El Camino Avenue to Reed Avenue	4,315	638	515	4,953	4,830
I-80 Westbound	Reed Avenue to U.S. 50	3,817	638	515	4,455	4,332
North Harbor Boulevard	Reed Avenue to Riverbank Road	484	638	515	1,122	999
Reed Avenue	I-80 Off-ramp to Harbor Boulevard	1,229	638	515	1,867	1,744
I-80 Eastbound Entrance	Reed Avenue	789	638	515	1,427	1,304
I-80 Westbound Entrance	Reed Avenue	772	638	515	1,410	1,287
I-80 Eastbound Exit	Reed Avenue	660	638	515	1,298	1,175
I-80 Westbound Exit	Reed Avenue	872	638	515	1,510	1,387
Old River Road	County Road 118 to County Road 126	390	638	515	1,028	905

Sources: West Sacramento 2016b, Yolo County 2009

Table 4.20-6. Peak-Hour Volumes and Project Impacts for the "Long Haul Scenario"

Roadway	Location	Max Peak-Hour Volume	Alt 2 or 3 "Long Haul Scenario" Max Peak-Hour Trips	Alt 4 or 5 "Long Haul Scenario" Max Peak-Hour Trips	Total Peak-Hour Volume Alt 2 or 3 "Long Haul Scenario"	Total Peak-Hour Volume Alt 4 or 5 "Long Haul Scenario"
I-5 Northbound	Sacramento County Line to County Road 102	1,820	1,129	1,450	2,949	3,270
I-5 Southbound	County Road 102 to Sacramento County Line	2,110	1,129	1,450	3,239	3,560
I-80 Eastbound	U.S. 50 to Reed Avenue	3,817	1,253	1,450	5,070	5,267
I-80 Eastbound	Reed Avenue to West El Camino Avenue	4,081	1,253	1,450	5,334	5,531
I-80 Westbound	West El Camino Avenue to Reed Avenue	4,315	1,253	1,450	5,568	5,765
I-80 Westbound	Reed Avenue to U.S. 50	3,817	1,253	1,450	5,070	5,267
North Harbor Boulevard	Reed Avenue to Riverbank Road	484	1,253	1,450	1,737	1,934
Reed Avenue	I-80 Off-ramp to Harbor Boulevard	1,229	1,253	1,450	2,482	2,679
I-80 Eastbound Entrance	Reed Avenue	789	1,253	1,450	2,042	2,239
I-80 Westbound Entrance	Reed Avenue	772	1,253	1,450	2,025	2,222
I-80 Eastbound Exit	Reed Avenue	660	1,253	1,450	1,913	2,110
I-80 Westbound Exit	Reed Avenue	872	1,253	1,450	2,125	2,322
Old River Road	County Road 118 to County Road 126	390	1,253	1,475	1,643	1,865

Sources: West Sacramento 2016b, Yolo County 2009

- Provide a site-specific access plan specifying the roadways on which construction workers are allowed travel to access the work sites and borrow areas.
- Prohibit construction workers from accessing work sites or borrow sites from any locations other than those specified in the plan.
- Provide 72-hour advance notification if access to driveways or private roads would be affected. Limit effects on driveway and private roadway access to working hours and provide uninterrupted access to driveways and private roads during non-work hours. If necessary, use steel plates, temporary backfill, or another accepted measure to provide access.
- Provide clearly marked bicycle detours to address bicycle route closures or if bicyclist safety would be otherwise compromised.
- Queue trucks only in areas and at times allowed by the appropriate jurisdiction.
- Post warnings about the potential presence of slow-moving vehicles.
- Use traffic control personnel when appropriate.
- Comply with Caltrans requirements by submitting this plan to Caltrans for review and approval to cover points of access from the State highway system (I-5 and I-80) for haul trucks and other construction equipment.
- Assess pre- and postconstruction condition of roadways identified for use by haul traffic in the plan. Assess and repair any damage to roadways that are used during construction, and repair all project-related potholes, fractures, or other damages to preproject conditions.

Timing: Before and during construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementing Mitigation Measure TR-1 would reduce the significant impact associated with an increase in traffic volumes and temporary road closures, but not to a less-than-significant level. Although a traffic control plan will be prepared and implemented that includes measures to minimize traffic congestion and provide acceptable traffic-flow to the maximum extent feasible, the high volumes of truck traffic relative to existing volumes and roadway capacity would still result in a significant effect, and there are no additional feasible mitigation measures available to reduce this impact to a less-than-significant level. Thus this impact would be **significant and unavoidable**. The impact related to effects on the condition of the roadway would be reduced to a **less-than-significant** level because DWR will assess roadways prior to construction and will repair damages to preproject conditions.

Impact TR-2: Potential for Increased Emergency Response Times or Inadequate Emergency Access.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5

miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** on emergency response times or access.

Alternatives 2 through 5: All Action Alternatives

Emergency access to Lower Elkhorn Basin could be affected by activities associated with proposed levee improvements, under all action alternatives. Construction-related traffic could delay or temporarily obstruct the movement of emergency vehicles. Therefore, the project would have a **potentially significant** impact, under all action alternatives. Mitigation Measures TR-1 and TR-2, described below, have been identified to address this impact.

Mitigation Measure TR-1: Prepare and Implement a Traffic Control and Road Maintenance Plan.

Please refer to the first appearance earlier in this section for the full text of this mitigation measure.

Mitigation Measure TR-2: Provide Pre-Notification of Road Closures and Detours to Emergency Service Providers, and Maintain Emergency Access.

DWR will provide public notice by appropriate means, such as physical signage, Internet postings, letters, or telephone calls, to emergency service providers in the Lower Elkhorn Basin at least 72 hours prior to road closures and detours. DWR will provide clear emergency access to all existing buildings and facilities at all times.

Timing:	Before and during construction.
Responsibility:	California Department of Water Resources.

Significance after Mitigation: Implementing Mitigation Measures TR-1 and TR-2 would reduce the potentially significant impact of construction traffic on emergency response times and emergency access under all action alternatives to a **less-than-significant** level because DWR will provide methods of access and detours/routes around construction activities so that emergency access is maintained and emergency personnel are notified throughout the term of each construction season.

Impact TR-3: Decreased Performance or Safety of Alternative Modes of Transportation.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No

Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** on alternative modes of transportation.

Alternatives 2 through 5: All Action Alternatives

Old River Road located just east of the project site is frequently used by recreational cyclists. Although project construction under any of the action alternatives would not require closure of Old River Road, increased heavy truck traffic during construction activities would decrease the performance and safety of Old River Road for cyclists during hauling activities. Therefore, implementing the project under any of the action alternatives would have a **significant** impact. Mitigation Measure REC-1, described below, has been identified to address this impact.

> **Mitigation Measure REC-1: Prepare and Implement a Bicycle Detour Plan for On-street Bicycle Routes, Provide Construction Period Information on Closures.**
>
> Please refer to the first appearance earlier in this section for the full text of this mitigation measure.
>
> **Significance after Mitigation:** Implementing Mitigation Measure REC-1 would reduce the potentially significant impact associated with decreased performance or safety of alternative modes of transportation to a **less-than-significant** level under all action alternatives, because DWR will provide public notice in advance of closures and detours/routes and will require the provision of detour signs indicating the location of alternate routes that could be used by bicyclists.

Impact TR-4: Possible Increased Hazards Due to a Design Feature or Incompatible Uses.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to increased transportation hazards.

Alternatives 2 through 5: All Action Alternatives

The combination of the high-volume of slow-moving heavy-duty truck traffic on affected roadways leading to the Lower Elkhorn Basin during construction, workers entering and existing construction sites, periodic road and lane closures associated with construction traffic, and potential damage to pavement would increase traffic hazards on local roadways during the construction period under all action alternatives. Therefore, these project components would have a **potentially significant** impact under all action alternatives. Mitigation Measure TR-1, identified below, has been developed to address this impact.

> **Mitigation Measure TR-1: Prepare and Implement a Traffic Control and Road Maintenance Plan.**
>
> Please refer to the first appearance earlier in this section for the full text of this mitigation measure.
>
> **Significance after Mitigation:** Implementing Mitigation Measure TR-1 would reduce the potentially significant impact associated with increased hazards due to a design feature or incompatible uses to a **less-than-significant** level under all action alternatives, because DWR will prepare and implement a construction traffic control and road maintenance plan.

Residual Significant Impacts

The action alternatives would have a significant impact related to increased traffic volumes and road closures during project-related construction (Impact TR-1). Implementing Mitigation Measure TR-1 would reduce this impact, but not to a less-than-significant level. Although a traffic control plan would be prepared and implemented that includes measures to minimize traffic congestion and provide acceptable traffic flow to the maximum extent feasible, the high volumes of truck traffic relative to existing volumes and roadway capacity would still result in a significant impact, thus the residual impact would be significant and unavoidable.

There are no other feasible alternatives or feasible, available mitigation measures to further reduce this significant and unavoidable impact related to increased traffic volumes and road closures during project-related construction. The project must be located at this site to meet the project purpose, and numerous alternatives have been identified and evaluated, including the four action alternatives. Given the finite schedule for constructing the project, alternatives that spread construction more than 2 years to reduce traffic are not feasible because the project would risk losing available funding. No additional feasible mitigation measures are available besides Mitigation Measure TR-1, which DWR will implement. DWR strongly desires to implement the “reuse scenario” which would eliminate or minimize the need for the “long haul scenario,” and reduce traffic-related impacts. But sufficient materials may not be available on-site. Consequently, traffic-related impacts would be reduced to the greatest degree feasible. Because DWR would assess roadways prior to construction and would repair damages to preproject conditions following completion of the project, the impact related to effects on the condition of the roadway would be reduced to a less than significant level.

Implementing Mitigation Measures TR-1, TR-2, and REC-1 would reduce the potentially significant construction-related impacts because DWR would (1) provide methods of access and detours/routes around construction activities so that emergency access is maintained and emergency personnel are notified throughout the term of each construction season, (2) provide public notice and signage for bicycle detours, and (3) prepare and implement a construction traffic control and road maintenance plan.

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4.21 Utilities and Service Systems

4.21.1 Environmental Setting

Water Supply

Potable water supplies in the unincorporated areas of Yolo County are provided by groundwater pumped from private wells. As discussed in more detail in Section 4.12, “Groundwater Resources,” the project site is located within the Sacramento Valley Groundwater Basin, Yolo Subbasin.

The project site is located within Reclamation Districts (RDs) 537, 785, and 827 (Yolo Local Agency Formation Commission 2004). These RDs provide levee maintenance, drainage, and agricultural irrigation services.

Wastewater

The Lower Elkhorn Basin is not located in a municipal wastewater system service area. Instead, wastewater treatment is provided by private on-site septic systems (Yolo County 2009). Wastewater treatment for farm workers in the field is provided by portable toilets.

Stormwater Drainage

Drainage facilities in the unincorporated areas of Yolo County are limited. On-site ditches that convey water to existing roadside ditches are commonly used by most agricultural land uses, including those within the project site (Yolo County 2009). The two main agricultural drainages that convey irrigation tailwater within the Lower Elkhorn Basin to the Sacramento River also convey stormwater drainage to the river, either as direct flow or overland flow.

Solid Waste

The Yolo County Central Landfill is located at the intersection of Yolo County Road 28 and County Road 104 in Davis. The landfill has a maximum permitted capacity of 49.0 million cubic yards (mcy) and a remaining capacity of 23.7 mcy. The landfill is scheduled for closure on January 1, 2080. (California Department of Resources Recycling and Recovery [CalRecycle] 2016.)

Electrical and Natural Gas Service, and Other Underground Pipelines

PG&E provides both electrical and natural gas services to the project site (Yolo County 2009). The project site receives power via low voltage overhead electrical transmission lines mounted on wood poles. Small natural gas lines that serve private residences within the project site are buried underground; the nearest major natural gas transmission pipeline is located west of the project site in the Yolo Bypass (Yolo County 2009).

The Sacramento International Airport Pipeline (Pipeline), owned by Wickland Pipelines, LLC, traverses the southeastern portion of the project site. The Pipeline provides jet fuel to the commercial airlines operating at Sacramento International Airport. The Pipeline originates in West Sacramento and heads north through primarily agricultural land until terminating at the airport’s fuel facility.

Agricultural Irrigation Pump Stations

Three pump stations (maintained and used by RD 537, RD 785, and RD 827) are located along the existing levee alignment.

Communications

The primary provider of land line telephone service is AT&T. Cell phone, cable television, and other communications services are provided to customers in the project site by a variety of private companies including Sprint, Frontier Communications, Wave Broadband, and Consolidated Communications. (Yolo County 2009.)

Fire Protection

Fire protection services, including rescue, emergency medical services, and hazardous material response, are provided by the Elkhorn Fire Protection District, which covers about 58 square miles (Yolo Local Agency Formation Commission 2016.) The District has one fire station located at 19396 County Road 124, and 12 volunteer firefighters (Yolo County 2009).

Law Enforcement

Law enforcement services in unincorporated areas of Yolo County are provided by the County Sheriff–Coroner. This department patrols the County, administers the County Jail and work program, provides animal control services, and serves as the County Coroner (Yolo County 2009).

4.21.2 Regulatory Setting

Federal

No Federal plans, policies, regulations, or laws related to utilities and service systems apply to the alternatives under consideration.

State

The following State plans, policies, regulations, or laws related to utilities and service systems apply to the alternatives under consideration, as listed below (see Appendix C, “Summary of Applicable Laws, Regulations, Policies, and Plans,” for additional information).

- California Integrated Waste Management Act – Applies to the impact analysis.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances related to utilities and service systems are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County 2030 General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding utilities and service systems are relevant to project design, construction, and/or the impact analysis of the project (see Appendix C, “Summary of Applicable Laws, Regulations, Policies, and Plans,” for relevant policies).

4.21.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

Effects to utilities and public services were identified by comparing existing facilities and capacity with the anticipated project needs during and after construction, the duration and extent to which the utilities and services would be affected, and the ability of a service provider to continue to provide a level-of-service that would meet the needs within the project site.

Comments submitted in response to the NOI and NOP were reviewed for relevance to the analysis of environmental consequences and development of mitigation measures. One comment letter was received suggesting coordination with PG&E regarding any PG&E-owned utilities that may be affected by the project. This comment is addressed in the impact analysis below.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to utilities and service systems if they would do any of the following:

- exceed wastewater treatment requirements of the applicable regional water quality control board;
- require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- require new or expanded water supply entitlements;
- result in a determination by the wastewater treatment provider which serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments;
- generate waste materials that would exceed permitted capacity of local landfills;
- result in the project not complying with Federal, State, regional, and local statutes and regulations related to solid waste; or
- result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for public services such as fire protection, police protection, schools, or parks.

In addition to the thresholds listed above, the alternatives under consideration would have a significant effect on utilities and public services if they would:

- physically interfere with a service provider's ability to continue to provide an existing level of service that meets established standards for the project site; or
- result in the need for new systems or substantial alterations to electrical, natural gas, or communications infrastructure, the construction or operation of which would have significant impacts.

Issues Not Discussed Further in this EIS/EIR

Demand for New or Expanded Utilities—The project would not generate any new housing, businesses, or other changes that would increase the demand for natural gas facilities, electrical transmission lines, communication systems, water or drainage infrastructure, water supply, or wastewater conveyance or treatment facilities beyond their current capacity. Therefore, no impact would occur and this issue is not evaluated further in this EIS/EIR.

Demand for New or Expanded Public Services—The project would not generate any new housing, businesses, or other development. Thus, the project would not increase demand for public services, including fire protection, law enforcement, schools, parks, or other public facilities such that construction of new or expansion of existing public facilities would be required. Therefore, no impact would occur and this issue is not evaluated further in this EIS/EIR.

Section 4.20, "Traffic and Transportation," addresses the potential for the project to temporarily affect emergency response times and access during construction.

Impact Analysis

Table 4.21-1 provides a summary of utilities and service systems impacts and mitigation measures for all alternatives under consideration.

Table 4.21-1. Summary of Impacts and Mitigation Measures—Utilities and Service Systems

Impact	Alternative	Level of Significance Before Mitigation	Mitigation Measure	Level of Significance After Mitigation
UTL-1: Temporary Short-term Disruption of Utility Services	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	UTL-1: Verify Utility Locations, Coordinate with Affected Utility Providers, Prepare and Implement a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
UTL-2: Increase in Solid Waste Generation	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	LTS	None	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact UTL-1: Temporary Short-term Disruption of Utility Services.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, “No Action/No Project Alternative,” under “Consequences of No Action.”

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to the temporary, short-term disruption of utility services.

Alternatives 2 through 5: All Action Alternatives

Construction of all of the project components under the action alternatives would encroach upon multiple types of utility equipment and facilities. The project site includes existing agricultural irrigation pump stations, irrigation canals and ditches, PG&E gas pipelines and overhead electrical transmission lines, coaxial communication cables, and the Sacramento International Airport jet fuel pipeline. Because the extent of construction activities under Alternatives 4 and 5 would be reduced as compared to Alternatives 2 and 3, the potential for adverse impacts to utilities would also be less under Alternatives 4 and 5.

Three pump stations (maintained and used by RD 537, RD 785, and RD 827) are located along the existing levee alignment. Two of these pump stations (under Alternatives 4 and 5) or all three pump stations (under Alternatives 2 and 3) would be combined into one station, to be located near the landside toe of the Yolo Bypass East Levee at its junction with the Sacramento Bypass North Levee.

The existing irrigation canal on the east side of the Yolo Bypass East Levee would remain, and a new irrigation canal would be constructed on the east side of the new Yolo Bypass East Levee setback. Irrigation water lines and small irrigation ditches throughout the setback area and along the future alignments of County Roads 124 and 126 would be removed during project-related construction.

As discussed in detail in Chapter 3, “Alternatives,” approximately 100 PG&E wood power poles and associated electrical transmission lines would be removed and relocated within the project site. New facilities would be constructed within designated utility corridors in advance of other construction activities to minimize utility outages.

The Sacramento International Airport pipeline, which provides jet fuel to Sacramento International Airport, would be replaced via horizontal directional drilling (HDD) techniques at least 50 feet below the Sacramento Bypass and the new Sacramento Bypass North Levee setback, and new tie-ins to the existing pipeline would be made to the north and south of the Sacramento Bypass on the project site. In addition, a new concrete pad approximately 30x15 feet would be installed on the west side of the southern irrigation cross canal for future access to the pipeline.

Several additional utility pipe relocations and/or deepening efforts would be required to complete the project in accordance with agency standards. Pipe penetrations anticipated within the levee foundations would include lines to facilitate the removal of interior drainage water and replacements for other existing subsurface utilities, including communications lines.

Those utilities described above that could be affected by project implementation would require temporary removal or relocation prior to construction. Coordination would be required with the utility owners/providers in advance of construction to identify infrastructure locations and appropriate protection measures, and temporary bypasses may be required for some. Any required utility relocation would be conducted either in advance of or concurrent with project construction activities.

Although steps would be taken to minimize potential impacts to utilities, project construction activities, including grading and excavation, could inadvertently damage identified and unidentified utility equipment and facilities. In addition, required relocation of existing utilities could result in interruptions in service. Furthermore, the extent and intensity of project construction activities could affect service providers' abilities to quickly repair damage and/or restore interrupted service. Therefore, the project would have a **potentially significant** impact. Mitigation Measure UTL-1, described below, has been identified to address this impact.

Mitigation Measure UTL-1: Verify Utility Locations, Coordinate with Affected Utility Providers, Prepare and Implement a Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage.

DWR will implement the following measures before construction begins to avoid and minimize potential damage to utilities, infrastructure, and service disruptions during construction.

- Coordinate with CVFPB and applicable utility and service providers to implement orderly relocation of utilities that need to be removed or relocated.
- Provide notification of any potential interruptions in service to the appropriate agencies and affected landowners.
- Verify through field surveys and the use of the Underground Service Alert services the locations of buried utilities in the project site, including natural gas, petroleum, and sewer pipelines. Any buried utility lines will be clearly marked in the area of construction (e.g., in the field) and on the construction specifications in advance of any earth-moving activities.
- Prepare and implement a response plan that addresses potential accidental damage to a utility line. The plan will identify chain-of-command rules for notification of authorities and appropriate actions and responsibilities regarding the safety of the public and workers. A component of the response plan will include worker education training in response to such situations.
- Stage utility relocations prior to and during construction to minimize interruptions in service.
- Coordinate with PG&E to relocate electrical and natural gas transmission lines and associated infrastructure such as power poles.

- Coordinate with Wickland Pipelines, LLC to conduct HDD activities to relocate the existing jet fuel pipeline underneath the Sacramento Bypass and the Sacramento Bypass North Levee setback.

- Coordinate with RD 537, RD 785, RD 827, and project site and adjacent landowners to reestablish, construct, and install agricultural irrigation pipelines and drainage ditches comparable to existing conditions.

Timing: Before and during construction activities.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure UTL-1 would reduce the potentially significant impact associated with temporary, short-term disruption of utility services under all action alternatives to a **less-than-significant** level because DWR will coordinate with affected utility service providers and consumers to minimize utility interruptions and inadvertent damage to unknown buried utilities to the maximum extent feasible, a response plan to address service interruptions will be prepared and implemented, and utilities will be relocated and installed comparable to existing conditions.

Impact UTL-2: Increase in Solid Waste Generation.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

With no construction of setback levees or flood risk reduction measures, and no other meaningful changes to existing conditions at the site, the No Action Alternative would have **no impact** related to increased generation of solid waste.

Alternative 2: DWR's Preferred Alternative (7-Mile Setback Partial Degrade)

Under Alternative 2, activities associated with the riparian plantings and installing erosion protection along the south Sacramento Bypass Training Levee would not generate solid waste. Therefore, these project components would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

Project construction activities under Alternative 2 would generate organic and non-organic solid waste. Sources of organic waste related to construction activities would include soils from degrading the existing Yolo Bypass East Levee and the Sacramento Bypass North Levee, and cleared vegetation, roots, and grass from the project footprints, staging areas, and borrow areas. Non-organic solid waste would include structural debris such as roadway pavement, fencing, landscape irrigation systems, residences, and storage or other structures. Other materials such as pipes, and gravel would also be removed from the footprints of the proposed components.

Soil material excavated from the existing Yolo Bypass East Levee and Sacramento Bypass North Levee as part of construction would most likely be reused to restore agricultural lands within the setback area to an appropriate grade for agricultural activities and to minimize fish stranding, and may also be reused for construction of the setback levees or seepage berms (if the material is suitable). None of the solid organic waste would require off-site transport.

Non-organic solid waste would be generated by structure and road demolition activities, which would consist of removing standing structures within the action alternative footprints (including up to four residences); removing up to three pump stations on the landside of the existing levee; and removing sections of County Roads 124 and 126 (both of which are two-lane asphalt, rural County roads). This waste would be hauled to a permitted disposal site. The location of the landfill used for off-site disposal of construction-related waste would 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 would be used. The Yolo County Central Landfill would be the likely destination for non-organic solid waste.

The Yolo County Central Landfill is located at the intersection of County Road 28H and County Road 104 in Davis, approximately 5 miles southwest of the project site. The landfill is permitted to accept 1,800 maximum tons per day (tpd) of solid waste. As discussed above, the landfill has capacity until its scheduled closure on January 1, 2080.

Project O&M would involve only periodic inspection and routine maintenance activities and would not result in short- or long-term solid waste generation.

Therefore, the Yolo County Central Landfill has sufficient permitted capacity to accommodate the project's construction disposal needs, and this alternative would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Alternative 3: 7-Mile Expanded Setback Full Degrade

Under Alternative 3, activities associated with the riparian plantings and installing erosion protection along the south Sacramento Bypass Training Levee would not generate solid waste. Therefore, these project components would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

Alternative 3 would entail construction of the same facilities as Alternative 2, with a different Yolo Bypass East Levee setback alignment in the southern portion of the project site (located farther east). Because the entire Yolo Bypass East Levee would be degraded, Alternative 3 would generate a large volume of organic waste to be disposed of as compared to Alternative 2. However, the same types of organic and non-organic wastes would be generated by the same project components. Sources of organic waste related to construction activities would include soils from degrading the existing Yolo Bypass East Levee and the Sacramento Bypass North Levee, and cleared vegetation, roots, and grass from the project footprints, staging areas, and borrow areas. Non-organic solid waste would include structural debris such as roadway pavement, fencing, landscape irrigation systems, four residences, and storage or other structures. Other materials such as pipes and gravel, would also be removed from the footprints of the project components.

As discussed above, the Yolo County Central Landfill fill is permitted to accept 1,800 tpd of solid waste and has remaining capacity until its scheduled closure of January 1, 2080. In addition, Landfill Unit 06 is permitted to accept 500 tpd of organic material (for composting), with a total permitted capacity of 45,000 cubic yards. (CalRecycle 2016.)

Project O&M would involve only periodic inspection and routine maintenance activities and would not result in short- or long-term solid waste generation.

Therefore, the Yolo County Central Landfill has sufficient permitted capacity to accommodate the project's construction disposal needs, and this alternative would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Alternative 4: 5-Mile Expanded Setback Partial Degrade

Under Alternative 4, activities associated with the riparian plantings and installing erosion protection along the south Sacramento Bypass Training Levee would not generate solid waste. Therefore, these project components would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

Alternative 4 would entail construction of the same types of facilities as Alternative 2, but the new Yolo Bypass East Levee setback would be shorter, located farther east, and the RD 784 Cross Levee would not be used as a source of borrow material. Because the extent of construction activities under Alternative 4 would be reduced as compared to Alternative 2, the volume of solid waste generated by the project would also be reduced.

However, the same types of organic and non-organic wastes would be generated by the same project components. Sources of organic waste related to construction activities would include soils from degrading the existing Yolo Bypass East Levee and the Sacramento Bypass North Levee, and cleared vegetation, roots, and grass from the project footprints, staging areas, and borrow areas. Non-organic solid waste would include structural debris such as roadway pavement, fencing, landscape irrigation systems, two residences, and storage or other structures. Other materials such as pipes and gravel, would also be removed from the footprints of the project components.

The Yolo County Central Landfill has remaining capacity until its scheduled closure on January 1, 2080. In addition, Landfill Unit 06 is permitted to accept 500 tpd of organic material (for composting), with a total permitted capacity of 45,000 cubic yards. (CalRecycle 2016.)

Project O&M would involve only periodic inspection and routine maintenance activities and would not result in short- or long-term solid waste generation.

Therefore, the Yolo County Central Landfill has sufficient permitted capacity to accommodate the project's construction disposal needs, and this alternative would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Alternative 5: 5-Mile Setback Full Degrade

Under Alternative 5, activities associated with the riparian plantings and installing erosion protection along the south Sacramento Bypass Training Levee would not generate solid waste. Therefore, these project components would have **no impact**.

Mitigation Measure: No compensatory mitigation is required.

Alternative 5 would entail construction of the same types of facilities as Alternative 2, but the new Yolo Bypass East Levee setback would be shorter and the RD 784 Cross Levee would not be used as a source of borrow material. Because the extent of construction activities under Alternative 5 would be reduced as compared to Alternative 2, the volume of solid waste generated by the project would also be reduced.

However, the same types of organic and non-organic wastes would be generated by the same project components. Sources of organic waste related to construction activities would include soils from degrading the existing Yolo Bypass East Levee and the Sacramento Bypass North Levee, and cleared vegetation, roots, and grass from the project footprints, staging areas, and borrow areas. Non-organic solid waste would include structural debris such as roadway pavement, fencing, landscape irrigation systems, one residence, and storage or other structures. Other materials such as pipes and gravel, would also be removed from the footprints of the project components.

The Yolo County Central Landfill has remaining capacity until its scheduled closure of January 1, 2080. In addition, Landfill Unit 06 is permitted to accept 500 tpd of organic material (for composting), with a total permitted capacity of 45,000 cubic yards. (CalRecycle 2016.)

Project O&M would involve only periodic inspection and routine maintenance activities and would not result in short- or long-term solid waste generation.

Therefore, the Yolo County Central Landfill has sufficient permitted capacity to accommodate the project's construction disposal needs, and this alternative would have a **less-than-significant** impact.

Mitigation Measure: No compensatory mitigation measures have been identified to further reduce this impact.

Residual Significant Impacts

Impacts from temporary, short-term disruption of utilities and services (Impact UTL-1) would be potentially significant. However, implementation of Mitigation Measure UTL-1 would reduce these impacts to a less-than-significant level. Therefore, no residual significant impacts would occur.

Impacts from increased generation of solid waste (Impact UTL-2) would be less than significant. Therefore, no residual significant impacts would occur.

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4.22 Water Quality

4.22.1 Environmental Setting

Surface Water Quality and Beneficial Uses

Surface water quality is monitored and the quality is maintained to protect beneficial uses as designated by the Central Valley Regional Water Quality Control Board (CVRWQCB). General water quality conditions and beneficial uses for the project site and vicinity are discussed below.

Yolo Bypass

The Yolo Bypass is inundated approximately once every 3 years with floodwaters from the Sacramento River and Sutter Bypass. When flooded, the Yolo Bypass is considered a Delta waterway and water quality conditions reflect those of the Sacramento River and Sutter Bypass, except along the western margin of the Bypass. After diversion over the Fremont Weir ceases and floodwater within the Bypass drains, chemical concentrations within the Yolo Bypass are influenced by inflows from local streams, which are sources of nutrient and contaminant loading (USGS 2002). Some contaminants from the Sacramento River can be trapped in the Yolo Bypass as the floodplain begins to drain. In addition, local stream inflows, irrigation return flows, and discharges from local urban areas are potential sources of contaminants to the Yolo Bypass (USGS 2002). When the area is not flooded, the Tule Canal/Toe Drain provides connectivity from the Yolo Bypass to the Sacramento River and Delta. The Yolo Bypass has several existing and potential beneficial uses, pertaining to agriculture, habitat, fisheries, and recreation, as detailed in Table 4.22-1.

Tule Canal

The Tule Canal is the major internal drain of the Yolo Bypass. During flood events, the Tule Canal is completely inundated, and its water quality would be typical of the Sacramento River and Sutter Bypass water quality conditions, similar to the Yolo Bypass. During non-flood periods, the Tule Canal serves as an agricultural drainage. Once water has entered the Bypass it accumulates in the lower eastern side in the area occupied by the Tule Canal (from 1 mile south of the Fremont Weir to I-80) and the Toe Drain (from I-80 to Liberty Island). These constructed channels lie adjacent to the flood levees on the eastern boundary of the Bypass and collect water from the west side tributaries, primarily Knights Landing, Cache Creek, and Putah Creek. Water leaves the Yolo Bypass either via the Toe Drain or Liberty Cut at Prospect Slough via Shag Slough or over the southern end of Liberty Island to Cache Slough (CDFW 2008).

Additionally, the Tule Canal is the main discharge location for treated effluent from the City of Woodland’s Water Pollution Control Facility. Woodland’s wastewater receives the highest level of treatment (tertiary and Ultraviolet Light Disinfection) due to the stringent requirements of the City of Woodland’s National Pollutant Discharge Elimination System (NPDES) permit requirement (NPDES No. CA0077950) (City of Woodland 2009). The final effluent is tested to confirm full treatment and to demonstrate compliance with the City’s discharge permit. The Tule Canal has several existing and potential beneficial uses associated with the waterway, pertaining to habitat and fisheries, as detailed in Table 4.22-1.

Table 4.22-1. Sacramento River Designated Beneficial Uses

Beneficial Use	Yolo Bypass	Tule Canal	Sacramento Bypass Training Levee Ditch	Sacramento River (from Knights Landing to the Delta)
Agricultural Irrigation	E	E	N/A	E
Stock Watering	E	N/A	N/A	N/A
Contact Recreation	E	E	N/A	E
Noncontact Recreation	E	N/A	N/A	E
Warm Freshwater Habitat	E	E	N/A	N/A
Cold Freshwater Habitat	P	P	N/A	E
Warm Migration Habitat	E	E	N/A	E
Cold Migration Habitat	P	E	N/A	N/A
Warm Spawning Habitat	E	E	N/A	N/A
Commercial or Sport Fisheries	E	E	N/A	E
Municipal and Domestic Supply	N/A	E	N/A	E
Industrial Service Supply	N/A	N/A	N/A	E
Industrial Process Supply	N/A	N/A	N/A	E
Groundwater Recharge	N/A	N/A	N/A	E
Navigation	N/A	N/A	N/A	E
Groundwater Recharge	N/A	N/A	N/A	E
Migration of Aquatic Organisms	N/A	N/A	N/A	E

Note: Delta = Sacramento-San Joaquin Delta; E = Existing Use; N/A = Not Applicable; P = Potential Use
Source: Central Valley Regional Water Quality Control Board 2016

Sacramento Bypass Training Levee Ditch

The Sacramento Bypass Training Levee Ditch is located immediately adjacent to the training levee located on the project site. The Sacramento Bypass is typically dry, except during flood events. All water in the Sacramento Bypass consists of local drainage, which drains into the Tule Canal/Toe Drain, and overflow from the Sacramento and American Rivers (during flood events). As a result, water quality conditions in the Sacramento Bypass during high-water events would be consistent with those of the Sacramento and American Rivers (Sacramento River water quality is discussed below). American River water is generally characterized as high-quality surface water that is low in alkalinity, mineral content, and organic contamination (RWA et al. 2006). However, since the Sacramento Bypass is inundated once every 5-10 years, there are no beneficial uses associated with the Sacramento Bypass Training Levee Ditch.

Sacramento River (from Knights Landing to the Sacramento-San Joaquin Delta)

All waterways at the project site and vicinity are tributary to the Sacramento River, as the Yolo Bypass drains floodwater back into the river at the southern end of the Bypass. The water quality of the

Sacramento River is good to excellent, with relatively cool water temperatures, low biochemical oxygen demand, medium to high dissolved oxygen, and low mineral and nutrient content. In general, the surface water quality of the Sacramento River is representative of agricultural return flows, urban runoff, and natural sedimentation from scouring. Designated beneficial uses for the Sacramento River are shown in Table 4.22-1.

303(d) Listed Impaired Waters

The State Water Resources Control Board (SWRCB) is required under the Clean Water Act (CWA) Section 303(d) to prepare a list of water bodies (also known as the 303[d] list) that do not meet applicable water quality standards and to develop a priority ranking for development of total maximum daily loads (TMDLs) for each water body. Section 303(d) requires that the State develop a TMDL for each listed pollutant. The TMDL is the amount of loading that the water body can receive and still be in compliance with water quality objectives. The NPDES permit limits for listed pollutants must be consistent with the waste load allocation prescribed in the TMDL. After implementation of the TMDL, the problems that led to placement of a given pollutant on the Section 303(d) list are anticipated to be remediated. Several water bodies at the project site, or immediately downstream of the project site, are currently listed as impaired, as detailed in Table 4.22-2. The Yolo Bypass as a whole is not evaluated in the 303(d) program; TMDLs are only developed for internal drainages within the Yolo Bypass.

Table 4.22-2. Clean Water Act Section 303(d) List of Water Quality Limited Water Bodies

Pollutant	Yolo Bypass*	Tule Canal	Sacramento Bypass Training Levee Ditch	Sacramento River (from Knights Landing to the Delta)
Invasive Species	N/A	N/A	✓	N/A
Mercury	N/A	N/A	✓	✓
Unknown Toxicity	N/A	N/A	✓	N/A
Chlorpyrifos	N/A	N/A	✓	N/A
Diazinon	N/A	N/A	✓	N/A
Dichlorodiphenyltrichloroethane (DDT)	N/A	N/A	✓	✓
Electrical Conductivity	N/A	N/A	✓	N/A
Group A Pesticides	N/A	N/A	✓	N/A
Boron	N/A	✓	N/A	N/A
Escherichia Coli (E. coli)	N/A	✓	N/A	N/A
Fecal Coliform	N/A	✓	N/A	N/A
Salinity	N/A	✓	N/A	N/A
Chlordane	N/A	N/A	N/A	✓
Dieldrin	N/A	N/A	N/A	✓
Polychlorinated biphenyl (PCB)	N/A	N/A	N/A	✓

Note: Delta = Sacramento-San Joaquin Delta; N/A = Not Applicable
* - The Yolo Bypass is not evaluated in the 303(d) program; TMDLs are only developed for internal drainages within the Yolo Bypass.
Source: Central Valley Regional Water Quality Control Board 2014

Sacramento-San Joaquin Delta Mercury Control Program and Methylmercury Total Maximum Daily Load

Although the Yolo Bypass and Tule Canal portion of the project site is outside the Legal Delta, the waterways are subject to site-specific methylmercury fish tissue objectives, the Delta mercury control implementation program, and monitoring provisions which apply to all Delta waterways, Yolo Bypass waterways within the Delta, and also those north of the Legal Delta boundary to which the commercial beneficial use applies (CVRWQCB 2016). The Sacramento River downstream of the Yolo Bypass is also subject to these provisions. A large proportion of the mercury and methylmercury loads in San Francisco Bay and the Delta originate in Cache Creek and pass through the Yolo Bypass (CDFW 2008). The TMDL was adopted as a Basin Plan Amendment and includes a monitoring and control program to reduce methylmercury and inorganic mercury in the Delta. The Delta Methylmercury TMDL was adopted by the CVRWQCB on April 22, 2010. Final approval by the U.S. Environmental Protection Agency (EPA) was received on October 20, 2011.

DWR is conducting a number of field and laboratory studies in the Cache Creek Settling Basin and the Yolo Bypass to provide information for the Yolo Bypass Dynamic Mercury Cycling Model that is being developed to fulfill Phase 1 open water requirements of the Delta Mercury Control Program. DWR has also already completed the sampling of one small wetland in the Bypass (at the confluence of Putah Creek and the Toe Drain) as part of a multiple wetland study to determine if tidal wetlands are sources or sinks for mercury and methylmercury in the Delta. The suite of tidal wetlands sampled (the Yolo Bypass is only one of them) fulfills phase 1 wetland control study requirements of the Delta Mercury Control Program.

4.22.2 Regulatory Setting

Federal

The following Federal plans, policies, regulations, or laws related to water quality apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- CWA – Primary Federal law governing water quality control activities – Applies to the analysis of project-related impacts.
  - CWA Section 404 – Regulates dredge and fill within waters of the United Stated and wetlands.
  - CWA Section 401 – Certifies that a project would not violate State water quality standards.
  - CWA Section 402 – Regulates discharges through NPDES and State waste discharge requirements (WDRs).
  - CWA Section 303(d) – Establishes the TMDL process for impaired waters.

State

- The following State plans, policies, regulations, or laws related to water quality apply to the alternatives under consideration, as listed below (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for additional information).

- Porter-Cologne Water Quality Control Act – Requires RWQCBs to develop basin plans and water quality objectives.

- CVRWQCB Delta Methylmercury TMDL – Applies to Delta waterways and Yolo Bypass waterways within the Delta and north of the Legal Delta to which the Commercial and Sport Fishing beneficial use, site-specific methylmercury fish tissue objectives, Delta mercury control implementation program, and monitoring provisions apply.

- California Toxics Rule and State Implementation Policy – Inland surface waters, enclosed bays, and estuaries in California that are subject to regulation pursuant to Section 303(c) of the CWA.

- California Fish and Wildlife Code Section 1602 – Requires a lake and streambed alteration agreement between CDFW and the DWR (project proponent).

- California State Nondegradation Policy – Applies to construction impacts by specifying that disposal of wastes into waters of the State be regulated to achieve the highest water quality.

- Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan) – Describes official designated beneficial uses for specific surface water and groundwater resources.

- General Order for Dewatering and Other Low Threat Discharges to Surface Waters – Applies to various categories of dewatering activities.

Regional and Local

The following regional and local plans, policies, regulations, or ordinances are relevant to the analysis of the alternatives under consideration, as listed below.

- Yolo County Improvement Standards – Section 11 requires all construction sites identify all storm drains, swales, and creeks in the vicinity of the site and provides Best Management Practices (BMPs).

- Yolo County Code – Chapter 9 – Stormwater Management and Discharge Control Code (known as The Stormwater Ordinance).

- Yolo County 2030 General Plan (Yolo County 2009) – Several policies from the Yolo County General Plan regarding water quality are relevant to project design, construction, and/or impact analysis (see Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans," for relevant policies).

- Yolo County Integrated Regional Water Management Plan (IRWMP) – See Appendix C, "Summary of Applicable Laws, Regulations, Policies, and Plans" for relevant IRWMP policies.

4.22.3 Environmental Consequences and Mitigation Measures

Analysis Methodology

Water quality impacts that could result from project construction activities and project operation were evaluated based on the construction practices and materials that would be used, the location and duration of the activities, and the potential for degradation of water quality or beneficial uses of project site and vicinity waterways.

There were no comments regarding water quality received in response to the NOI and NOP or during the scoping period for this project.

Basis of Significance

The thresholds for determining the significance of impacts for this analysis are based on the environmental checklist in Appendix G of the State CEQA Guidelines, as amended. These thresholds, and the impact analysis that follows, also take into consideration the significance of an action in terms of its context and its intensity (severity) as required under NEPA (40 CFR 1508.27). The alternatives under consideration were determined to result in a significant impact related to water quality if they would do any of the following:

- violate any water quality standards or waste discharge requirements or otherwise degrade water quality (See Impacts WQ-1 and 2); or
- 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 (see Impact HH-3 regarding stormwater quantity and site drainage effects and Impact WQ-1 regarding the possibility of polluted runoff on the project site).

Issues Not Discussed Further in this EIS/EIR

Operations and Maintenance Activities—Project O&M activities would be minimal with the new setback levee and would have no effects on water quality. Therefore, water quality impacts from O&M activities are not considered further in this EIS/EIR analysis.

Impact Analysis

Table 4.22-3 provides a summary of water quality impacts and mitigation measures for all alternatives under consideration.

Table 4.22-3. Summary of Impacts and Mitigation Measures—Water Quality

Impact	Alternative	Level of Impact Significance Before Mitigation	Mitigation Measure	Level of Impact Significance After Mitigation
WQ-1: Possible Temporary and Short-term Impacts on Water Quality from Stormwater Runoff, Erosion, and Spills Associated with Construction	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	WQ-1: Limit Ground-disturbance to Construction Areas and Avoid and Limit Disturbance to Stream Banks and Habitats WQ-2: Install, Monitor, and Maintain Erosion Control Measures to Minimize Soil or Sediment from Entering Waterways or Wetlands WQ-3: Inspect Sediment and Turbidity Control Barriers Daily during Construction for Proper Function and Replace Immediately if Not Functioning Effectively WQ-4: Remove Sediment from Sediment Controls and Dispose of Properly WQ-5: Treat Water with Silt or Mud from Construction Activities to Prevent it from Entering Live Waterways WQ-6: Treat All Disturbed Soils with Appropriate Erosion Control GEO-2: Acquire Appropriate Regulatory Permits, Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices, and Comply with Yolo County Improvement Standards for Grading and Erosion Control HAZ-1: Implement Measures such as a Spill Prevention Control and Countermeasures Plan and Bentonite Slurry Spill Contingency Plan to Reduce the Potential for Environmental Contamination during Construction Activities	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			
WQ-2: Possible Temporary Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table during Construction	Alternative 1: No Action Alternative	NI	None	NI
	Alternative 2: DWR's Preferred Alternative	PS	WQ-7: Obtain Appropriate Discharge and Dewatering Permit and Implement Provisions for Dewatering	LTS
	Alternative 3: 7-Mile Expanded Setback Full Degrade			
	Alternative 4: 5-Mile Expanded Setback Partial Degrade			
	Alternative 5: 5-Mile Setback Full Degrade			

Key:
B = beneficial
NI = no impact
LTS = less than significant
PS = potentially significant
S = significant
SU = significant and unavoidable

Impact WQ-1: ***Possible Temporary and Short-term Impacts on Water Quality from Stormwater Runoff, Erosion, and Spills Associated with Construction.***

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, “No Action/No Project Alternative,” under “Consequences of No Action.”

Without construction of the project, there would be no construction-related impacts to water quality. Water quality would remain relatively unchanged from existing conditions as land uses, levee O&M activities, and resulting runoff would generally be unchanged in the Lower Elkhorn Basin. There would be **no impact**.

Alternatives 2 through 5 – All Action Alternatives

Construction activities associated with setback levee, levee degrade, cutoff wall, seepage berm, and relief well construction; installation of erosion protection; vegetation management; and implementation of the various ecosystem project elements described in Chapter 3, “Alternatives,” could involve storage and use of toxic and other harmful substances near the Tule Canal and other internal drainages or agricultural ditches of the Yolo and Sacramento Bypasses. These project components could result in discharge of these substances to the Sacramento River or other water bodies, under all action alternatives. 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. 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 streams or water bodies in the project site and vicinity, and indirectly affect regional water quality of the river or water body. Therefore, these project components under all action alternatives could have a **potentially significant** impact. Mitigation Measures WQ-1 through WQ-6, GEO-2, and HAZ-1, described below, have been identified to address this impact.

Mitigation Measure WQ-1: Limit Ground-disturbance to Construction Areas and Avoid and Limit Disturbance to Stream Banks and Habitats.

DWR will limit ground-disturbance to construction areas, including necessary access routes and staging areas. The number of access routes, size of staging areas, and total area of the project activity will be limited to the minimum necessary. When possible, existing access routes and points will be used. All roads, staging areas, and other facilities will be placed to avoid and limit disturbance to stream banks and habitat when feasible.

Timing: During project construction.

Responsibility: California Department of Water Resources.

Mitigation Measure WQ-2: Install, Monitor, and Maintain Erosion Control Measures to Minimize Soil or Sediment from Entering Waterways or Wetlands.

DWR will install erosion control measures that minimize soil or sediment from entering waterways and wetlands. These measures will be monitored for effectiveness, and maintained throughout construction activities.

Timing: During and after project construction.

Responsibility: California Department of Water Resources.

Mitigation Measure WQ-3: Inspect Sediment and Turbidity Control Barriers Daily during Construction for Proper Function and Replace Immediately if Not Functioning Effectively.

DWR will inspect performance of sediment and turbidity control barriers at least once each day during construction to ensure they are functioning properly. Should a control barrier not function effectively, it will be immediately repaired or replaced. Additional controls will be installed as necessary.

Timing: During project construction.

Responsibility: California Department of Water Resources.

Mitigation Measure WQ-4: Remove Sediment from Sediment Controls and Dispose of Properly.

DWR will remove sediment from sediment controls once the sediment has reached 1/3 of the exposed height of the control. Sediment collected in these devices will be disposed of away from the collection site at designated fill areas on the project site.

Timing: During project construction.

Responsibility: California Department of Water Resources.

Mitigation Measure WQ-5: Treat Water with Silt or Mud from Construction Activities to Prevent it from Entering Live Waterways.

DWR will treat water containing mud or silt from construction activities by filtration, or retention in a settling pond, adequate to prevent muddy water from entering live waterways.

Timing: During project construction.

Responsibility: California Department of Water Resources.

Mitigation Measure WQ-6: Treat All Disturbed Soils with Appropriate Erosion Control.

DWR will ensure that all disturbed soils undergo appropriate erosion control treatment (e.g., sterile straw mulching, seeding, planting) prior to the end of the construction season, or prior to October 15, whichever comes first.

Timing:	During and after project construction.
Responsibility:	California Department of Water Resources.

Mitigation Measure: Implement Mitigation Measure GEO-2: (Acquire Appropriate Regulatory Permits, Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices, and Comply with Yolo County Improvement Standards for Grading and Erosion Control).

Please refer to Impact GEO-2 in Section 4.11, "Geology, Soils, and Paleontological Resources," for the full text of this mitigation measure.

Mitigation Measure: Implement Mitigation Measure HAZ-1: (Implement Measures such as a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities).

Please refer to Impact HAZ-1 in Section 4.13, "Hazards and Hazardous Materials," for the full text of this mitigation measure.

Significance after Mitigation: Implementation of Mitigation Measures WQ-1 through WQ-6, GEO-2, and HAZ-1 would reduce potentially significant temporary and short-term construction-related water quality impacts under all of the action alternatives to a **less-than-significant** level by requiring preparation and implementation of a Stormwater Pollution Prevention Plan with appropriate BMPs such as source control and revegetation to reduce erosion and by requiring preparation and implementation of a Spill Prevention Control and Countermeasures Plan and Bentonite Slurry Spill Contingency Plan along with other measures designed to prevent contamination of the environment from hazardous materials and maintain surface water quality conditions in adjacent receiving waters.

Impact WQ-2: Possible Temporary Effects on Groundwater or Surface Water Quality Resulting from Contact with the Water Table during Construction.

Alternative 1: No Action Alternative

Under the No Action Alternative, USACE would not grant permission to DWR to modify the SRFCP by constructing setback levees or other flood risk reduction measures in the Lower Elkhorn Basin. The No Action Alternative would allow a continued high risk of flooding from levee deficiencies along 5.5 miles of the Yolo Bypass East Levee in Lower Elkhorn Basin, constrain Yolo Bypass flood conveyance capacities to existing levels, and substantially reduce flexibility to implement future Sacramento Basin flood system improvements to collectively improve public safety for portions of the Cities of Sacramento, West Sacramento, and Woodland. However, no construction-related effects would occur and existing O&M practices would continue. The consequences and environmental effects of potential levee failure and flooding are described in Section 3.5, "No Action/No Project Alternative," under "Consequences of No Action."

Without construction of the project, there would be no construction-related impacts to groundwater or surface water quality resulting from contact with the water table, and no other meaningful changes to existing conditions at the site. Groundwater and surface water quality would remain relatively unchanged from existing conditions as land uses, levee O&M activities, and resulting runoff would generally be unchanged in the Lower Elkhorn Basin. There would be **no impact**.

Alternatives 2 through 5 – All Action Alternatives

Construction of project components or the need for construction dewatering related to construction of the setback levees, cutoff walls, or relief wells under all action alternatives could bring construction-related contaminants such as oil and grease, bentonite, and hazardous materials in contact with the water table. Trenching and excavation associated with installation of cutoff walls 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. Slurry cutoff walls could also affect groundwater quality by reducing the inflow of good quality recharge from the Sacramento River and western Yolo County to the shallow and deep aquifers.

On October 15, 2007, DWR entered into an agreement with CVRWQCB describing acceptable means of treatment and disposal of investigation-derived material. The agreement also describes acceptable means of disposal for drilling fluid and wet cuttings containing bentonite, as listed below.

- Investigation-Derived Material not containing bentonite (i.e., dry cuttings) may be broadcast on the landside of the levee slope at least 100 feet from any water feature, including dry ditches, wet ditches, streams, ponds, vernal pools, and wetland areas.

- Investigation-Derived Material containing bentonite will not be discharged to the ground surface without a means of containment (i.e., settling basin), or will be containerized on site. All bentonite that contains Investigation-Derived Material will be disposed of at an approved landfill facility or deposited at an approved settling basin.

- A Bentonite Slurry Spill Contingency Plan will be developed for activities that involve the use of bentonite materials (e.g., the construction of slurry walls). The plan 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. In addition, a Spill Prevention Control and Countermeasures Plan will be developed to prevent discharge of petroleum products into navigable water or adjoining shorelines.

Because dewatering of the construction area and direct construction of project components could have an adverse effect on groundwater or surface water quality, these project components under all action alternative would have a **potentially significant** impact. Mitigation Measure WQ-7, described below, has been developed to address this impact.

Mitigation Measure WQ-7: Obtain Appropriate Discharge and Dewatering Permit and Implement Provisions for Dewatering.

Before discharging any dewatered effluent to surface water, DWR will obtain a Low Threat Discharge and Dewatering NPDES permit, or an Individual Permit from the CVRWQCB if the dewatering is not covered under the RWQCB’s NPDES Construction General Permit. The dewatering permit includes extensive water quality monitoring 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 a cutoff wall, the dewatering permit will 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.

Implementation 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 would be subject to approval by CVRWQCB. DWR will verify that coverage under the appropriate NPDES permit has been obtained before allowing dewatering activities to begin. DWR or its authorized agent will perform routine inspections of the construction area to verify that the water quality control measures are properly implemented and maintained. DWR will notify its contractors immediately if there is a non-compliance issue and shall require compliance.

Timing: Before the start of earth-moving activities and during construction.

Responsibility: California Department of Water Resources.

Significance after Mitigation: Implementation of Mitigation Measure WQ-7 would reduce the potential impacts associated with the potential release of contaminants to surface or groundwater during construction of all action alternatives to a **less-than-significant** level because implementation of dewatering provisions would decrease the potential for release of these contaminants, and would provide for cleanup should these releases occur.

Residual Significant Impacts

Potential temporary and short-term impacts on water quality from stormwater runoff, erosion, and spills associated with construction (Impact WQ-1) and possible temporary effects on groundwater or surface water quality resulting from contact with the water table during construction (Impact WQ-2) would be potentially significant. However, implementation of Mitigation Measures WQ-1 through WQ-7, GEO-2, and HAZ-1 would reduce these impacts to a less-than-significant level. Therefore, no residual significant impacts would occur.

Chapter 5. Cumulative Impacts

5.1 Introduction

5.1.1 NEPA Requirements

The Council on Environmental Quality (CEQ) regulations implementing provisions of NEPA define cumulative effects as "the effect on the environment which results from the incremental effect 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" (40 Code of Federal Regulations [CFR] 1508.7). Cumulative effects can result from individually minor, but collectively significant actions over time (40 CFR 1508.8). They are caused by the incremental increase in total environmental effects when the evaluated project is added to other past, present, and reasonably foreseeable future actions.

5.1.2 CEQA Requirements

As defined in State CEQA Guidelines Section 15355, a cumulative impact is an environmental impact that is created as a result of the combination of the project evaluated together with other projects causing related impacts. CEQA requires that an EIR discuss cumulative impacts of a project when the project's incremental effect is cumulatively considerable (State CEQA Guidelines Section 15130[a]). "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past, current, and probable future projects (State CEQA Guidelines Section 15065[a][3]). If an incremental effect is not cumulatively considerable, then the lead agency does not need to consider that effect significant and must briefly describe the reason why (State CEQA Guidelines Section 15130[a]).

State CEQA Section 15130(b) states that the discussion of cumulative impacts need not provide as much detail as the discussion of the effects attributable to the project. The level of detail should be guided by what is practical and reasonable.

The elements provided below are necessary for an adequate discussion of significant cumulative impacts (State CEQA Guidelines Section 15130[b]).

- A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency; or a summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or areawide conditions contributing to the cumulative impact. Any such planning document shall be referenced and made available to the public at a location specified by the lead agency.

- A defined geographic scope of the area affected by the cumulative effect and a reasonable explanation for the geographic limits identified.

- A summary of expected environmental effects that might be produced by those projects with specific reference to additional information stating where that information is available.

- A reasonable analysis of the cumulative impacts of the relevant projects. An EIR shall examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant or potentially significant cumulative effects.

5.2 Method of Analysis

This cumulative impact analysis has four steps as defined below.

- Define and present the geographic scope of potential cumulative impacts (Subsection 5.2.1, "Geographic Scope of Cumulative Impacts").

- Provide a context for the cumulative impact analysis, including a broad overview of the Yolo Bypass and regional land use and growth that establishes the cumulative context upon which the project would interact with past, present, and probable future projects in the Sacramento region (Subsection 5.2.2, "Cumulative Context").

- List and summarize past, present, and probable future (reasonably foreseeable) projects to include in the cumulative analysis (Subsection 5.2.3, "List of Projects Considered in Cumulative Impact Analysis," and Subsection 5.2.4, "Summary of Projects Considered in Cumulative Impact Analysis").

- Conduct cumulative impact analyses (Section 5.3, "Cumulative Impact Analysis by Topic Area").

5.2.1 Geographic Scope of Cumulative Impacts

State CEQA Guidelines indicate that lead agencies "should define the geographic scope of the area affected by the cumulative effect" (California Code of Regulations [CCR] Section 15130[b][3]). Although the geographic scope of the area affected by cumulative impact varies by topic, it consists of four geographic areas, as described below.

- Project Site—Lower Elkhorn Basin (see Figure 1-1, "Project Vicinity), where all new and modified project levees and other facilities would be located, constructed, and operated.

- Project Vicinity and Region—generally the project vicinity and region shown in Figure 1-1, "Project Vicinity," which some topics would affect when considered in a cumulative context such as air quality and climate change (see topic-specific geographic areas below).

- Regional Transportation Network—linear transportation corridors used for truck haul routes during construction (up to 50 miles from the project site primarily along portions of I-5 and I-80, part of which is shown in Figure 1-1, "Project Vicinity").

- Sacramento River Flood Control Project Area—all rivers and bypasses included in Table 4.14-3, "Hydraulic Modeling Results at Representative Index Points for 100- and 200-year Events," and as shown in Figure 4.14-1, "Location of Sacramento River HEC-ResSim System Model Index Points," where project and flood system operations would measurably modify flow conditions during potential flood events, as listed below.

    - Sutter Bypass Upstream of Fremont Weir to Fremont Weir.

- Yolo Bypass Downstream of Fremont Weir to Cache Slough, including Cache Slough Complex (e.g., Streamboat, Miner, and Lindsey Sloughs) (i.e., entire bypass).
- Sacramento Bypass at Sacramento Weir (i.e., entire bypass) and Natomas Cross Canal.
- Sacramento River Deep Water Ship Channel (DWSC) (entire ship channel).
- Sacramento River downstream of Knights Landing to Rio Vista.
- Lower American River, primarily near its confluence with the Sacramento River.

The stage changes in the Sutter Bypass, Natomas Cross Canal, DWSC, and lower American River were only considered with respect to hydraulic impacts as these changes during potential flood events (including 100- and 200-year flood events) would either be: (1) beneficial stage and flow reductions in Sutter Bypass (including Feather River), the lower American, and Natomas Cross Canal that would not adversely affect other environmental resources or topics in any way, given the sheer magnitude of the flows; or (2) small stage and flow increases in the Cache Slough Complex and DWSC that also would not adversely affect other environmental resources or topics in any way, given the sheer magnitude of the flows.

The geographic scope of the area affected by the project for each of the topics addressed in this EIS/EIR is listed below.

- Aesthetics—local (individual improvement sites), and immediate vicinity.
- Air Quality—regional (Sacramento Federal Ozone Nonattainment Area [includes Sacramento and Yolo Counties, the western portion of El Dorado County, and portions of Placer and Solano Counties]).
- Biological Resources (Fish and Aquatic Organisms)—local (individual improvement sites), and regional.
- Biological Resources (Vegetation and Wildlife)—local (individual improvement sites), and regional.
- Biological Resources (Wetlands and Other Waters)—local (individual improvement sites), and regional.
- Climate Change (including Greenhouse Gas Emissions)—local (individual improvement sites), regional, and global.
- Cultural Resources (Archaeological, Historical, and Tribal)—local (individual improvement sites), and regional.
- Energy—local (individual improvement sites), and regional.
- Environmental Justice—local (individual improvement sites).
- Geology, Soils, and Paleontological Resources—local (individual improvement sites), and regional (Sacramento Valley for paleontological resources).
- Groundwater Resources—local (individual improvement sites).

- Hazards and Hazardous Materials—local (individual improvement sites), and nearby construction projects.
- Hydrology, Hydraulics, and Flood Risk Management—local (drainage systems affected within and downstream of individual improvement sites), and regional (Sacramento River Flood Control System).
- Land Use and Planning, and Agricultural and Forestry Resources—local (individual improvement sites), and regional.
- Mineral Resources—local (individual improvement sites), and the Sacramento-Fairfield Production Consumption Region.
- Noise—local (immediate vicinity of the local improvement sites and along access routes to I-5 during construction activities) and regional transport network for truck haul routes during construction (up to 50 miles from the project site primarily along portions of I-5 and I-80).
- Recreation—local (individual improvement sites).
- Socioeconomics (including Population, Housing, and Employment)—local (immediate vicinity of the individual improvement sites), and regional.
- Traffic and Transportation—local (roadways in immediate vicinity of the local improvement sites and along access routes to I-5 during construction activities) and regional transportation network for truck haul routes during construction (up to 50 miles from the project site primarily along portions of I-5 and I-80).
- Utilities and Service Systems—local service areas.
- Water Quality—local (immediate vicinity of the individual improvement sites), and regional.

5.2.2 Cumulative Context

This subsection provides a broad overview of the Yolo Bypass and land use, growth, and infrastructure in the region affected by the Lower Elkhorn Basin Levee Setback (LEBLS) project. It sets the cumulative context upon which the project would interact with past, present, and probable future projects in the Sacramento region.

Yolo Bypass

The Yolo Bypass is a prominent flood conveyance feature of the Sacramento River Flood Control Project (SRFCP). Yolo Bypass levees are operated and maintained by local levee and reclamation districts and DWR. These maintenance activities are inspected and monitored by DWR, USACE, and the Central Valley Flood Protection Board (CVFPB) to ensure compliance with Federal regulations. Because of its strategic location and features, the Yolo Bypass is currently the focus of several major interagency planning efforts and projects aimed at improving flood conveyance, fisheries and wildlife habitats, water supply and water quality, agricultural land preservation, and economic development; relevant projects are discussed later in this chapter. See Appendix B, “Project Background and Context,” for detailed information on the existing Yolo Bypass flood management facilities and proposed systemwide improvements).

Land Use and Population

The area in and adjacent to the Yolo Bypass is comprised of urban, agricultural, and environmental land use areas. Urban lands adjacent to the Yolo Bypass are located within Sacramento, Yolo, and Solano Counties. The Cities of Sacramento, West Sacramento, Woodland, Davis, and Rio Vista are located adjacent to the Yolo Bypass. Most of the farmland in and adjacent to the Yolo Bypass is classified in the State's highest category of agricultural land. The Yolo Bypass is seasonally inundated depending on the flows in the Sacramento River, and since agricultural land makes up the largest portion of the Bypass, the impact associated with inundation of Yolo Bypass lands can adversely affect the regional economy (DWR 2016a.)

Natural Resources and Wildlife Areas

There are significant natural resources such as aquatic habitats, wetlands, riparian habitats, and wildlife foraging areas within the Yolo Bypass. Given substantial evidence over nearly 15 years for its benefits to native fishes during flooded periods (DWR 2015), the Yolo Bypass has become the focus of interest in managing seasonally flooded habitat in the Delta. Hence, floodplain restoration in the Yolo Bypass has become increasingly important to increase survival of special-status fishes such as Chinook salmon, Sacramento splittail, and green sturgeon.

Many of the more than 500 species of native plants and wildlife found in the Central Valley rely, to some extent, on habitat existing within the Yolo Bypass. Many of these resources are located within wildlife areas managed by the California Department of Fish and Wildlife (CDFW), as listed below.

- *Yolo Bypass Wildlife Area* – The approximately 15,900-acre Yolo Wildlife Area, includes approximately 3,700 acres of land in the Yolo Bypass floodway restored to wetlands and other associated habitats.

- *Fremont Weir Wildlife Area* – The Fremont Weir Wildlife Area is located in the northern part of the Yolo Bypass and consists of approximately 1,461 acres of tall weedy vegetation, brush, valley oaks, willows, and cottonwood trees.

- *Sacramento Bypass Wildlife Area* – The Sacramento Bypass Wildlife Area is an approximately 360-acre area preserve, providing important cover and feeding areas for wildlife during late fall, winter, and early spring. Vegetation varies throughout the preserve, from mature cottonwood trees to willows and valley oaks.

Agricultural areas within the Bypass also provide valuable habitat for wintering waterfowl within flooded rice fields and Swainson's hawk foraging habitat within alfalfa fields. Vegetation in the wildlife areas is managed by DWR and CDFW to maintain the design flood conveyance capacities of the Yolo and Sacramento Bypasses while achieving significant wildlife habitat benefits. (DWR 2016a.)

Existing Flood Facilities

Key existing flood facilities of the Yolo Bypass include levees, Fremont Weir at the northern end of the Yolo Bypass, Knights Landing Ridge Cut, the Cache Creek Settling Basin, Willow Slough Bypass Channel, Sacramento Weir and Sacramento Bypass, Putah Creek, DWSC, Cache Slough, and Lindsey Slough. See Section B.5 in Appendix B, "Project Background and Context," for summary descriptions of these flood facilities.

Other Key Infrastructure

Major interstate highways and State highways cross the Yolo Bypass on causeways – I-5 on the north, I-80 in mid-region. The Sacramento Northern Railway short-line rail trestle passes over the Yolo Bypass and then runs along the west levee of the Sacramento River into the City of West Sacramento. The Union Pacific Railroad crosses the Bypass adjacent to I-80. There are also electrical power lines, pipelines, natural gas wells, and farm infrastructure within the Yolo Bypass. Other surrounding infrastructure includes the Woodland-Davis Clean Water Agency's raw water supply pipeline connecting the Sacramento River to the water treatment plant in Woodland, which includes a buried pipeline that crosses the Yolo Bypass along the north side of County Road 22.

Sacramento Area Council of Governments Sacramento Region Blueprint

The Sacramento Area Council of Governments (SACOG) is an association of local governments in the six-county Sacramento Region, including the Counties of Sacramento, El Dorado, Placer, Sutter, Yuba, and Yolo and the 22 incorporated cities within. The Sacramento Region Blueprint (SACOG and Valley Vision 2004) depicts a way for the region to grow through the year 2050 as the current population of about 2 million increases to more than an estimated 3.8 million; the number of jobs increases from approximately 921,000 to an estimated 1.9 million; and the amount of housing increases from approximately 713,000 to an estimated 1.5 million units. The SACOG Preferred Blueprint Scenario provides a vision for growth that promotes compact, mixed-use development, and more transit choices as an alternative to low-density development. The Preferred Blueprint Scenario predicts that undertaking a realistic long-term planning process will result in long-term environmental benefits and avoidance of adverse impacts; these benefits are intended to minimize the extent of the inevitable physical expansion of the overall regional urban area. As a result, natural resources that might be lost under a traditional approach would be protected because less land would be required for urban uses and less agricultural land would be converted. In addition, the Preferred Blueprint Scenario predicts less time per person devoted to travel, fewer car trips, and fewer miles traveled to work and local businesses. The reduction in traffic compared with what would occur under traditional patterns would lead to long-term reductions in air quality emissions in the region by reducing the amounts of vehicular carbon monoxide and particulate matter that would otherwise be emitted under traditional, lower-density development patterns. (SACOG and Valley Vision 2004.)

Although it is only advisory, the Blueprint provides policy guidance in the Sacramento region for long-term regional land use and transportation planning. A number of jurisdictions either are adopting the Blueprint concepts or are considering and encouraging projects consistent with the Blueprint.

Yolo County

Yolo County encompasses approximately 1,021 square miles within the agriculturally rich Central Valley and Delta regions of California. It is located west of Sacramento County and northeast of Solano and Napa Counties, directly between the rapidly growing regions of Sacramento and the San Francisco Bay Area. Sacramento International Airport, Capitol Corridor train, Port of Sacramento, and I-5, I-80, and I-505 allow easy access to the surrounding region. Yolo County has experienced, and will continue to experience, pressure to provide additional residential, commercial, and industrial development opportunities in the region. The County's economy is primarily based on agriculture. Yolo County has led the State in agricultural preservation practices for the last several decades, primarily by directing growth into the incorporated cities where services are available and where development can occur more efficiently. (Yolo County 2009a.)

The County's major population centers include the Cities of Davis, West Sacramento, and Woodland. Woodland is the County seat, and is located in the central/eastern portion of the County. Davis is the largest city in the County and is located in the southern portion of the County. West Sacramento is the third largest city in the County and is located in the eastern County. In 2008, the County's estimated 653,549 acres were home to approximately 199,066 people of which about 22 percent live in unincorporated towns, community areas, the UC Davis campus, and farms. The remaining approximately 88 percent are concentrated in the four incorporated cities: Davis, West Sacramento, Winters, and Woodland. Yolo County contained an estimated 73,138 housing units, also with the majority (about 90 percent) concentrated within Davis, West Sacramento, Winters, and Woodland. (Yolo County 2009b.)

According to SACOG projections (2008-2035), the population of unincorporated Yolo County and the County as a whole are anticipated to grow by an average of approximately 1.4 percent annually. Growth in the unincorporated County is not expected to occur evenly across communities, with higher growth rates projected for the Cities of West Sacramento and Winters and lower growth rates projected for the Cities of Davis and Woodland, and for the unincorporated communities of Clarksburg, Dunnigan, and Knights Landing. By 2020, SACOG projects an estimated total population of just under 30,000 for the unincorporated County, and nearly 225,000 Countywide. (Yolo County 2009a.)

Due to the Yolo County General Plan's strict land use policies and strong focus on protecting agricultural and open space resources, an estimated 92 percent of land within Yolo County is off-limits to residential, commercial, and industrial development uses. Additionally, approximately 67 percent of the unincorporated area of the County is protected under Williamson Act contracts to provide further long-term protection of these lands. The largest areas of designated open space are the U.S. Bureau of Land Management lands in the Cache Creek Natural Area and CDFW lands and other State-owned lands within the Yolo Bypass. Future residential or commercial growth will be directed to urban infill and buildout of vacant and underutilized parcels in existing incorporated cities and towns. (Yolo County 2009a, 2009b.)

City of Woodland

Woodland lies about 20 miles northwest of Sacramento on I-5 and approximately 7 miles north of Davis on State Route (SR) 113. The Yolo Bypass of the Sacramento River lies approximately 3 miles east of the City, Willow Slough is located about 1 mile to the southeast, and Cache Creek is located approximately 2 miles to the north. Woodland is completely surrounded by agricultural lands and is located within an important agricultural region.

Woodland's City limits encompass approximately 10.25 square miles. Residential uses encompass over half of the land area. Industrial development, constituting about one-third of the land area in the City, is located primarily in the northeast part of the City. Commercial uses are found along Main Street and East Street. The downtown area is centrally located along Main Street.

Woodland's population is projected to increase from approximately 42,500 in 1995 to approximately 66,000 in 2020, while employment is projected to increase from approximately 15,400 to approximately 25,400 during the same time period (City of Woodland 2002). Housing units are expected to increase from approximately 15,822 to approximately 25,300, approximately 3,000 of which would be developed within the City limits (City of Woodland 1996). This results in annual growth rates of approximately 1.8 percent for population, approximately 3.7 percent in employment, and approximately 2.0 percent for housing. Vacant and underutilized land within the City limits consists of approximately 959 acres, with an additional estimated 4,540 acres located outside of the City limits but within the planning area (City of Woodland 1996). Approximately 500 acres within the City limits is planned for commercial and industrial/business park development (City of Woodland 1996). Additional industrial development is planned to the north and northeast and additional residential development is planned to occur in the south. Additional commercial development will be accommodated along Main Street and East Street (City of Woodland 1996).

The City of Woodland General Plan is currently undergoing an update for the 2035 planning horizon. An updated NOP for the 2035 General Plan EIR was released on May 23, 2016.

City of West Sacramento

West Sacramento is located in eastern Yolo County between the Sacramento River on the east and the Yolo Bypass on the west. The Sacramento Bypass is located immediately adjacent to and north of the West Sacramento City limits. West Sacramento lies immediately across the Sacramento River from the City of Sacramento and is approximately 85 miles east of San Francisco. I-80 runs through the northwestern part of the City; Business 80/U.S. 50 bisects the City, running east-west through the center of town. The City limits of West Sacramento encompass the former unincorporated communities of Broderick, Bryte, West Sacramento, and Southport. (City of Sacramento 2000.)

As of 1994, there were approximately 3,198 acres of residential land; approximately 1,164 acres of industrial land; and approximately 386 acres of commercially zoned land available within the City. In addition, there were approximately 767 acres of vacant agricultural land, approximately 625 acres of vacant land zoned for open space/parks, and approximately 456 acres of vacant waterfront. The Waterfront and Waterfront Commercial designations allow a range of residential and commercial uses. In 1980, the population of West Sacramento was approximately 24,521, which had grown to approximately 30,467 in 1993. (City of West Sacramento 2000.) The population in 2014 was approximately 50,836 (City of West Sacramento 2015).

The City of West Sacramento General Plan is in the process of undergoing an update for the 2035 planning horizon. The draft General Plan Land Use Map, released in August 2015, indicates that the approximately 415-acre area in the northwestern portion of the City adjacent to the Sacramento Bypass would continue to be designated as “Public/Quasi Public.” (City of West Sacramento 2015.)

Sacramento County

Sacramento County encompasses approximately 775 square miles in the middle of the approximately 400-mile-long Central Valley, which is California's prime agricultural region. Sacramento County is bordered by Contra Costa and San Joaquin Counties on the south, Amador and El Dorado Counties on the east, Placer and Sutter Counties on the north, and Yolo and Solano Counties on the west. Sacramento County extends from the low Delta lands between the Sacramento and San Joaquin Rivers north to about 10 miles beyond the State Capitol and east to the Sierra Nevada foothills. Both recreational boating and maritime commerce in Sacramento County have access to the San Francisco Bay via the Sacramento River. Sacramento County lies at the geographic center of the region and spans both agricultural land uses as well as the most urbanized areas of the region. The geographic boundaries of Sacramento County include seven incorporated cities: Sacramento, Folsom, Rancho Cordova, Citrus Heights, Elk Grove, Galt, and Isleton.

The highest densities of employment and residential uses are located in the urban core of the City of Sacramento. Two of the three regional employment centers are located in Sacramento County, one in downtown Sacramento and the more recent along the U.S. 50 corridor in the Cities of Rancho Cordova and Folsom. Land uses north of the American River are primarily suburban residential with concentrations of commercial and employment uses along major transportation routes. The southern end of the region (e.g., South Sacramento, the unincorporated Vineyard community, and the Cities of Elk Grove and Galt) is predominantly residential, with the latter three areas at fairly low suburban to rural densities. The Cosumnes River floodplain and existing agricultural operations separate the Cities of Elk Grove and Galt. The southeast County (outside of existing cities and the County Urban Services Boundary) is in agricultural use with pockets of rural residential communities.

According to the SACOG Sacramento Region Blueprint, the unincorporated portion of Sacramento County will grow by nearly 100,000 new jobs and approximately 100,000 new housing units by 2030 (Sacramento County 2009). Accommodating the projected employment and the new residents will not only require more housing, but will also necessitate additional jobs, stores, human services, transportation system capacity, public facilities, and municipal and Countywide services. The County population grew from approximately 1,041,219 in 1990 to approximately 1,223,499 in 2000 (U.S. Census Bureau 2003), and the population of the County as of January 1, 2015, was estimated to be 1,501,335 (U.S. Census Bureau 2016a). Growth is projected to occur primarily in the Cities of Elk Grove, Rancho Cordova, and Folsom (south of U.S. 50); in the community of Natomas; and in new growth areas along Jackson Highway (SR 16) where land is available within the County Urban Services Boundary.

City of Sacramento

The City of Sacramento is located approximately 80 miles east of San Francisco and 85 miles west of Lake Tahoe in the Central Valley. The City is located at the northern end of the Delta and the confluence of the Sacramento and American Rivers. Sacramento is the capitol of the State of California and is the largest incorporated city in Sacramento County. (City of Sacramento 2014.)

Sacramento is a major transportation hub, the point of intersection of major highway and rail transportation routes that connect Sacramento to the San Francisco Bay Area to the west, the Sierra Nevada range and State of Nevada to the east, City of Los Angeles to the south, and the State of Oregon to the north. The City is crossed by three major freeways: I-5, which traverses the State from north to south; I-80, which is an important cross-country, interstate highway that also provides an east-west connection between San Francisco and Reno; and U.S. 50, which provides a connection from Sacramento to South Lake Tahoe and points farther east. The Union Pacific Railroad tracks also transect the City providing rail connections to the rest of the western portion of the State. (City of Sacramento 2014.)

The City of Sacramento and Sacramento County have experienced population growth in the recent past, and this growth is forecasted to continue. The California Department of Finance estimates that the City of Sacramento’s total estimated population increased from approximately 407,018 in 2000 to an estimated 466,488 in 2010, a 1 percent increase over the 10-year period (City of Sacramento 2013). As of July 1, 2015, the City’s total estimated population was an estimated 490,712 (U.S. Census Bureau 2016b). The City is expected to reach a total estimated population of 640,381 by 2035 (City of Sacramento 2013). This represents an increase of approximately 38 percent over the 2010 estimated population. Most of this population growth is anticipated to occur in North Natomas and the Central City.

5.2.3 List of Projects Considered in Cumulative Impact Analysis

This cumulative impact analysis includes past, present, and probable future flood risk reduction and related projects that potentially could impact resources affected by the project. The criteria used to identify individual projects for consideration in this cumulative impact analysis are defined below.

- The project would have an effect on a portion of the physical environment that also could be affected by the Lower Elkhorn Basin Levee Setback (LEBLS) project (i.e., interact on a cumulative basis spatially and/or temporally).

- Sufficiently detailed information about the project is available to allow meaningful cumulative analysis without undue speculation.

- The project is actively under development (i.e., an identified project sponsor/lead agency is actively pursuing project development or construction; a Notice of Intent (NOI) or Notice of Preparation (NOP) has been released and/or project-level environmental clearance documentation has been completed or substantial progress has been made toward completion; and the project is "reasonably foreseeable" given other considerations, such as site suitability, funding and economic viability, and regulatory limitations/requirements).

If a related project met all of these criteria, then it was considered reasonably foreseeable and was included in the cumulative impact analysis. It was then determined whether the LEBLS project could cause a cumulatively considerable incremental contribution to an overall significant cumulative impact on each resource from all related projects shown in Table 5-1 combined, including LEBLS project activities.

The cumulative impact analyses for each resource was qualitative with the exception of hydrology and hydraulics. The qualitative analysis considered projects that are in the planning stage and are being discussed by various entities, and projects that are not quantifiable. These cumulative projects were addressed qualitatively to disclose information about potential cumulative impacts.

The 2012 Central Valley Flood Protection Plan (CVFPP) Program EIR (DWR 2012b) as modified by the Draft CVFPP 2017 Update Supplemental Program EIR (DWR 2016b) provide cumulative impact analyses and mitigation at a program level. This EIS/EIR cumulative impact analysis draws from these two previous DWR Program EIRs where necessary and appropriate.

Table 5-1. Projects Considered for Cumulative Impact *Analysis*

Project	Primary Project Proponent(s)	Existing Conditions		No Action/No Project	Future Conditions (Cumulative)	Projects Included in Hydraulic Modeling	
		Past	Present			Existing Conditions	Future Conditions
Relevant Plans							
Central Valley Flood Protection Plan	California Department of Water Resources	✓	✓	✓	✓		
▪ Sacramento River Basin-Wide Feasibility Study	California Department of Water Resources		✓	✓	✓		
▪ Lower Sacramento River/Delta North Regional Flood Management Plan	FloodProtect/California Department of Water Resources		✓	✓	✓		
▪ Central Valley Flood System Conservation Strategy	California Department of Water Resources		✓	✓	✓		
▪ Central Valley Integrated Flood Management Study	California Department of Water Resources, U.S. Army Corps of Engineers	✓	✓	✓	✓		
California Water Action Plan	State of California, Governor's Office		✓	✓	✓		
Yolo Habitat Conservation Plan/Natural Community Conservation Plan	Yolo Habitat Conservancy				✓		
Westside Sacramento Integrated Regional Water Management Plan	Westside Sacramento Regional Water Management Group		✓	✓	✓		
The Delta Plan	Delta Stewardship Council	✓	✓	✓	✓		
Fish Restoration Program Agreement	California Department of Water Resources, California Department of Fish and Wildlife	✓	✓	✓	✓		
CALFED		✓	✓	✓			
Flood Risk Reduction Projects							
Authorized Section 408 Projects							
Cache Creek Setback Levee Project	California Department of Water Resources	✓					
Natomas Levee Improvement Program	Sacramento Area Flood Control Agency	✓	✓	✓	✓	✓	✓
North Sacramento Streams Levee Accreditation Project	Sacramento Area Flood Control Agency				✓		
Sacramento River East Levee Accreditation Project	Sacramento Area Flood Control Agency				✓	✓	✓
Feather River West Levee Project	Sutter Butte Flood Control Agency					✓	✓
Star Bend Setback Levee Project	Sutter Butte Flood Control Agency	✓				✓	✓
Feather River East Levee Project	Three Rivers Levee Improvement Authority	✓				✓	✓

Table 5-1. Projects Considered for Cumulative Impact *Analysis*

Project	Primary Project Proponent(s)	Existing Conditions		No Action/No Project	Future Conditions (Cumulative)	Projects Included in Hydraulic Modeling	
		Past	Present			Existing Conditions	Future Conditions
Western Pacific Interceptor Canal	Three Rivers Levee Improvement Authority				✓		
West Sacramento and Southport Projects	West Sacramento Area Flood Control Agency	✓	✓		✓	✓	✓
Section 408 Authorizations Currently under Consideration							
Colusa Boat Launch	City of Colusa				✓		
Rice Mill Pier	City of West Sacramento				✓		
Feather River Parkway – Phase 2	City of Yuba City				✓		
Mark Brennen Security Fence (excluded, small size)	Central Valley Flood Protection Board						
Knights Landing Outfall Gates	Reclamation District 108	✓	✓				
Natomas East Main Drainage Canal North Extension	Sacramento Area Flood Control Agency	✓	✓		✓		
North Sacramento Streams Levee Accreditation Project	Sacramento Area Flood Control Agency				✓		
Putah Creek Nature Park Channel Realignment	Solano County Water Agency				✓		
Western Pacific Interceptor Canal 200-Year Standard Project	Three Rivers Levee Improvement Authority				✓		
Southport Early Implementation Project	West Sacramento Area Flood Control Agency	✓	✓		✓		
Other Projects							
American River Common Features General Reevaluation Project	U.S. Army Corps of Engineers				✓		✓
Folsom Dam Auxiliary Spillway Approach Channel	Sacramento Area Flood Control Agency				✓		
▪ Folsom Dam Raise	Sacramento Area Flood Control Agency				✓		
▪ Folsom Dam Right Bank Stabilization	Sacramento Area Flood Control Agency				✓		
Sutter Basin Pilot Project	Sutter Butte Flood Control Agency				✓		
West Sacramento General Reevaluation Project	West Sacramento Area Flood Control Agency	✓	✓		✓		
Urban and Nonurban Levee Evaluation Programs	California Department of Water Resources	✓		✓			

Table 5-1. Projects Considered for Cumulative Impact *Analysis*

Project	Primary Project Proponent(s)	Existing Conditions		No Action/No Project	Future Conditions (Cumulative	Projects Included in Hydraulic Modeling	
		Past	Present			Existing Conditions	Future Conditions
CALFED Levee System Integrity Program	U.S. Army Corps of Engineers, California Department of Water Resources, California Department of Fish and Wildlife	✓		✓			
Cache Creek North Levee Setback Project	California Department of Water Resources	✓		✓			
Feather River East Levee Repair Project	Three Rivers Levee Improvement Authority	✓		✓		✓	✓
Star Bend Levee Setback and Habitat Enhancement Project	Levee District One of Sutter County	✓		✓			
Sacramento River Flood Control Project	California Department of Water Resources, U.S. Army Corps of Engineers, Central Valley Flood Protection Board	✓	✓	✓			
Sacramento River Bank Protection Project	U.S. Army Corps of Engineers	✓	✓	✓	✓		
American River Common Features Project WRDA 1996/99	U.S. Army Corps of Engineers	✓	✓	✓	✓	✓	✓
Folsom Dam Safety and Flood Damage Reduction Joint Federal Project	U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Central Valley Flood Protection Board, Sacramento Area Flood Control Agency	✓	✓	✓	✓	✓	✓
Folsom Joint Federal Project Auxiliary Spillway	U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Central Valley Flood Protection Board, Sacramento Area Flood Control Agency	✓	✓	✓	✓	✓	✓
▪ Dike 4 and 6 Repairs	U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Central Valley Flood Protection Board, Sacramento Area Flood Control Agency	✓		✓		✓	✓
▪ Mormon Island Auxiliary Dam Modifications	U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Central Valley Flood Protection Board, Sacramento Area Flood Control Agency	✓		✓		✓	✓
▪ Pier Tendon Installation, Spillway Pier Wraps, and Braces at Main Concrete Dam	U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Central Valley Flood Protection Board, Sacramento Area Flood Control Agency	✓		✓		✓	✓
▪ Folsom Dam Right Bank Stabilization	U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Central Valley Flood Protection				✓	✓	✓

Table 5-1. Projects Considered for Cumulative Impact *Analysis*

Project	Primary Project Proponent(s)	Existing Conditions		No Action/No Project	Future Conditions (Cumulative)	Projects Included in Hydraulic Modeling	
		Past	Present			Existing Conditions	Future Conditions
	Board, Sacramento Area Flood Control Agency						
Yuba River Basin Flood Damage Reduction Project and Yuba River Basin Project General Reevaluation Report	U.S. Army Corps of Engineers, Yuba County Water Agency, Marysville Levee Commission, Central Valley Flood Protection Board, California Department of Water Resources	✓	✓	✓	✓		
Small Erosion Repair Program	California Department of Water Resources	✓	✓	✓	✓		
Natomas Levee Improvement Program	Sacramento Area Flood Control Agency, U.S. Army Corps of Engineers	✓	✓	✓	✓		
West Sacramento General Reevaluation Report	West Sacramento Area Flood Control Agency, U.S. Army Corps of Engineers, California Department of Water Resources	✓	✓	✓	✓		
West Sacramento Levee Improvements Program	West Sacramento Area Flood Control Agency	✓	✓	✓	✓		
Levee Accreditation Project	Sacramento Area Flood Control Agency				✓		
Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area	Sacramento Area Flood Control Agency		✓	✓	✓		
Folsom Dam Water Control Manual Update	U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Central Valley Flood Protection Board, Sacramento Area Flood Control Agency				✓		
Western Pacific Interceptor Canal 200-Year Standard Project	Three Rivers Levee Improvement Authority				✓		
Sacramento River General Reevaluation Report	U.S. Army Corps of Engineers, Central Valley Flood Protection Board, California Department of Water Resources				✓		
Folsom Dam Raise	U.S. Army Corps of Engineers				✓		
South River Pump Station Flood Protection Project	Sacramento Regional County Sanitation District				✓		
Bryte Landfill Remediation Project	Sacramento Area Flood Control Agency			✓			
Sutter Basin Pilot Feasibility Study	U.S. Army Corps of Engineers, California Department of Water Resources, Central Valley Flood Protection Board, Sutter Butte Flood Control Agency				✓		

Table 5-1. Projects Considered for Cumulative Impact *Analysis*

Project	Primary Project Proponent(s)	Existing Conditions		No Action/No Project	Future Conditions (Cumulative)	Projects Included in Hydraulic Modeling	
		Past	Present			Existing Conditions	Future Conditions
Ecosystem Restoration and Fisheries Projects							
National Marine Fisheries Service OCAP CVP/SWP Biological Opinion	National Marine Fisheries Service	✓	✓	✓	✓		
▪ Restoration and Floodplain Rearing Habitat by Increasing Seasonal Inundation within the Lower Sacramento River Basin	California Department of Water Resources, U.S. Bureau of Reclamation				✓		
▪ Fremont Weir Adult Fish Passage Modification Project	California Department of Water Resources, U.S. Bureau of Reclamation				✓		
▪ Liberty Island/Lower Cache Slough and Lower Yolo Bypass Habitat Enhancements	California Department of Water Resources, U.S. Bureau of Reclamation				✓		
▪ Lower Putah Creek Enhancements	California Department of Water Resources, U.S. Bureau of Reclamation				✓		
▪ Lisbon Weir Improvements	California Department of Water Resources, U.S. Bureau of Reclamation				✓		
▪ Reduce Migratory Delays and Loss of Salmon, Steelhead, and Sturgeon by Modifying Fremont Weir and Other Structures in the Yolo Bypass	California Department of Water Resources, U.S. Bureau of Reclamation			✓	✓		
▪ Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project	California Department of Water Resources, U.S. Bureau of Reclamation			✓	✓		
U.S. Fish and Wildlife Service OCAP CVP/SWP Biological Opinion	U.S. Fish and Wildlife Service	✓	✓	✓	✓		
▪ Restore 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh	California Department of Water Resources, U.S. Bureau of Reclamation				✓		
▪ California Department of Fish and Wildlife Incidental Take Permit for Longfin Smelt	California Department of Fish and Wildlife			✓	✓		
CALFED Bay-Delta Ecosystem Restoration Program	California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, National Marine Fisheries Service	✓		✓			
California WaterFix and California EcoRestore	California Natural Resources Agency				✓		
Knights Landing Outfall Gates Project	Reclamation District 108	✓	✓	✓			
Reclamation District 2035 Sacramento River Joint Intake Project	Reclamation District 2035, Woodland Davis Clean Water Agency	✓	✓	✓			

Table 5-1. Projects Considered for Cumulative Impact *Analysis*

Project	Primary Project Proponent(s)	Existing Conditions		No Action/No Project	Future Conditions (Cumulative)	Projects Included in Hydraulic Modeling	
		Past	Present			Existing Conditions	Future Conditions
North Delta Flood Control and Ecosystem Restoration Project	California Department of Water Resources	✓		✓	✓		
Projects Excluded From Cumulative Impact Analysis							
Yolo Bypass Phase II	California Department of Water Resources						
Certain Yolo Bypass Phase I System Improvements	California Department of Water Resources						
Elkhorn Specific Plan	County of Yolo						
Elkhorn Marina Project	County of Yolo						
Knaggs Ranch	CalTrout						
Prospect Island Restoration Project	California Department of Water Resources, California Department of Fish and Wildlife						
Lower San Joaquin River Basin Interim Feasibility Study	U.S. Army Corps of Engineers, San Joaquin Area Flood Control Agency						
Reclamation District 17 Levee Seepage Repair Project	Reclamation District 17						
River Islands at Lathrop	U.S. Army Corps of Engineers						
Delta Islands and Levee Feasibility Project	U.S. Army Corps of Engineers, California Department of Water Resources						
North-of-Delta Off-Stream Storage	California Department of Water Resources, U.S. Bureau of Reclamation						
North Bay Aqueduct Alternative Intake Project	California Department of Water Resources						
Emergency Repairs following 2016-2017 Flood Events	Multiple						

Source: Data compiled by GEI Consultants, Inc. in 2017

5.2.4 Summary of Projects Considered in Cumulative Impact Analysis

This section briefly describes other similar or related projects in the Sacramento region, focusing on flood risk reduction and habitat restoration projects within and near floodplains that have similar impact mechanisms and affect similar resources as would the project. Many past and present projects and activities have occurred and are occurring in the project study area. The effects of the past and present projects have strongly influenced existing conditions, and some past projects are still affecting resources potentially affected by the project. Past and present projects and activities have contributed on a cumulative basis to the existing environment within the general project area via various mechanisms, such as the following:

- population growth and associated development of socioeconomic resources and infrastructure;
- conversion of natural vegetation to agricultural and developed land uses, and subsequent conversion or restoration of some agricultural lands to developed or natural lands;
- alteration of riverine hydrologic and geomorphic processes by flood management, water supply management, and other activities; and
- introduction of nonnative plant and animal species.

Several major past, present, and probable future projects are considered in the cumulative impact analysis. The similar projects described below have had a profound effect on resources in the project study area and some projects have elements that would be developed in the future as well; however, future elements did not always meet the specified criteria for inclusion in the cumulative impact analysis and therefore the future elements were not included.

Relevant Plans

Central Valley Flood Protection Plan – Past/Present/Future

The Central Valley Flood Management Planning (CVFMP) Program is one of several programs managed by DWR under FloodSAFE California, a multifaceted initiative launched in 2006 to improve integrated flood management in the Central Valley, including the North Sacramento Streams and Sacramento River East Levee Improvement areas. The CVFMP Program addresses State flood management planning activities in the Central Valley. The 2012 CVFPP was adopted by CVFPB in June 2012, and is one of several documents adopted by CVFPB to meet the requirements of flood legislation passed in 2007 and, specifically, the Central Valley Flood Protection Act of 2008. It contains a broad plan for flood management system improvements, and ongoing planning studies, engineering, feasibility studies, designs, funding, and partnering are required to better define, and incrementally fund and implement, these elements over the next 20 to 25 years.

CVFPB adopted an update to the 2012 CVFPP in 2017. The 2017 CVFPP Update incorporates results relevant to the project from the State-led Sacramento River Basin-Wide Feasibility Study (BWFS) (DWR 2016d), Lower Sacramento River/Delta North Regional Flood Management Plan (RFMP) (Flood Protect Planning for Action 2014), and the Central Valley Flood System Conservation Strategy (DWR 2016c), which are intended to support implementation of future CVFPP actions affecting the Yolo Bypass, as described below.

- **Sacramento River BWFS – Present/Future.** BWFS planning is focused on developing Basin objectives and exploring different scales and configurations for system improvements, followed by evaluating and comparing system and regional improvements on a systemwide scale. The BWFS results will support selection of State-preferred system configurations that provide a balanced approach to reducing flood risk in the Sacramento River Basin.

- **Lower Sacramento River/Delta North RFMP – Present/Future.** The Lower Sacramento River Delta North RFMP was released in 2015 and presents local agencies' perspectives of flood management with a prioritized list of projects that need to be implemented to reduce flood risks in the Lower Sacramento River and North Delta. The plan assesses costs and benefits for projects while considering their potential contribution to an integrated multi-benefit and basin-wide solution.

- **Central Valley Flood System Conservation Strategy – Present/Future.** The Conservation Strategy, currently in draft form, is an informational document that identifies specific tools and approaches to restore natural areas to benefit fish and wildlife as part of a sustainable flood management plan.

Yolo Bypass actions would be implemented in two phases and are expected to be completed by 2032. Phase I actions are expected to be implemented from 2016 through 2022. Only those Phase I actions considered reasonably foreseeable at this time are described below. Implementation of the Phase I actions would set the foundation to create additional hydraulic capacity in the Yolo Bypass and to divert Sacramento River flood flows that can substantially reduce flood stage in the Lower Sacramento River. To successfully implement these actions, additional funding for construction of Lower Elkhorn and Sacramento Bypass setback levees and some other actions must be identified and secured by 2018. Approximately $200 million is currently available from Proposition 1E for initial implementation of flood system improvements in the Yolo Bypass. The LEBLS project described and analyzed in this project-level EIS/EIR is one of the identified Phase I system improvements. However, the LEBLS project has independent utility from other Phase I and Phase II projects as it reduces flood risks on its own merits.

Phase II actions would occur from 2023 through 2032, a 10-year period. None of the Phase II actions are reasonably foreseeable at this time as sufficiently detailed information about the projects are unavailable, project-level environmental clearance documentation has not been initiated, and funding and economic viability has not been determined.

Central Valley Integrated Flood Management Study – Past/Present/Future

The Central Valley Integrated Flood Management Study (CVIFMS), is a recently completed USACE study that is currently awaiting approval by the Assistant Secretary of the Army (Civil Works). The CVIFMS may serve as a mechanism for facilitating ongoing cooperation between USACE, DWR, and CVFPB as part of the CVFPP Update process and serve as a mechanism for USACE to begin to align its ongoing projects and investigations in the Central Valley with the CVFPP and with other potential partners. It can help USACE determine what additional studies may be required to identify Federal interest, support congressional authorization of further studies, or recommend improvements to complement the State's CVFPP implementation. It may also identify additional legislative and implementation frameworks, processes, and tools to support effective long-term implementation of the recommended plan to facilitate project permitting, systemwide crediting, and governance.

CVIFMS is a collaborative watershed study focusing on multiple objective solutions to identified problems and opportunities in the areas of flood-risk management, environmental restoration, and water supply in the Central Valley. The current study phase is limited to an evaluation of the Sacramento River Basin watershed. CVIFMS will include a complete list of recommendations for USACE implementation, as well as a reconnaissance-level evaluation of CVFPP initiatives. It may include recommendations for other agencies to implement and propose regional actions. Proposals that have a good chance of being economically feasible may be recommended for more detailed feasibility studies. CVIFMS will provide a forum for coordination and resolution of issues between DWR and USACE as the State's BWFS and CVFPP move forward. Some issue resolution may be accomplished through implementation of the CVFPP.

California Water Action Plan – Present/Future

The California Water Action Plan (CWAP), first issued by the Governor in January 2014 and updated in January 2016, describes the challenges of managing California's water resources to meet both human and ecological needs in a time of growing demands and dwindling supplies (California Natural Resources Agency et al. 2016). The CWAP sets broad objectives including increasing flood protection and restoring important species and habitat.

Westside Sacramento Integrated Regional Water Management Plan – Present/Future

Westside Sacramento Integrated Regional Water Management Plan (IRWMP) has been prepared by water management agencies within the Counties of Yolo, Colusa, Lake, Napa, and Solano by the Westside Sacramento Regional Water Management Group (2015). The goal has been to leverage the resources of five water management agencies within this region to pursue State and Federal funding to implement projects identified through the planning process. The planning process includes flood management and environmental and habitat improvements and protections.

Yolo Habitat Conservation Plan/Natural Community Conservation Plan – Future

Yolo County and the Cities of Davis, West Sacramento, Winters, and Woodland entered into a Joint Powers Authority (JPA) in 2002 to form the Yolo Habitat Conservancy and to prepare a Countywide Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP). The Yolo HCP/NCCP covers 12 endangered and threatened species and 15 natural communities. It will provide for the conservation of these species in Yolo County, as well as 50-year permits for development activities. An NOP/NOI for the EIR/EIS on the HCP/NCCP was released in October 2011. A Second Administrative Draft HCP/NCCP was released in March 2015. A draft Yolo Local Conservation Plan (LCP) is planned for the future. The LCP will cover species and natural communities of local concern not included in the Yolo HCP/NCCP. These two plans are intended to establish a framework to protect, enhance, and restore natural resources across Yolo County while allowing for continued rural and urban development in the region. (Yolo Habitat Conservancy 2016.)

Fish Restoration Program Agreement – Past/Present/Future

Several NMFS and USFWS BiOp RPAs are being implemented under the Fish Restoration Program Agreement (FRPA) between DWR and CDFW. The FRPA was signed on October 18, 2010, and addresses several habitat restoration requirements of the NMFS and USFWS BiOp. The primary purpose of the FRPA is to implement the fish habitat restoration requirements of the BiOp in the Delta, Suisun Marsh, and Yolo Bypass and it is focused on restoring a minimum of 8,000 acres to intertidal and associated subtidal habitat to benefit delta smelt, mesohaline habitat to benefit longfin smelt, and a number of related actions for salmonids.

CALFED – Past/Present

CALFED was initiated in 1994 and led to the signing of the Bay-Delta Accord by Federal and State implementing agencies, which began a 10-year period in which the CALFED Framework, Record of Decision (ROD), final Programmatic EIS/EIR and California Bay-Delta Act were adopted. The primary objectives established by the CALFED ROD are to improve water supply reliability, water quality, ecosystem restoration, and levee system integrity in the Delta. Most of the CALFED program has been replaced with subsequent Delta efforts to meet CALFED's primary objectives.

Flood Risk Reduction Projects

Several project proponents in the Sacramento Valley have requested and received Section 408 permission from USACE, Sacramento District, under the Rivers and Harbors Act (Table 5-2). Other requesters have sought Section 408 permission but have not yet received permission (Table 5-3). These projects are listed for context. Projects presented after Table 5-3 are part of the cumulative impact analysis as they meet the criteria presented above in Subsection 5.3.1.

Urban and Nonurban Levee Evaluation Programs – Past

DWR conducted geotechnical exploration, testing, and analysis of State and Federal levees that protect the highly populated urban areas of greater Sacramento, Stockton/Lathrop, and Marysville/Yuba City. The levee evaluations were completed in 2011. Technical specialists reviewed existing levee historical data; mapped near-surface geology; conducted field explorations; performed engineering, stability, and seepage analyses; and prepared preliminary design and construction estimates for repairing and upgrading the levees, where needed.

Cache Creek North Levee Setback Project – Past

The Cache Creek North Levee Setback project near the Community of Yolo addressed critical erosion damage on the left bank of Cache Creek at Levee Miles (LM) 3.9 and 4.2, which threatened the stability of the existing levee. The levee setback at LM 3.9L is approximately 1,285 feet in length, and was placed approximately 180 feet from the existing levee. The levee setback at LM 4.2L is approximately 717 feet in length, and was placed approximately 75 feet from the existing levee. Erosion repairs were also made at LM 2.8 and LM 3.4. Setting the levee back from the creek benefitted fish and other wildlife by creating additional floodplain for stream-shading riparian trees and other vegetation. Work was completed in 2013.

Feather River East Levee Repair Project – Past

The Three Rivers Levee Improvement Authority (TRLIA) implemented the Feather River Levee Repair Project (FRLRP), an element of the Yuba-Feather Supplemental Flood Control Project, to reduce flood risks in the Reclamation District (RD) 784 area of Yuba County. RD 784 encompasses East and West Linda, and then runs south to the north bank levees at the confluence of the Feather and Bear Rivers. The project entailed repairing and strengthening the existing Feather River East Bank Levee, and repairing and strengthening the existing Yuba River South Bank Levee near the confluence with the Feather River. The project corrected levee deficiencies related to underseepage and through-levee seepage to achieve protection from a 200-year flood event. The project was completed in 2010.

Table 5-2. Authorized Section 408 Projects in the Sacramento Valley and Delta

Requester	Project
California Department of Water Resources	Cache Creek Setback Levee Project
Reclamation District 17	Reclamation District 17 Phase 3 Levee Seepage Repair Project
Sacramento Area Flood Control Agency	Natomas Levee Improvement Program
Sacramento Area Flood Control Agency	North Sacramento Streams Levee Accreditation Project
Sacramento Area Flood Control Agency	Sacramento River East Levee Accreditation Project
Sutter Butte Flood Control Agency	Feather River West Levee Project
Sutter Butte Flood Control Agency	Star Bend Setback Levee Project
The Cambay Group	River Islands at Lathrop
Three Rivers Levee Improvement Authority	Feather River East Levee Project
Three Rivers Levee Improvement Authority	Western Pacific Interceptor Canal
West Sacramento Area Flood Control Agency	West Sacramento and Southport Projects

Source: Compiled by U.S. Army Corps of Engineers in 2016

Table 5-3. Section 408 Authorizations Currently under Consideration in Sacramento Valley and Delta

Requester	Project
City of Colusa	Colusa Boat Launch
City of West Sacramento	Rice Mill Pier
City of Yuba City	Feather River Parkway – Phase 2
Central Valley Flood Protection Board	Mark Brennen Security Fence
Reclamation District 108	Knights Landing Outfall Gates
Sacramento Area Flood Control Agency	Natomas East Main Drainage Canal North Extension
Sacramento Area Flood Control Agency	North Sacramento Streams Levee Accreditation Project
Solano County Water Agency	Putah Creek Nature Park Channel Realignment
Three Rivers Levee Improvement Authority	Western Pacific Interceptor Canal 200-Year Standard Project
West Sacramento Area Flood Control Agency	Southport Early Implementation Project

Source: Compiled by U.S. Army Corps of Engineers in 2016

Star Bend Levee Setback and Habitat Enhancement Project – Past

In 2010, Levee District 1 completed construction of approximately 3,400 feet of setback levee along the west side of the Feather River in the vicinity of Star Bend, approximately 7 miles south of Yuba City (east of SR 99). The Star Bend Levee Setback Project replaced a critical section of the right bank of the Feather River levee system (by constructing a new setback levee) to address critical underseepage issues to improve flood risk reduction. The project also reduced flood stage levels, and reduced a known hydraulic restriction in the Feather River during high-water flood stages (by lowering water elevations and velocities within the Feather River near the Star Bend area). The project also restored approximately 50 acres of riparian habitat along the newly created floodplain, and increased the size of the O'Connor Lake Wildlife Habitat Restoration Area.

Sacramento River Flood Control Project – Past

The SRFCP is a collection of levees, navigation waterways, overflow weirs, pumping plants, and bypass channels that help reduce the risk of flooding to communities and agricultural lands in the Sacramento Valley and the Delta. Located along the Sacramento River from Elder Creek (near Tehama), to its confluence with the San Joaquin River in the Delta (near Collinsville), the project has approximately 980 miles of levees (about 650 miles of which are part of the Federally authorized project) protecting more than 2.3 million people within 50 communities, 1 million acres of land, and nearly $38 billion worth of infrastructure. Project features are also located along a number of tributaries, sloughs, and bypass channels including the Feather River, American River, Sutter Bypass, and Yolo Bypass.

Sacramento River Bank Protection Project – Past/Present/Future

The Sacramento River Bank Protection Project (SRBPP) has been constructed on an annual basis since the 1960s by USACE to protect the existing levees and flood management facilities of the SRFCP. Phase I was constructed from 1963 to 1975, and consisted of an estimated 436,397 linear feet of bank protection. Phase II was authorized in 1974 for an estimated 405,000 linear feet of bank protection. In 2007, Congress added 80,000 linear feet to the Phase II authorization. The SRBPP authorizes USACE to provide bank protection along the Sacramento River and its tributaries, including that portion of the Lower American River bordered by Federal flood control project levees. Beginning in 1965, erosion control projects at 12 sites covering an estimated 16,141 linear feet of the south and north banks of the Lower American River have been implemented. This is an ongoing project. USACE is preparing a DEIS/DEIR, which identifies additional sites requiring maintenance within the scope of the estimated 80,000 linear feet added to the Phase II authorization.

American River Common Features Project – Past/Present/Future

The American River Common Features Project (ARCF) is authorized by the Water Resources Development Acts of 1996 and 1999 and includes strengthening and raising levees, installing stream-flow gages, and improving flood-warning systems. The ARCF work has installed approximately 24 miles of slurry walls at depths up to 80 feet, raised levees to provide adequate freeboard, addressed slope stability issues, and corrected some erosion problems along the Lower American River. This work, as authorized in 1996 and 1999, was completed in January 2016.

A comprehensive study, called the ARCF General Reevaluation Report (GRR), has been completed by USACE and investigates further improvements to the flood risk reduction system throughout the Sacramento region. The ARCF study area consists of: (1) approximately 12 miles of the north and south banks of the American River immediately upstream from the confluence with the Sacramento River; (2) the east bank Natomas East Main Drainage Canal (NEMDC)/Steelhead Creek; Pleasant Grove Creek Canal; Dry, Robla, and Arcade Creeks; and the Magpie Creek Diversion Channel (collectively referred to as the “East Side Tributaries”); (3) the east bank of the Sacramento River downstream from the American River to the Community of Freeport where the levee ties into Beach Lake Levee; and (4) the Sacramento Weir and Bypass, located along the north edge of the City of West Sacramento in Yolo County.

USACE, CVFPB, and the Sacramento Area Flood Control Agency (SAFCA) are currently considering two alternatives that could be implemented as part of future ARCF projects. Alternative 1, “Improve Levees,” involves the construction of fix-in-place levee remediation measures to address seepage, slope stability, erosion, and overtopping concerns identified for the American and Sacramento River, NEMDC/Steelhead Creek, Arcade, Dry/Robla, and Magpie Creek Levees. A vegetation variance would be sought to allow for vegetation to remain on the lower portion of the waterside levee slope.

Alternative 2, “Improve Levees and Widen the Sacramento Weir and Bypass,” has been identified as the “Tentatively Selected Plan.” Alternative 2 would include all of the levee improvements discussed in Alternative 1, except levee raises along the Sacramento River would be included to a lesser extent. Instead of the full extent of levee raises, the Sacramento Weir and Bypass would be widened to divert more flows into the Yolo Bypass. The levees along the American River; NEMDC/Steelhead Creek; and Arcade, Dry/Robla, and Magpie Creeks would be improved to address identified seepage, stability, erosion, and height concerns. The levees along the Sacramento River would be improved to address identified seepage, stability, and erosion concerns. A small amount of levee raising would still be required on the Sacramento River.

A final report with a recommended plan for improvements, along with the joint FEIS/FEIR, was released for public review in 2016 (USACE and CVFPB 2016). The ROD was signed in August 2016, and the project received Congressional authorization in December 2016. The project would take up to 20 years to complete, and there is no construction start date at this time.

The LEBLS project includes a setback of the Sacramento Bypass North Levee, consistent with the setback proposed in the ARCF GRR. However, the LEBLS project differs from the ARCF in that it includes a setback of the Yolo Bypass East Levee, and does not include a widening of the Sacramento Weir.

DWR intends to implement the LEBLS project. Because funding for the Sacramento Weir and Bypass widening included in the ARCF GRR is not yet appropriated, and was assigned a relatively lower schedule priority than other proposed improvements, the LEBLS project would be implemented before the ARCF GRR actions in the Sacramento Weir and Bypass. For the purposes of the cumulative analysis, it was assumed that the ARCF GRR weir widening would occur following implementation of the LEBLS project, and would include tie-in to the new setback levee, and deconstruction of the short segment of levee which would connect the new setback levee to the existing levee near the Sacramento Weir. Because the LEBLS project would include the new Yolo Bypass setback, the length of the Sacramento Bypass North Levee setback that would need to be constructed as part of the ARCF GRR project would be approximately 1,500 feet shorter than proposed in the ARCF GRR.

Folsom Dam Safety and Flood Damage Reduction Joint Federal Project – Past/Present/Future

The Folsom Dam Safety/Flood Damage Reduction Joint Federal Project (Folsom JFP) is a cooperative effort among USACE, the U.S. Bureau of Reclamation (Reclamation), CVFPB, and SAFCA. The Folsom JFP is designed to improve the dam safety, security, and flood damage reduction features at Folsom Dam and associated facilities (Folsom facility), including construction of a gated auxiliary spillway southeast of the main dam. Operation of this spillway would increase water discharge capability from the reservoir and help to provide Urban Levee Design Criteria flood protection to the Sacramento area. The Folsom JFP would reduce downstream flood risk in the American and Sacramento Rivers. Major activities associated with the Folsom JFP include the Folsom Dam Auxiliary Spillway, static upgrades to Dike 4, Mormon Island Auxiliary Dam modifications, and seismic upgrades to the Main Concrete Dam.

Folsom Joint Federal Project Auxiliary Spillway – Past/Present/Future

Major work under the first two phases of construction associated with the Auxiliary Spillway included partially excavating the western portion of the spillway; excavating the stilling basin of the spillway; building downstream cofferdams; relocating the Natoma Pipeline; constructing an access road to the stilling basin; constructing certain temporary staging, stockpile, and storage areas east of the spillway; and constructing a major haul road extending from the spillway area to the temporary staging, stockpile, and disposal areas. This work was completed in 2011.The next 2 phases of Auxiliary Spillway construction primarily involved excavating the approach channel to the spillway, construction of the spillway's control structure, and concrete lining of the spillway discharge chutes and stilling basin. This work began in 2010 and was completed in 2017

Restoration of certain lands disturbed by construction of the Auxiliary Spillway began in spring 2016 and was completed in 2017. The main restoration area encompasses roughly 58 acres located east of the spillway, where lands were disturbed by construction of the temporary staging, stockpile, and disposal areas previously mentioned, as well as by construction of the haul road serving these areas. Restoration work in this area involves restoring the topography to mimic preconstruction topography, then seeding the area with a mixture of native grasses and forbs.

Dike 4 and 6 Repairs – Past

To address seepage concerns due to static and hydrologic loading for Dikes 4 and 6 (components of the Folsom Facility), Reclamation installed full height filters, toe drains, and overlays on the downstream face of each earthen structure. Construction was completed in 2010.

Mormon Island Auxiliary Dam Modifications – Past

This project involved excavating and replacing the Mormon Island Auxiliary Dam's (MIAD's) foundation, placement of overlay on the downstream side, and installing drains and filters. Construction of the improvements was completed in 2016.

Pier Tendon Installation, Spillway Pier Wraps, and Braces at Main Concrete Dam – Past

These improvements were completed in early 2014 and were designed to help stabilize the main concrete dam against movement during a major earthquake.

Folsom Dam Right Bank Stabilization – Future

This project involves stabilization (reinforcement) of a segment of the right bank of the American River immediately downstream of Folsom Dam. The area to be stabilized is a rock mass located where flows from Folsom Dam and flows from the new Auxiliary Spillway will converge. These convergent flows could erode and possibly destabilize the steep lower slope of the river bank. The Right Bank Stabilization project will help prevent this by installing rock bolts into the rock mass comprising the lower river bank slope, and by using formed concrete to fill rock joint cavities present in this slope. Project construction will begin in early 2017 and should be completed by fall 2017.

Sutter Basin Pilot Feasibility Study and Feather River West Levee Project – Future

The purpose of the Sutter Basin Pilot Feasibility Study (SBPFS) and EIS/EIR were released in 2013 and investigated and determined the extent of Federal interest in plans that reduce flood risk to the Sutter Basin in Sutter and Butte Counties. This USACE feasibility report: (1) assessed the risk of flooding; (2) described a range of alternatives formulated to reduce flood risk; and (3) identified a recommended plan for implementation. The recommended plan, authorized by Congress in the Water Resources Reform and Development Act (WRRDA) of 2014 and the Water Resources Development Act (WRDA) of 2016, would strengthen approximately 41.4 miles of existing project levees along the Feather River. Following release of the draft FR/EIR/SEIS for public comment in 2013, SBFCA initiated construction of the FRWLP, which is similar to the recommended plan. The FRWLP will provide underseepage and through-levee seepage improvements to an estimated 44 miles of levees from Thermalito Afterbay (southwest of Oroville) south to the Sutter Bypass. The improvements will be achieved using cutoff walls and seepage berms along the west bank of the Feather River. The goal of the project is to reduce flood risk by providing 100-year flood protection, and to eventually remove more than 34,000 properties from Federal Emergency Management Agency Special Flood Hazard Areas. The FRWLP will also provide 200-year flood protection to the Cities of Biggs, Gridley, Live Oak, and most of Yuba City. The first phase of the FRWLP, from Thermalito Afterbay to Star Bend (just south of Yuba City), is scheduled to be completed in 2016. The second phase will include the area south of Star Bend to the confluence of the Feather River and the Sutter Bypass. Phase II, which is in the planning stages, will also include repairs to the Sutter Bypass.

Yuba River Basin Flood Damage Reduction Project and Yuba River Basin Project General Reevaluation Report – Past/Present/Future

The Yuba River Basin Flood Damage Reduction project is an initiative to provide a 200-year level of protection for communities in Yuba County. To accelerate this Federally authorized project, the State and local interests (Yuba County, Yuba County Water Agency, and TRLIA), began an advanced construction program in the southern portion of the County. Repairs are now complete on 29 miles of levees, including construction of two new setback levees: the 2-mile-long Bear River setback and 6-mile-long Feather River setback. These setbacks, besides providing greater regional flood risk reduction, created nearly 2,200 acres of floodplain habitat along the Bear and Feather Rivers.

The scheduled repairs by USACE on the approximately 7.5-mile-long Marysville Ring Levee, which surrounds and protects the historic City of Maryville, is the final construction element of the project. Construction is now complete on the first of four scheduled construction project phases (Phase 1). With additional Federal funding, USACE will continue its design, planning, and construction to the ring levee.

Small Erosion Repair Program – Past/Present/Future

DWR’s Small Erosion Repair Program (SERP) provides a streamlined process for DWR to identify, obtain regulatory authorization for, and construct small levee repairs on levees maintained by DWR within the SRFCP area. A Program EIR was prepared and the SERP was approved by DWR in February 2014. The initial focus of SERP covers approximately 300 miles of levees and represents an initial 5-year effort. After the first phase, the Interagency Flood Management Collaborative Program Group will evaluate the program's success and, if warranted, SERP may be expanded to include sites repaired by local maintaining agencies throughout the Sacramento-San Joaquin Drainage District.

Natomas Levee Improvement Program – Past/Present/Future

SAFCA initiated the Natomas Levee Improvement Program (NLIP) in 2006 as an early-implementation project to provide flood risk reduction to the Natomas Basin as quickly as possible. NLIP includes improvements to the approximately 42-mile perimeter levee system of the Natomas Basin in Sutter and Sacramento Counties, as well as associated landscape and irrigation/drainage infrastructure modifications. SAFCA has completed construction of about 18 miles of levee improvements, but USACE is responsible for completing the remaining approximately 24 miles of levee improvements to finish the improvements, under the ARCF, Natomas Basin Project. USACE construction of portions of the Natomas Basin Project are scheduled to commence in 2017/2018.

West Sacramento General Reevaluation Report – Past/Present/Future

The purpose of USACE's West Sacramento GRR is to bring the approximately 50-plus miles of perimeter levees surrounding West Sacramento into compliance with applicable Federal and State standards for levees protecting urban areas. Proposed levee improvements would address: (1) seepage, (2) stability, (3) levee height, and (4) erosion concerns along the West Sacramento levee system. Measures to address these concerns would include seepage cutoff walls, seepage berms, stability berms, levee raises, flood walls, relief wells, sheet pile walls, jet grouting, and bank protection. The West Sacramento Area Flood Control Agency (WSAFCA) has and will pursue early implementation projects (EIPs) to more immediately address flood risk before the GRR is complete and projects under the GRR can be implemented. (EIPs are intended for construction of projects that rehabilitate, reconstruct, replace, improve, or add to the facilities of SPFC.) Construction of the Sacramento River Bank Protection Project (South River Road near Stone Lakes) was completed by USACE in 2015.

In addition, several projects were completed by USACE that were part of the original West Sacramento Project authorization prior to the GRR. These projects consist of the following: (1) the Yolo Bypass South Reach Project (Slip Repair #1) was completed by USACE in 2009, which entailed levee reconstruction along the Yolo Bypass south of I-80; and (2) the Yolo Bypass North Reach Project (Slip Repair #2), which was completed in 2011 and entailed levee repairs along the Yolo Bypass north of I-80.

West Sacramento Levee Improvements Program – Past/Present/Future

WSAFCA developed the West Sacramento Levee Improvements Program (WSLIP) to implement needed modifications to the approximately 50-plus miles of levees in Yolo and Solano Counties that surround the City of West Sacramento. Along with the WSLIP, WSAFCA launched a parallel process for identifying smaller-scale deficiencies that might be candidates for an EIP Project to address urgent needs and can be planned and designed in advance of or concurrent with the overall program. Four such projects have been constructed by WSAFCA: the I Street Bridge EIP in 2008 and the Bridge District Levee Maintenance Road Project, the California Highway Patrol (CHP) Academy EIP (reconstruction of the Sacramento Bypass South Levee) in 2011, and The Rivers EIP (reconstruction of the Sacramento River West Levee near Bryte Park) in 2011. The Rivers EIP also included construction of the Bryte Park Nature Trail.

The Southport Sacramento River EIP entails constructing flood risk reduction measures along approximately 5.7 miles of the Sacramento River South Levee (along the west bank of the Sacramento River) in the City of West Sacramento. The project extends from the Port North Levee at the Barge Canal south to the South Cross Levee at Burrows Avenue. Levee improvements include constructing a new setback levee, a slurry cutoff wall, and seepage berms to address through-levee seepage, foundation underseepage, slope stability and geometry, and erosion, as well as removing encroachments and noncompliant vegetation. The project would achieve a 200-year level of flood protection for the City of West Sacramento, along with opportunities for ecosystem restoration and public recreation. The project also would replace South River Road with a new wider roadway entitled Village Parkway, which would eliminate the existing hazardous sharp curves and incorporate a Class I bicycle lane. Construction of Phase I of the Southport Sacramento River EIP (approximately 3 miles of the northern portion of Village Parkway), was completed in June 2016. A Subsequent EIR related to borrow material for the Southport Sacramento River EIP was released in April 2016, and the EIR was certified in September 2016. Construction of Phase II, which involves the levee work and constructing the southern 3 miles of Village Parkway, is anticipated to be complete in 2018.

Colusa Boat Launch Facility – Future

The proposed project is located on the waterside of the west bank levee of the Sacramento River, east of Roberts Road and north of 10th Street in Colusa, Colusa County. The project site is approximately 15.5 acres and is located between the Colusa-Sacramento River State Recreation Area and the Colusa Scenic Levee Park. The City of Colusa proposes to redevelop an existing day use and boat launch facility, including regrading, excavation, and fill of the existing site. The proposed project would also include construction of a 42-foot by 190-foot two-lane boat launch ramp, piles and floating docks, and a 3-inch sewer pipe through the levee.

Rice Mill Pier – Future

The proposed project is located on the west bank of the Sacramento River, south of the I Street Bridge and north of the Tower Bridge in West Sacramento, Yolo County. The City of West Sacramento proposes to build a new public boat dock in the former location of the former Raley's Dock, a facility that fell into disrepair and was thus removed in 2012. Currently, the pile structures are all that remain of the former dock, the majority of these piles will be re-used as part of the proposed project. The proposed floating dock would be 432 feet long overall and would provide a new recreational boating facility with docking available for small boats, water taxis, and other vessels. The new floating dock would require removal of one existing pile and installation of a new steel pile. Additionally, the City of West Sacramento proposes to construct a 235-foot-long debris deflector boom upstream of the new dock, install a gangway, and construct an ADA-compliant access ramp and landing from the top of the levee to the gangway entrance.

Feather River Parkway (Phase 2) – Future

The City of Yuba City proposes to expand an existing parkway along the Feather River by improving and restoring approximately 84 acres to the north of the existing park, including stabilizing 100 feet of riverbank with rock slope protection, and restore approximately 2 acres of riparian habitat through native vegetation plantings. All proposed work would occur above the ordinary high water mark.

Levee Accreditation Project – Future

SAFCA will implement improvements to the flood management system protecting portions of the City and County of Sacramento along the Lower American and Sacramento Rivers and their tributaries outside the Natomas Basin. The project includes levee improvements to approximately 4 miles along the NEMDC/Steelhead Creek and Arcade Creek Levees; levee improvements to approximately 6 miles of the Sacramento River East Levee in the Little Pocket and Pocket areas; soil erosion repair on the Sacramento River East Levee; removal of high-hazard encroachments and vegetation along segments of the Arcade Creek, American River, Beach Lake, and Sacramento River East Levee levees to accredit the levees; a corridor management plan in the NEMDC area; and a conservation strategy for the project. The North Sacramento Streams, Sacramento River East Levee, Lower American River, and Related Flood Improvements Project Final EIR was certified and the project was adopted in July 2016. (SAFCA 2016a.)

Because the North Sacramento Streams and Sacramento River East Levee improvement components are on different permitting and construction timelines, separate 408 permission is being requested for each levee accreditation project. For North Sacramento Streams, USACE prepared an EA/FONSI. The North Sacramento Streams Levee Accreditation 408 is pending USACE approval [*Note to: USACE and DWR: This sentence will be updated if and when approval is granted, estimated May/June 2017*]. For the Sacramento River East Levee Accreditation Project, USACE is preparing an EIS. The ROD is expected to be issued in summer 2018. The North Sacramento Streams Levee Accreditation Project is anticipated to begin construction in early 2017. The Sacramento River East Levee Accreditation Project is anticipated to begin construction in 2018 (2018-2020).

Local Funding Mechanisms for Comprehensive Flood Control Improvements for the Sacramento Area – Present/Future

SAFCA created a new assessment district (CCAD2) to replace the existing Consolidated Capital Assessment District (CCAD) and updated the existing development impact fee to provide the local share of the cost of constructing and maintaining flood control improvements and related environmental mitigation and floodplain habitat restoration along the American and Sacramento Rivers and their tributaries in the Sacramento metropolitan area. The program will complete the projects necessary to provide at least a 100-year level of flood protection for developed areas in Sacramento's major floodplains as quickly as possible; achieve the State of California's 200-year flood protection standard for these areas within the timeframe mandated by the Legislature; and improve the resiliency, robustness, and structural integrity of the flood control system over time so that the system can safely contain flood events larger than a 200-year flood. The program includes Yolo and Sacramento Bypass system improvements, levee modernization, and lower Sacramento River erosion control. The Updated Local Funding Mechanisms Final Subsequent Program EIR was certified and the project was adopted in April 2016. (SAFCA 2016b.)

Folsom Dam Water Control Manual Update – Future

The Folsom Dam Water Control Manual (WCM) is being updated by USACE, in collaboration with Reclamation, CVFPB, and SAFCA, to reflect authorized changes to the flood management and dam safety operations at Folsom Dam to reduce flood risk in the Sacramento area. The WCM Update would use the existing and authorized physical features of the dam and reservoir, specifically the auxiliary spillway currently under construction, and is scheduled to be completed in 2017.

Along with evaluating operational changes to use the additional operational capabilities created by the auxiliary spillway, the WCM Update would assess the use of available technologies to enhance the flood risk management performance of Folsom Dam, including a refinement of the basin wetness parameters and the use of real time forecasting operation. Further, the WCM Update would evaluate options for the inclusion of creditable flood control transfer space in Folsom Reservoir in conjunction with Union Valley, Hell Hole, and French Meadows Reservoirs (also referred to as Variable Space Storage). The study would result in an Engineering Report as well as a WCM implementing the report's recommendations.

The WCM would be further revised in the future to reflect the capabilities to be provided by the Folsom Dam Raise project and additional ARCF GRR project improvements as appropriate.

Western Pacific Interceptor Canal 200-Year Standard Project – Future

This TRLIA project is located in southern Yuba County, south of the Community of Olivehurst and immediately east of SR 70, along the West Levee of the Western Pacific Interceptor Canal (WPIC). The WPIC West Levee is approximately 6.1 miles long. The project consists of improvements at various reaches along the approximately 5.9 miles of the levee east of SR 70 to provide 200-year flood protection by correcting deficiencies related to seepage and slope stability. Remedial construction activities would be focused on approximately 2 miles of the West Levee. In addition, a new landside access road would be constructed along the approximately 3.3-mile northern portion of the West Levee for future operations and maintenance activities. The project is under construction in 2016-2017.

Sacramento River General Reevaluation Report – Future

The Sacramento River GRR was initiated in October 2015 by USACE, with CVFPB and DWR as partner agencies (USACE 2015). The reevaluation study will include an analysis of the SRFCP. The GRR is a multipurpose flood risk management and ecosystem restoration study which will evaluate opportunities to modify the SRFCP, including widening existing bypasses, modifying existing weirs, optimizing weir operations, constructing setback levees, developing floodplain management plans, restoring riverine aquatic and riparian habitat, removing barriers to fish passage, and restoring natural geomorphic processes, among others. Changes or modifications to the SRFCP may also include updates or revisions to the operations and maintenance manuals in affected areas. The reevaluation could eventually lead to Congressional authorization and Federal funding for implementation of recommended actions. This GRR is a potential vehicle for Federal participation in the implementation of the CVFPP over time, and thus ongoing interagency cooperation between USACE, CVFPB, and DWR on this project will be of great importance to the long-term success of CVFPP implementation.

Folsom Dam Raise – Future

USACE is moving forward with the Folsom Dam Raise project to improve flood risk management and address dam safety issues associated with safely passing rare, extreme flood events at Folsom Dam. Authorized components of the Folsom Dam Raise project include: (1) Raising Folsom Dam and appurtenant features (Dikes 1 through 8, the Left Wing Dam [LWD], the Right Wing Dam [RWD], and MIAD) by 3.5 feet, and; (2) Ecosystem restoration at 4 restorations sites on the Lower American River situate between River Mile (RM) 1 and RM 13. The "raising" of the main dam would primarily involve refinements to the dam's tainter gates and related structural alterations to the dam. Dikes 1 through 8 and MIAD are earthen embankments that would be raised by increasing the height of the dikes and MIAD. While the LWD and RWD are also earthen embankments, their effective height would be increased by installing concrete floodwalls along the crest of both the LWD and RWD. It is anticipated that construction of the dam raise component of the overall project would begin in late 2017 and would be fully completed by late 2021. There is no current schedule for implementing the ecosystem restoration component of the overall project.

South River Pump Station Flood Protection Project – Future

The South River Pump Station (SRPS) Flood Protection Project will consist of constructing a new 200-year flood protection levee and raised all-weather access roads around the existing SRPS. The SRPS is within RD 765 between the Sacramento River and the DWSC, in an area protected on four sides by levees. The top of the new levee will be approximately 22 feet above existing ground and will require 400,000 cubic yards of levee borrow material. Once completed, the levee will be approximately 5,000 feet in total length. Project construction will include a significant operation to import soil (borrow) material for construction of the flood protection system. The project plans to obtain borrow material from within the surrounding basins. Sacramento Regional County Sanitation District certified the FEIR in 2012, and construction is anticipated to begin in summer 2017.

Bryte Landfill Remediation Project – Future

The former Old Bryte Landfill is located at 50035 County Road 126, within the project site, adjacent to the northwestern side of the Sacramento Bypass. Beginning in the 1940s, the approximately 17-acre site accepted domestic, municipal, and commercial waste, which was piled, burned, and then leveled. Use of the site as a landfill was terminated in 1974. The soil has been contaminated with lead, zinc, polychlorinated biphenyls (PCBs), and dioxins, and further analysis of potential groundwater contamination is needed. Before the Sacramento and Yolo Bypasses in this area can be widened, the former landfill must be remediated. SAFCA is preparing a CEQA compliance document that will examine the environmental impacts of landfill remediation. Remediation will be completed in 2018-2019.

Sutter Basin Pilot Feasibility Study – Future

The Sutter Basin Pilot Feasibility Study (SBPFS) investigated the extent of Federal interest in plans that reduce flood risk to the Sutter Basin in Sutter and Butte Counties and provides a recommended plan. The recommended plan would strengthen about 41.4 miles of existing project levees along the west bank of the Feather River from the vicinity of Laurel Avenue, just south of Yuba City, to Thermalito Afterbay at the northern end of the Sutter Basin. Under the recommended plan, existing levees would be strengthened to reduce the risk of geotechnical failure modes associated with under-seepage. The existing levees would not be raised. The recommended plan would provide flood risk management benefits to the northern communities of Biggs, Gridley, and Live Oak, as well as to Yuba City.

Ecosystem Restoration and Fisheries Projects – Past/Present/Future

National Marine Fisheries Service/U.S. Fish and Wildlife Service Biological Opinions and California Department of Fish and Wildlife Incidental Take Permit Requirements for Long-Term Central Valley Project/State Water Project Operations – Past/Present/Future

The National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) conducted Federal Endangered Species Act (ESA) consultations for long-term operations of the Central Valley Project (CVP) and State Water Project (SWP) (NMFS 2009). To comply with the prevailing Biological Opinions (BiOps) and Incidental Take Permit (ITP), Reclamation and DWR must implement habitat restoration and fisheries projects, some of which involve the Yolo Bypass and North Delta, as summarized below. The information below is taken primarily from the Sacramento River BWFS (DWR 2016).

National Marine Fisheries Service Biological Opinion – Past/Present/Future

On June 4, 2009, NMFS issued a Biological Opinion, with a Reasonable and Prudent Alternative (RPA), on the Long-Term Operations of the CVP and SWP (NMFS, 2009). Several actions identified under the RPA may be implemented wholly, or in part, in the Yolo Bypass. The RPA action focus on improved fish passage and increased acreage and frequency of inundation of floodplain habitat. Fish species expected to benefit from the RPA actions in the Lower Sacramento River Basin are Chinook salmon, Central Valley steelhead, Sacramento splittail, Pacific and river lamprey, sturgeon, and delta smelt.

Implementation of certain RPA actions is currently in the planning phase, and the NEPA/CEQA process is expected to be complete in 2018. NMFS BiOp actions that are currently planned or underway wholly, or in part, in the Yolo Bypass are discussed below. The projects described below are being evaluated in the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Draft EIS/EIR currently being developed by DWR and Reclamation. The Final EIR/EIS is anticipated in late 2018.

NMFS RPA 1.6.1: Restoration of Floodplain Rearing Habitat by Increasing Seasonal Inundation within the Lower Sacramento River Basin – Future

This RPA action seeks to restore floodplain rearing habitat for juvenile winter- and spring-run Chinook salmon and Central Valley steelhead in the Lower Sacramento River Basin. This objective may be achieved at the Yolo Bypass; and/or through actions in other suitable areas of the Lower Sacramento River, including the actions listed below.

- Increase access for juvenile salmonids onto seasonally inundated aquatic habitat, generally from late November through April, except when hydrologic conditions do not allow.
- Significantly increase seasonal floodplain rearing habitat.
- Significantly reduce stranding of juvenile salmon and steelhead and minimize the presence of migration barriers that limit the passage of juvenile salmon and steelhead.
- Increase aquatic primary and secondary biotic production, thus increasing the abundance and availability of food for native aquatic organisms.
- Provide juvenile salmonids access to inundated aquatic habitat through volitional entry to avoid potential adverse effects to salmonid population diversity associated with trap and haul operations.

Inundation of floodplain habitat is a common element between the BiOp actions that may be implemented wholly, or in part, in the Yolo Bypass as well as draft CVFPP Conservation Strategy actions under consideration by DWR. The timing, duration, frequency, and hydrology of inundation flows are critical for target fish species. Inundation structures (notching) on or adjacent to Fremont Weir will allow for the introduction of managed flows into the Yolo Bypass at times when the weir is not overtopping due to flood stage. The weir would continue to passively overtop when the Sacramento River stage exceeds the height of the weir.

Fremont Weir Adult Fish Passage Modification Project – Future

The Fremont Weir Adult Fish Passage Modification Project would widen and deepen the existing fish ladder at the Fremont Weir to improve adult fish passage at the Fremont Weir and along the Tule Canal. The maximum target flow through the fish passage structure would be limited to approximately 1,100 cubic feet per second. The upstream and downstream adjoining channels would be reconfigured to accommodate migratory fish passage. Two existing earthen agricultural road crossings would be replaced by two permanent crossings, either railcar bridges or large fish-friendly box culverts, to allow for clear passage of migratory fish. One agricultural crossing would be eliminated. The Fremont Weir is owned by the Sacramento-San Joaquin Drainage District. The agricultural crossings are owned by Knaggs Ranch and Swanston Properties. Planning and design began in 2016. A joint NEPA/CEQA document is anticipated in early 2017, and construction is anticipated to start in late 2017.

Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project – Future

The Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project would create channels and facilities and modify existing channels at the Fremont Weir and in the Fremont Weir Wildlife Area to facilitate adult fish passage and passage of rearing habitat flows and juvenile salmonids. Depending on the alternative selected, the project would provide for flows of 3,000 to 12,000 cfs between November 1 and March 15.

Existing berms that present a fish passage barrier would also be removed at Agricultural Road Crossing 1, and an inverted siphon would be constructed to maintain access and water deliveries to the agricultural pumps on the landside of the east levee. The road crossing would be replaced with a bridge that would be 18 feet wide and 80 feet long. It would include concrete abutments on either side to span Tule Canal.

A Draft EIS/EIR was released in December 2017.

West of Fremont Weir Inundation Structure

BiOp planning efforts are considering a stand-alone inundation notch located to the west of Fremont Weir. This location is not concurrent with the existing weir, but allows for hydrologic benefit by capturing flood flows along the river at an earlier point with no impact to the existing Fremont Weir structure. Flood flows would be introduced on the west side of the Bypass.

East of Fremont Weir Inundation Structure

BiOp planning efforts are considering a stand-alone inundation notch located to the east of Fremont Weir. This location is not concurrent with the existing weir but allows for hydrologic benefit by capturing flood flows along the river at an earlier point with no impact to the existing Fremont Weir structure. Flood flows would be introduced on the east side of the Bypass.

Existing Fremont Weir Fish Ladder Modification

As a trial, CDFW has been working to remove the existing baffles from the fish ladder, transforming it into a clear-chute fishway that would be monitored by means of underwater cameras, and monitoring the passage of tagged fish. This and other experimental actions are continuing on an interim basis to improve fish passage and gather better information to guide future fish passage improvement efforts.

NMFS RPA 1.6.2: Liberty Island/Lower Cache Slough and Lower Yolo Bypass Habitat Enhancements – Future

This RPA action is being implemented under the Fish Restoration Program Agreement (FRPA). Liberty Island restoration occurred naturally after a flooding event in 1999 and a portion of the island is preserved as a mitigation bank. Lower Cache Slough restoration planning efforts to enhance salmonid habitat under the NMFS BiOp are ongoing. On October 10, 2012, DWR submitted the FRPA Implementation Strategy to NMFS as fulfillment of the “Liberty Island/Lower Cache Slough Enhancement Plan” that is required by RPA Action 1.6.2 (DWR and CDFW 2015).

NMFS RPA 1.6.3: Lower Putah Creek Enhancements – Future

The purpose of RPA action 1.6.3 is to realign Lower Putah Creek and restore floodplains for fish passage improvement and multi-species habitat development on existing public lands. The Putah Creek Enhancements Project is being planned by the Yolo Basin Foundation, with funds from an Ecosystem Restoration Program grant managed by CDFW. The realignment has the potential to create 130 to 300 acres of shallow water habitat, improve adult and juvenile salmonid passage to Putah Creek, increase avian (shorebird and waterfowl) habitat, and increased aquatic and riparian habitat for other native species.

NMFS RPA 1.6.4: Lisbon Weir Improvements – Future

The purpose of RPA action1.6.4 is to provide better fisheries management opportunities in Putah Creek and the Toe Drain, while improving the reliability of agricultural diversions and reducing maintenance requirements. RPA action 1.6.4 is evaluated in the Yolo Bypass Salmonid Habitat Restoration and Fish Passage Draft EIS/EIR currently being developed by DWR and Reclamation. Modifying or replacing Lisbon Weir would improve reliability for agricultural diversions and increase flexibility in water distribution, allowing for greater adult fall-run Chinook attraction flows to be released down the realigned Putah Creek. Weir modifications would also reduce delay and possible stranding of adult steelhead, Chinook salmon and sturgeon, when passable conditions to the Sacramento River exist. Lisbon Weir improvements are local priority projects.

NMFS RPA 1.7: Reduce Migratory Delays and Loss of Salmon, Steelhead, and Sturgeon by Modifying Fremont Weir and Other Structures in the Yolo Bypass – Existing/Future

Several actions contained in the RPA specifically address improvements to fish passage though the Yolo Bypass and over the Fremont Weir, as listed below.

- Reduce Fish Stranding (Future) – Aside from fish rescue, reduced stranding would be accomplished by connecting stranding pools to main channels or regrading existing channels so isolation pools do not form.
- Wallace Weir Fish Rescue Facility Project (Existing) – This project is located at the confluence of the Yolo Bypass and the Knights Landing Ridge Cut. CDFW will operate the fish rescue portion of the facility, while DWR will own and operate the weir, inflatable dam, and fish barrier. Implemented by RD 108, the facility has been completed. This fish passage improvement action will impede salmon entry into the Colusa Basin Drain (CBD), which results in mortality, while also providing for safe and effective fish rescue. The project is designed to maintain appropriate irrigation water surface elevations without impeding outflows during flood season. The facility will complement the Knights Landing Outfall Gate Fish Barrier Project completed in 2015 by RD 108. Construction began in August 2016 and has been completed. Wallace Weir improvements are a local priority project.
- Agricultural Crossing Modifications along Tule Canal and Toe Drain (Future) – Three agricultural structures in the northern Tule Canal would be modified to reduce flow impediments and fish passage delays while maintaining utility of the canals for agricultural uses. Tule Canal agricultural crossing modifications are a local priority project.

U.S. Fish and Wildlife Service Biological Opinion – Past/Present/Future

On December 15, 2008, USFWS issued its BiOp on the Long-Term Operational Criteria and Plan for coordination of the CVP and SWP (USFWS 2008). Habitat restoration actions implemented in compliance with the USFWS BiOp that also meet the habitat restoration requirements of the California Endangered Species Act (CESA) ITP will satisfy the acreage requirements of the ITP.

One habitat restoration action set forth in the RPA is intended for implementation in the lower Yolo Bypass as described below.

USFWS RPA Component 4/Action 6 – Restore 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh – Future

RPA Component 4 (also referred to as Action 6) of the USFWS BiOp calls for the creation or restoration of a minimum of 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh. A public DEIR, evaluating alternatives to serve implementation of RPA Component 4, is ongoing (DWR and CDFW 2015).

CALFED Bay-Delta Ecosystem Restoration Program – Past

The Ecosystem Restoration Program (ERP) is a multi-agency effort aimed at improving and increasing aquatic and terrestrial habitats and ecological function in the Delta and its tributaries. The ERP Focus Area includes the Delta and the Sacramento River below Shasta Dam. Principal participants overseeing the ERP are CDFW, USFWS, and NMFS, collectively known as the ERP Implementing Agencies. The

ERP implements restoration projects through grants administered by the ERP Grants Program. The vast majority of these projects focus on fish passage issues, species assessment, ecological processes, environmental water quality, or habitat restoration. Strategic goals of the ERP include:

- recover endangered and other at-risk species and native biotic communities;
- rehabilitate ecological processes;
- maintain or enhance harvested species populations;
- protect and restore habitats;
- prevent the establishment of and reduce impacts from non-native invasive species; and
- improve or maintain water and sediment quality.

California WaterFix and California EcoRestore – Future

The California Natural Resources Agency has been working with State and Federal agencies since 2006 on a plan to secure California's water supplies and improve the Delta's ecosystem. In 2015, Governor Jerry Brown announced a major change for the project formerly known as the Bay Delta Conservation Plan (BDCP). The lead State and Federal agencies shifted their focus from a habitat conservation plan to permitting, design, and construction of a Delta conveyance facility (California WaterFix), with the majority of ecosystem restoration work now occurring under a separate program, California EcoRestore. California WaterFix consists of three new diversion points in the north Delta, tunnel conveyance and ancillary facilities, operational elements, and restoration plus other environmental commitments to restore and protect the Delta ecosystem. Over the next 5 years, California will pursue more than 30,000 acres of critical Delta restoration under the California EcoRestore program, pursuant to preexisting regulatory requirements such as the 2008 and 2009 BiOps and various enhancements to improve the overall health of the Delta ecosystem (California Natural Resources Agency 2016). Habitat restoration projects, many of which would be located in the Yolo Bypass and North Delta as described above for the NMFS and USFWS BiOps, would restore aquatic, subtidal, tidal, riparian, floodplain, and upland ecosystem habitats as described below.

- 25,000 acres associated with existing mandates for habitat restoration, pursuant to Federal BiOps to support native fish species recovery including projects aimed at tidal marsh creation, floodplain habitat restoration, and fish passage improvement. These projects will be funded exclusively by the State and Federal water contractors that benefit from the SWP and CVP.

- 5,000 acres of habitat enhancements throughout the Delta supported by Proposition 1E grants to local governments, non-profit organizations, and other entities. Funding will come primarily from the Delta Conservancy, CDFW, and DWR.

Knights Landing Outfall Gates Project – Past/Present

Constructed in 2015 by RD 108, this project consists of a positive fish barrier on the downstream side of the existing Knights Landing Outfall Gates (KLOG) to prevent adult salmon entry into the CBD, as well as repairing an erosion site on the right bank of the CBD. The KLOG structure is located on the CBD, approximately 0.25 mile from its confluence with the Sacramento River near the community of Knights Landing, just below RM 90, in Yolo County.

Reclamation District 2035 Sacramento River Joint Intake Project – Past/Present

RD 2035, along with the Woodland Davis Clean Water Agency, constructed this fish screen project for its 400-cubic feet per second joint intake on the Sacramento River. The joint intake now includes a state-of-the-art fish screen to avoid losses of juvenile anadromous fish while allowing diversions for agricultural, municipal, and industrial uses. The existing intake was the largest unscreened diversion on the Sacramento River. The project was completed in September 2016, and is located approximately 0.5 mile upstream from the project site, on County Road 117.

5.2.5 Projects not Included in Cumulative Impact Analysis

Several potential future projects or future project concepts were considered for the cumulative impact analysis but did not meet the criteria presented above in Section 5.2, "Method of Analysis." These projects are described below.

- *Yolo Bypass Phase II System Improvements* – The Phase II System Improvements would be implemented by DWR in 2023-2032. During this period, design, permitting, and construction of all the remaining CVFPP actions identified for the Yolo Bypass are expected to be completed. Phase II actions further expand flow capacity in the Yolo Bypass and also allow increased flow into the Yolo Bypass through extension of the Fremont and Sacramento Weirs, to provide additional flood risk reduction to urban areas and small communities. Longer-term improvements potentially include in-place improvements, additional setback levees, and use of the DWSC to convey flows in high-water events. Phase II actions also implement conservation strategies within the Yolo Bypass.

  There is not sufficiently detailed information about these improvements to allow meaningful cumulative analysis without undue speculation. Furthermore, these projects are not actively under development (i.e., an identified sponsor is actively pursuing project development or construction); an NOI or NOP has been released and/or environmental clearance documentation has been completed or substantial progress has been made toward completion; and the project is "reasonably foreseeable" given other considerations, such as site suitability, funding and economic viability, and regulatory limitations/requirements. Additional funding, project-level design, and environmental analyses must be successfully completed before Phase II system improvements can be implemented.

- *Certain Yolo Bypass Phase I System Improvements* – Phase I System Improvements would be implemented by DWR in 2015-2022 (including the LEBLS project). However, some of these potential projects do not meet the criteria for being reasonably foreseeable as they do not have project-level environmental documents prepared and do not have sufficient information available to assess impacts. These projects include: in-place improvements in the Bypass; DWSC design, permitting, and real estate; Upper Elkhorn Basin design, permitting, and real estate; small communities protection feasibility, design, and construction; and several smaller projects in the lower Yolo Bypass (Build Prospect Island Cross Levee, Modify Step Levee, Degrade Lower Egbert Levees, and Construct In-Place Improvements).

- *Elkhorn Specific Plan* – This specific plan covers an area located on the north and south sides of I-5, and encompasses an approximately 343-acre area between the Sacramento River and the Tule Canal (Yolo County 2013). The northern portion of the LEBLS project site overlaps with the southwestern portion of the area designated for the future Elkhorn Specific Plan. Yolo County 2030 General Plan Policy CC-3.17 indicates that approximately 300 acres are designated for job-producing commercial and industrial land uses, about 170 of which are general commercial and an estimated 130 acres of which are industrial. High-density residential housing would be accommodated in upper story units. In addition, 23 acres are designed for open space and 20 acres are designated for public/quasi-public (Yolo County 2009b). The Elkhorn Specific Plan area is projected to accommodate approximately 17.7 percent of the projected future growth in the County (Yolo County 2011). General Plan Policy CC-3.16 notes that the goal for this area is a regional conference center and hotel facility, with appropriate general commercial development and industrial research and development uses and some high-density residential housing, capitalizing on the existing natural amenities and riverfront.

There is not sufficiently detailed information about the Elkhorn Specific Plan projects to allow meaningful cumulative analysis without undue speculation. Furthermore, the Elkhorn Specific Plan projects are not actively under development (i.e., an identified sponsor is actively pursuing project development or construction); an NOI or NOP has been released and/or environmental clearance documentation has been completed or substantial progress has been made toward completion; and the project is "reasonably foreseeable" given other considerations, such as site suitability, funding and economic viability, and regulatory limitations/requirements. Also, the Yolo County General Plan indicates that the specific plan cannot be implemented unless and until the necessary flood protection elements have been constructed (i.e., levees that provide a 200-year level of flood protection, which the LEBLS project evaluated in this EIS/EIR would not provide).

- *Elkhorn Marina Project* – This project consists of a 62-slip marina that has been proposed for an approximately 18-acre parcel on the west bank of the Sacramento River, immediately north of the I-5 Bridge overcrossing (Yolo County 2013). The project would include a harbormaster's office and elevated platform for marina services, a 36-space automobile parking area, a 21-space boat parking area, five boat storage buildings, and a caretaker's office. The marina facilities would consist of two floating-dock sections that would be accessed by an elevated landing and two bridges and stairway structures. The marina would be used for year-round berthing of recreational boats. No boat launching or refueling facilities are proposed. (Yolo County 2010.)

  The Elkhorn Marina Project is not actively under development (i.e., an identified sponsor is actively pursuing project development or construction); an NOI or NOP has been released and/or environmental clearance documentation has been completed or substantial progress has been made toward completion; and the project is "reasonably foreseeable" given other considerations, such as site suitability, funding and economic viability, and regulatory limitations/requirements. An NOP has not been prepared, and the last extension of the Yolo County Use Permit for the marina expired in 2012. Furthermore, RD 2035 has expressed concerns that its joint fish screen project with the Woodland Davis Clean Water Agency (RD 2035 Sacramento River Joint Intake Project) could be adversely affected if the marina were to be constructed (Yolo County 2010).

- *Knaggs Ranch* – Knaggs Ranch is an approximately 1,700-acre agricultural parcel in the Yolo Bypass north of I-5 that is currently used for rice production and waterfowl hunting. A multi-year experimental evaluation is currently underway of the Yolo Bypass as winter floodplain rearing habitat for juvenile Chinook salmon. The study is improving the understanding of how juvenile salmonids use various habitat types in the Yolo Bypass. The study will provide information on best management practices for agricultural lands in the Yolo Bypass, which could also serve as fish rearing habitat during winter and early spring. This study is not included as it is not considered to be a project under CEQA.

- *Water supply projects such as North-of-Delta Off-Stream Storage (Sites Reservoir) and the North Bay Aqueduct Alternative Intake Projec*t – These projects are located far from the LEBLS project and would have negligible or no overlapping environmental impacts with the LEBLS project, would not have overlapping construction seasons and therefore no related construction impacts, and water supply operations would have relatively minor and infrequent interacting effects with the effects of the LEBLS project.

- *Delta plans and projects such as The Delta Plan, North Delta Flood Control and Ecosystem Restoration Project, Delta Islands and Levee Feasibility Project, River Islands at Lathrop, RD 17 Levee Seepage Repair Project, Prospect Island Restoration Project, CALFED Levee System Integrity Program, and Lower San Joaquin River Basin Interim Feasibility Study.* These projects are located far from the LEBLS project site and would have negligible or no overlapping environmental impacts with the LEBLS project; the LEBLS project would modify flows downstream only during infrequent flood-flow conditions when the magnitude of Delta inflows would be substantial and project effects would be negligible. Construction and O&M of the LEBLS project would have essentially no incremental contribution to overall cumulative effects involving these projects.

- *Emergency Repairs initiated following the Flood Events of 2016-2017.* These projects generally involve repair or replacement of damaged levee sections and are not expected to change overall system hydraulics. Furthermore, construction associated with these efforts would generally be completed in 2017 and 2018, and so would not overlap with construction of the LEBLS project.

5.3 Cumulative Impact Analysis by Topic Area

In the cumulative impact analysis below, the LEBLS project was found to make a cumulatively considerable incremental contribution to a significant cumulative impact related to the following impact areas:

- changes in scenic vistas and existing visual character (long-term permanent alteration in the Lower Elkhorn Basin),

- loss of agricultural lands (primarily long-term permanent loss from new levee footprints),

- changes in agricultural economics and values (NEPA only).

There are no feasible mitigation measures to further reduce the cumulatively considerable incremental contribution to these significant cumulative impacts beyond Mitigation Measures VIS-2 in Section 4.2, “Aesthetics”; AG-1a, AG1b, and AG1c, in Section 4.15, Land Use and Planning, and Agricultural and Forestry Resources.”

For all other topics and impacts, the LEBLS project would not make a cumulatively considerable incremental contribution to a significant cumulative impact.

5.3.1 Aesthetics

The cumulative geographic context for aesthetics is defined as the LEBLS project site and the immediate vicinity, including motorists on I-5 to the north and motorists and recreationists on Old River Road to the east, residents throughout the Lower Elkhorn Basin, and recreationists in the Sacramento Bypass Wildlife Area and along the Tule Canal. The areas where construction would occur on the project site are of high visual quality and scenic vistas are present. In addition, sensitive viewer groups (i.e., recreationists and residents), are present.

Old River Road, which parallels the west side of the Sacramento River, is a Yolo County-designated scenic highway. Most of the project-related facilities would not be visible from this roadway. However, construction and operation of the southeastern end of the new Yolo Bypass East Levee setback and the eastern end of the Sacramento Bypass North Levee setback would be visible in the foreground and middleground views for motorists and bicyclists traveling on the southern end of Old River Road near the Sacramento Weir. The completed setback levees would appear visually similar to the existing levees. Since the area between the existing Sacramento Bypass North Levee and the proposed Sacramento Bypass North Levee setback would either continue to be in agricultural use and/or would receive riparian plantings, it would appear visually similar to the existing land uses. Therefore, the LEBLS project would result in less-than-significant impacts.

The related projects discussed above in subsection 5.2.4 would occur in a variety of different locations in different viewsheds throughout the Sacramento Valley. Some of the related projects may entail construction and operation of facilities that would be visible from State- or County-designated scenic highways. However, for a cumulatively significant impact to occur, construction and operation of one or more of the related projects would have to occur at the same time and within the same viewshed as the LEBLS project. As discussed previously, widening of the Sacramento Weir, which is envisioned under both the ARCF GRR and CVFPP, would not occur until after the LEBLS project is completed. However, remediation of the former Old Bryte Landfill, which is located in the southwestern corner of the project site, would be completed prior to LEBLS project-related construction activities. Landfill remediation activities would be located approximately 1.2 miles west of Old River Road, and views from this road would likely be blocked by the intervening height of the existing levee. Even if portions of the existing Sacramento Bypass North Levee were degraded prior to landfill remediation, views of remedial work would be so far in the background as to be negligible. Finally, even if other related projects were to be implemented at the same time as the LEBLS project and in the same viewshed, the project site is only visible from Old River Road in two locations: at the southern end of the road near the Sacramento Weir (discussed above) and at the northern end near I-5, where the project site appears only in the background. Although multiple construction activities could be visible in the background, this impact would be temporary and short-term. Therefore, the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact from damage to scenic resources within a State- or County-designated scenic highway.

Project implementation would result in the construction and operation of a 25-foot-high earthen levee located immediately adjacent to 1–2 existing residences (depending on the alternative selected). Both residences currently have scenic views in all directions; therefore, construction of the new Yolo Bypass East Levee setback would block the scenic views to the northwest, west, and southwest from either or both of these residences (depending on the alternative selected). In addition, construction crews and equipment would be located immediately adjacent to these residences, with no intervening vegetation or topography to block these residents' views of the construction personnel and equipment. Borrow activities along the south cross-canal would also take place immediately adjacent to an existing residence, with no intervening vegetation or topography to block this resident's views of the construction personnel and equipment. Finally, the watersides of the new Yolo Bypass East Levee and Sacramento Bypass North Levee setbacks and the South Sacramento Bypass Training Levee would be armored with riprap to provide erosion protection. Views of large areas of boulder-sized angular rocks for erosion control would not be consistent with the existing natural setting on the waterside of the levee and would have an adverse effect on scenic vistas in the areas where the riprap is placed. The waterside of these levees would be visible to motorists traveling along I-5, recreationists within the project site, recreationists within the Sacramento Bypass Wildlife Area, and local residents.

Implementing Mitigation Measure VIS-2 would reduce the LEBLS project's significant temporary and short-term impacts associated with changes in scenic vistas and alteration of visual character during construction. However, no feasible mitigation is available to reduce the long-term significant impacts from permanent loss of scenic vistas and the change in visual character from operation of the project's levees adjacent to the 1–2 residences, and the changes in scenic vistas from the project's placement of riprap for erosion control on the waterside of the levees (particularly along the south Sacramento Bypass Training Levee adjacent to the Sacramento Bypass Wildlife Area). Therefore, the LEBLS project's long-term permanent impacts would be significant and unavoidable. The related projects described in Subsection 5.2.4 could also result in significant impacts from temporary and short-term degradation of visual character during construction (where no intervening vegetation or topography blocks residential views of construction personnel and equipment in close proximity), and there is no guarantee that the related projects would include mitigation measures to avoid these visual impacts during construction. Implementing Mitigation Measure VIS-2 would reduce the LEBLS project's contribution to a cumulatively less-than-significant level. However, the related projects could also result in long-term permanent alteration of scenic vistas from operation of large new facilities (such as levees) adjacent to sensitive viewers and from installation of riprap for erosion control. Therefore, when considered in combination with the impacts of the related projects, *the LEBLS project would generate a cumulatively considerable incremental contribution to a significant cumulative impact from long-term permanent alteration of scenic vistas in the Lower Elkhorn Basin.*

Nighttime lighting would be used during construction of project-related slurry cutoff walls for the new levee setbacks, and the project site lies within the airport approach zone of Sacramento International Airport, in Referral Areas 1 and 2 of the Airport Land Use Compatibility Plan (SACOG 2013:Map 4b). Projects within either Referral Areas 1 or 2 that include lighting which could be mistaken for airport lighting and/or could cause glare in the eyes of pilots of aircraft using the airport, require review by the Airport Land Use Commission. In addition, nighttime lighting would be used for horizontal directional drilling associated with relocation of the Sacramento International Airport jet fuel pipeline. That lighting would be located immediately adjacent to and west of the CHP Academy Airport. Nighttime lighting associated with construction of slurry cutoff walls for the Sacramento Bypass North Levee setback would be located within 0.5 mile of the CHP Academy Airport. In addition, construction-related nighttime lighting could result in glare effects for motorists traveling along I-5 in the north and Old River Road in the south. Finally, construction-related nighttime lighting would result in skyglow effects.

Implementing Mitigation Measures VIS-3a and VIS-3b would reduce the LEBLS project's significant impacts to a less-than-significant level. Some of the related projects discussed in Subsection 5.2.4 may also require the use of nighttime lighting that could result in airport hazards, sleep disturbance for residents, and skyglow effects. However, for a cumulatively significant impact to occur, construction and operation of one or more of the related projects would have to occur at the same time and within the same viewshed as the LEBLS project. As discussed previously, widening of the Sacramento Weir, which is envisioned under both the ARCF GRR and CVFPP, would not occur until after the LEBLS project is completed. Although remediation of the former Old Bryte Landfill (which is located in the southwestern corner of the project site), may overlap with project-related construction activities, remediation activities would not occur during the evening hours and therefore would not require nighttime lighting. Therefore, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact from construction-related nighttime light and glare effects.

5.3.2 Air Quality

As presented in Table 4.3-1, in Section 4.3, "Air Quality," the Sacramento Valley Air Basin (SVAB) is currently designated as nonattainment under the State Ambient Air Quality Standards (SAAQS) for ozone, and particulate matter with an aerodynamic diameter of 10 micrometers or less (PM_{10}), and designated nonattainment under the National Ambient Air Quality Standards (NAAQS) for ozone and for fine particulate matter with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$). Yolo-

Solano Air Quality Management District (YSAQMD) guidance states that, within the jurisdiction of YSAQMD, any project that would individually have a significant air quality impact over a significance threshold for ROG, NO_X, or PM_{10}, would be considered cumulatively significant as well (YSAQMD 2007). As shown in Tables 4.3-5a and 4.3-5b, in Section 4.3, "Air Quality," the LEBLS project would generate construction-related emissions that exceed YSAQMD's significance threshold for NO_x and PM_{10}. Implementation of Mitigation Measures AIR-1a through AIR-1e would reduce the LEBLS project's construction-related emissions to the maximum extent feasible.

Other construction projects may occur simultaneously in the SVAB prior to or during the planned construction period for the LEBLS project (2020-2021). These projects, grouped by their anticipated construction year(s), include:

- **2017 –** SAFCA North Sacramento Streams Levee Accreditation Project
- **2017 –** SAFCA NLIP Reach I
- **2018/2019 –** SAFCA Bryte Landfill Remediation Project
- **2017-2020 –** WSAFCA Southport EIP
- **2018/2019 – 2020/2021 –** SAFCA Sacramento River East Levee Accreditation Project, NLIP Riverside Canal, NLIP Reaches 13-20
- **2020+ –** SAFCA NLIP Contract 2

The projects listed above all have the potential to generate construction-related emissions that exceed YSAQMD's significance thresholds individually, although some of the above projects, such as the Sacramento River East Levee Accreditation Project, North Sacramento Streams Levee Accreditation Project, and the NLIP projects are all located under the jurisdiction of the Sacramento Metropolitan Air Quality Management District (SMAQMD); however, they are all located within the SVAB. All construction projects are required to submit information regarding construction activities and emissions and to offset emissions with the potential to adversely affect air quality in the SVAB. All of the projects listed with potential simultaneous construction timelines have included air quality mitigation commitments to reduce emissions below levels expected to create an adverse cumulative effect (i.e., less than significant).

In addition, many offset projects create long-term, permanent emissions reductions. The offsets purchased in mitigation for all of these projects cumulatively have the potential to create a long-term benefit after construction completion. Due to the purchase of offsets on simultaneously occurring projects, and the implementation of mitigation measures for the LEBLS project, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative effect related to regional air quality.

5.3.3 Biological Resources – Fish and Aquatic Organisms

Past and present activities by humans have substantially changed aquatic habitats in the Sacramento River Basin, compared to historical conditions. These changes have resulted in significant cumulative impacts on the distribution, abundance, and species composition of native fish assemblages and other aquatic organisms. Numerous factors have contributed to these impacts: substantial alteration of flow regimes and flow reductions; dewatering of stream reaches; removal of instream vegetation; isolation of floodplains from the river channel by channelization and levee construction; substantial reductions in the frequency, magnitude, and duration of floodplain inundation; habitat fragmentation by physical barriers; creation of false migration pathways by flow diversions; introduction of nonnative fish species; and poor water quality. The extent of available spawning and rearing habitat for all runs of Chinook salmon, Central Valley steelhead, Pacific lamprey, and green sturgeon have been reduced as a result of these factors. Ocean harvest, fluctuating ocean conditions, and reduced spawning success have dramatically reduced the abundance of all Chinook salmon runs in the Central Valley. Populations of estuarine species such as delta smelt and longfin smelt have declined due to invasive species, food web alterations, habitat reduction, and other factors. Fisheries management plans and restoration programs, such as those discussed above, have been initiated to offset the adverse effects of ongoing activities. However, many ongoing and reasonably foreseeable future projects are expected to further contribute to existing significant cumulative impacts.

As discussed in Section 4.4, “Biological Resources – Fish and Aquatic Organisms,” implementing the LEBLS project could adversely affect special-status fish and their behaviors and habitat in several ways. Specifically, water quality could be degraded; a small amount of shaded riverine aquatic habitat (SRA) cover and riparian vegetation would be lost; and disturbance from noise and vibration during construction could occur. The LEBLS project would also have substantial beneficial effects, including increased availability of floodplain habitat and planting of riparian vegetation to increase SRA cover and provide a source for future instream woody material (IWM).

Impacts of the LEBLS project would be reduced to less-than-significant levels with implementation of Mitigation Measures GEO-2, WQ-1, and WQ-2 to minimize potential erosion and increased turbidity and sedimentation and Mitigation Measures HAZ-1, HAZ-2a, HAZ-2b, HAZ 2c, HAZ 3a, and HAZ-3b to minimize potential for habitat contamination. Given the minor level of impact after mitigation implementation and the overall beneficial effect of increasing floodplain habitat, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to erosion, sedimentation, and contamination of habitats and directly on fish and aquatic organisms at the project site and in the region.

LEBLS project activities associated with extracting borrow, constructing the project components, and degrading the existing levees would involve grading and moving earth, which could result in soil erosion, stormwater discharges of suspended soils, and increased turbidity during construction and when the expanded floodplain inundates for the first time. Increased turbidity could temporarily disrupt fish behaviors, and high levels of suspended sediments could displace fish and degrade food-producing habitat downstream. Grading and earth-moving also could mobilize contaminants such as concrete, fuels, oils, and other petroleum products used in construction activities could be introduced in the water system, either directly or through surface runoff. Contaminants can degrade habitat and may be toxic to fish and benthic macroinvertebrates or may change oxygen diffusion rates, thus causing acute and chronic toxicity to aquatic organisms and reducing their growth and survival.

Mitigation measures would be implemented to reduce potential for these adverse effects: ground-disturbance adjacent to aquatic habitat would be minimized (Mitigation Measure WQ-1), erosion control measures would be implemented (Mitigation Measure WQ-2), a Stormwater Pollution Prevention Plan (SWPPP) consistent with the existing Statewide National Pollutant Discharge Elimination System (NPDES) discharge permits from the Central Valley Regional Water Quality Control Board (CVRWQCB), and a Spill Prevention Control and Countermeasures Plan would be implemented (Mitigation Measures GEO-2 and HAZ-1), and Old Bryte Landfill would be remediated before project-related ground-disturbing activities begin (Mitigation Measure HAZ-2c). Implementing these measures would avoid increasing sedimentation and turbidity or releasing contaminants that could degrade aquatic habitats and adversely affect aquatic species. Therefore, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to effects of pollutants on fish habitat (including designated critical habitat and Essential Fish Habitat, movement, and populations.

Degrading the Yolo Bypass East Levee and armoring the Sacramento Bypass Training Levee could result in localized disturbance and displacement of special-status fish. If fishes are present in canals adjacent to construction area, noise, vibration, and disturbance from construction activities could displace adults and juveniles from cover, potentially increasing their susceptibility to mortality by predation, or disrupt essential behaviors such as foraging and migration. However, no in-water construction, dewatering, or direct disturbance of aquatic habitat would occur. In addition, a relatively small number of fish would be affected, because LEBLS project construction would occur when the number of fish present in the area is low. Therefore, from a cumulative context, the LEBLS project would not result in a cumulatively considerable incremental contribution to the significant cumulative impact that exists on special-status fish in the region.

Degrading the Yolo Bypass East Levee and implementing LEBLS project ecosystem project elements could result in removal of SRA cover and would likely remove riparian trees that could be a source of IWM. Potential adverse effects of SRA cover loss include increased predation risk, increased water temperatures, and reduced food availability. However, a very small amount of habitat would be removed, especially in relation to the amount of habitat available on the opposite bank of Tule Canal. Removal of SRA cover and riparian vegetation associated with the LEBLS ecosystem project elements would only occur when it is determined that a greater ecological benefit to fish habitat would result from improving connectivity to the expanded floodplain. In addition, habitat loss would be offset by planting riparian vegetation along the proposed Tule Canal habitat corridor and potentially elsewhere adjacent to aquatic habitat that would be incorporated into the expanded Bypass areas, thereby avoiding a net loss of habitat extent, function, and value. Consequently, from a cumulative context, the LEBLS project would not result in a cumulatively considerable incremental contribution to the overall significant cumulative impact that exists in the region with respect to the substantial loss of SRA cover from past levee projects in particular.

Ongoing LEBLS project activities, and reasonably foreseeable future projects and programs, will affect aquatic biological resources. Many of these projects and programs may adversely affect special-status fish, but others are likely to improve their condition. The net effect of new and ongoing programs, projects, and restoration efforts in the Yolo Bypass is difficult to predict; however, over time, these projects would be expected to maintain and likely benefit fish populations and available aquatic habitats in the Yolo Bypass. Likewise, the LEBLS project would result in an overall long-term benefit to fish and other aquatic organisms through a substantial increase in seasonal floodplain habitat, and implementing mitigation measures related to water quality would minimize potential for adverse impacts on aquatic biological resources associated with the LEBLS project. Although effects of past, present, and reasonably foreseeable future projects on special-status fish species have resulted in a significant cumulative impact on special-status fish, the LEBLS project would not result in a cumulatively considerable incremental contribution to the significant cumulative impact on special-status fish, fish movement, designated critical habitat, or Essential Fish Habitat.

5.3.4 Biological Resources – Vegetation and Wildlife

Implementation of the LEBLS project has the potential to contribute to the loss or degradation of sensitive habitats, including waters of the United States, waters of the State, and protected trees, and to adversely affect special-status species (special-status plants, vernal pool invertebrates, Valley elderberry longhorn beetle host plants, giant garter snakes, northwestern pond turtles, burrowing owls, Swainson's hawks, Western yellow-billed cuckoo, least Bell's vireo, pallid bat, and other nesting raptors and migratory birds). Most potential impacts of the LEBLS project related to wildlife would be associated with construction disturbances of wildlife and their habitats, but permanent loss of habitat would also result from some of the individual project components. These impacts could contribute to species declines and losses of habitat that have led to the need to protect these species under the Federal ESA and CESA. Similar potential for adverse effects on special-status species and sensitive habitats would be associated with the flood risk reduction projects, including future ARCF GRR projects proposed along the Sacramento River East Levee and American River, the West Sacramento Levee Improvements Program projects proposed along the Sacramento River West Levee, which would generally continue to reduce suitable habitat and nest sites. It is clear that a significant cumulative impact exists on vegetation and wildlife from past and present projects in the project vicinity and region. However, numerous habitat and ecosystem restoration projects expected in the Yolo Bypass, including the beneficial impacts of floodplain expansion from the LEBLS project, would likely enhance and expand sensitive habitats.

Implementation of Mitigation Measures BIO-1a through BIO-9 in Section 4.5, "Biological Resources – Vegetation and Wildlife," would ensure that the impacts of the LEBLS project are reduced or avoided in accordance with the requirements of the Federal ESA and CESA and other regulatory programs that protect habitats, such as Section 1602 of the California Fish and Game Code. In addition, the LEBLS project ecosystem elements ensure that sensitive habitats, such as riparian and wetland habitats and habitats used by special-status species are enhanced and expanded throughout the project site.

Avoidance and minimization measures would be implemented in accordance with the requirements of the Federal ESA, CESA, and Section 1602, as part of the LEBLS project, and would include additional habitat enhancement components as part of the LEBLS project ecosystem elements. Therefore, it anticipated that the LEBLS project would not generate a cumulatively considerable incremental contribution to significant cumulative impacts related to the loss or degradation of sensitive habitats and to adverse impacts on special-status species.

5.3.5 Biological Resources – Wetlands and Other Waters

LEBLS project implementation has the potential to contribute to the loss or degradation of waters of the United States. Most potential adverse impacts of the LEBLS project on waters of the United States would be a result of permanent loss of waters rather than adverse impacts to water quality leading to habitat degradation. These adverse impacts could contribute to an overall net loss of waters within Yolo County as a result of other land use projects and plans. Similar potential for adverse impacts (i.e., loss of waters) could be associated with the plans and projects described in Subsection 5.2.4. Such projects would generally continue to contribute to the loss or degradation of waters of the United States in the region.

As mentioned previously in this section, the Yolo Bypass is currently the focus of several major interagency planning efforts aimed at improving flood conveyance, fisheries and wildlife habitats, water supply and water quality, agricultural land preservation, and economic development. These planning efforts include preparation and adoption of plans as described in Subsection 5.2.4 and implementation of projects such as those mentioned in Subsection 5.2.4. Two of the relevant plans described in Subsection 5.2.4, the 2017 CVFPP Update (in particular the Central Valley Flood System Conservation Strategy) and the Yolo Habitat Conservation Plan/Natural Community Conservation Plan are being prepared with an emphasis on the preservation and enhancement of natural resources in the region, including wetlands and other waters of the United States. Related projects associated with these plans would be required to include wetland and other waters enhancement, restoration, and/or creation as part of the projects.

Additionally, regulatory permits that would be required to implement the related projects would also require mitigation of impacts to wetlands and other waters of the United States and waters of the State at a minimum no-net-loss basis.

Similarly, the projects described in Subsection 5.2.4 would all require compliance with environmental laws and regulations, including obtaining regulatory permits from agencies such as USACE, CVRWQCB, and CDFW. As such, these related projects would need to compensate for loss of waters on a no-net-loss basis, at a minimum. In the case of many of the flood risk reduction projects and especially the ecosystem restoration and fisheries projects, habitat enhancements and creation including those to wetlands and waters of the United States are being planned and implemented resulting in a net benefit and increase in total wetlands and waters of the United States acreage.

Implementation of Mitigation Measure WATERS-1 presented in Section 4.6, "Biological Resources – Wetlands and Other Waters of the United States," would minimize and mitigate the impacts of the LEBLS project in accordance with the requirements of the Federal Clean Water Act Sections 401 and 404, which would also meet Yolo County policy for open space and conservation elements. Implementation of this mitigation measure in combination with implementation of the LEBLS project ecosystem elements is anticipated to result in a net increase in waters of the United States and a net ecological benefit to the project site and to the region. Therefore, the LEBLS project would not result in a cumulatively considerable incremental contribution to significant cumulative impacts related to the loss or degradation of waters of the United States.

5.3.6 Climate Change

Climate change is a global phenomenon and any increase in greenhouse gas (GHG) emissions has the potential to contribute to the greenhouse effect. However, planning for responsible GHG emissions and reductions to achieve even very aggressive goals for GHG emissions reductions allows for responsible allocation of GHG emissions to projects that are effective in planning for a robust climate future both in terms of GHG emissions, and climate resiliency. The project would generate GHG emissions during construction that would potentially be a cumulatively considerable incremental contribution to a significant cumulative impact on global climate change. However, implementation of Mitigation Measure GHG-1 would reduce this impact such that there would not be a cumulatively considerable incremental contribution to a significant cumulative impact on global climate change for the reasons listed below.

- The action alternatives do not show substantial annual GHG emissions when considered in the context of the useful life of the levees (at least 50 years) and the extremely low GHG emissions during project O&M (48 years of the expected 50-year project life).
- The action alternatives are preferable to the No Action Alternative as good planning to avoid the risk of huge and uncontrolled GHG emissions that would potentially result from construction activities after flooding, which would be much more likely to occur under the No Action Alternative.
- The action alternatives are consistent with plans, policies, and regulations without offsets through maintaining and enhancing open spaces and riparian habitats.

5.3.7 Cultural Resources

Considered together, the LEBLS project and related projects have the potential to contribute to the loss or degradation of known and unrecorded archaeological resources, known prehistoric-period Cultural Landscapes, known and unknown Tribal Cultural Resources (TCRs) and Traditional Cultural Properties

(TCPs), known and unknown human remains, known and unknown historic-period archaeological resources, and known historical built environment resources, such as levees. Potential impacts of the LEBLS project and other related projects to cultural resources would be associated with impacts to levees such as construction disturbances of archaeological sites, prehistoric Cultural Landscapes, TCRs and TCPs, and human remains. These impacts could contribute to the loss of intact cultural resources and human remains in the Sacramento and Yolo County regions. The adequacy of cultural resources inventory efforts and NRHP evaluation of identified resources has been confirmed by USACE and through consultation with SHPO. No significant archaeological finds have been located at the project site during geoarchaeological and surficial archaeological surveys; approximately 99 percent of the project APE has been subjected to archaeological pedestrian survey with the existing Old Bryte Landfill property and an area south of the Sacramento Bypass Training Levee (approximately 20 acres of the 2,089-acre project APE) not having been surveyed because of private access issues and because the surface of the Old Bryte Landfill consists entirely of fill. Consequently, there is no substantial evidence to support the presence of TCRs, TCPs, and human remains on the project site at this time.

Furthermore, Implementation of Mitigation Measures CR-3a, CR-3b, CR-3c, CR-5, and CR-6 would reduce or avoid the impacts of the LEBLS project on TCRs, TCPs, unknown archaeological sites, and unknown human remains that could be discovered during project construction. Although a significant cumulative impact in the region exists with respect to impacts on the loss of TCRs, TCPs, and human remains because of substantial development over time, the LEBLS project's contribution to the significant cumulative impact that exists with respect to past, current, and reasonably foreseeable projects in the region would not be cumulatively considerable because there is no substantial evidence of any TCRs, TCPs or human remains at the site, and appropriate mitigation will be implemented to avoid, minimize, and appropriately treat any resources that are discovered. Although USACE and SHPO have concluded determinations of NRHP eligibility that are identified in this document, USACE has not yet consulted with SHPO concerning the findings of effect. Therefore, the findings presented in this document do not reflect complete consensus findings under Section 106 of the NHPA. Under Section 106, confirmation of findings of effect and appropriate mitigation will be made through consultation between USACE, SHPO and other parties as appropriate.

Measures described in Mitigation Measure CR-1 would reduce impacts to the historical levees (Levee Unit 122), but would not reduce impacts to a less-than-significant level (as stated above, these findings to not reflect consensus determinations under Section 106 of the NHPA and mitigation under Section 106 will be determined through consultation following a finding of adverse effect). Although impacts to the levees would result in a significant and unavoidable impact, most other regional flood risk reduction projects do not have significant impacts to levees because they would not remove and/or degrade levees. Therefore, although there would be a significant and unavoidable direct impact to levees at the project site (Levee Unit 122), there is not an overall significant cumulative impact with respect to the region's levees as nearly all levees remain intact with the exception of a few setback levees. Most levees remain intact from a historical perspective. Therefore, the LEBLS project would not make a cumulatively considerable incremental contribution to significant cumulative impacts on historical levees.

Overall, it is concluded that the LEBLS project would not generate a cumulatively considerable incremental contribution related to impacts on any cultural resources, including historic resources. This impact would be cumulatively less than considerable.

5.3.8 Energy

The LEBLS project would have negligible impacts during both construction and O&M as discussed in Section 4.9, "Energy." Several pumps would be replaced by a newer and more efficient pump. Other

O&M impacts would generally remain the same for the new levees as with the old levees. None of these project impacts would be considered cumulatively considerable and would be orders of magnitude less than the energy that would be used to rebuild flooded areas that would be necessary under the increased flood threat that exists under existing conditions and implementation of the No Action Alternative. Therefore, the LEBLS project would not make a cumulatively considerable incremental contribution to the significant cumulative impact that respect to energy use in the project vicinity and region.

5.3.9 Environmental Justice

The cumulative geographic context for environmental justice impacts is defined as the LEBLS project site and the immediate project vicinity (including Census Tract [CT] 101.02). According to the Council on Environmental Quality (CEQ 2007) and U.S. Environmental Protection Agency (EPA 2008) guidelines, a minority population is present in a study area if the minority population of the affected area exceeds 50 percent, or if the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. Under the same guidelines, a low-income population exists if a study area is composed of 50 percent or more people living below the poverty threshold, as defined by the U.S. Census Bureau, or if the percentage of people living below the poverty threshold in the study area is substantially greater than the poverty percentage of the general population or other appropriate unit of geographic analysis.

As discussed in Section 4.10, “Environmental Justice,” no minority population exceeds 50 percent in CT 101.02, Yolo County, or the State of California as a whole. The median household and per-capita income in CT 101.02 and Yolo County are less than for the State; however, the percentages of the population below the poverty level in CT 101.02 and Yolo County are not meaningfully greater than of the percentage of the general population in the State living in poverty. Therefore, the LEBLS project would not cause a disproportionately high and adverse impact on minority and low-income populations.

The related projects discussed above in Subsection 5.2.4 would occur in various locations throughout the Sacramento Valley. It is presently unknown whether these related projects would occur in areas where a minority population exceeds 50 percent, or whether there may be percentages of the population below the poverty level that are meaningfully greater than the general population in the State, in the site-specific locations where each individual related project would occur. However, the related projects are located in a variety of different geographic environments ranging from very rural agricultural and open space areas, to somewhat developed areas near urban centers, to heavily urbanized areas in incorporated cities and unincorporated communities. The related projects are also located in a variety of different geographic locations ranging from the northern to the southern end of the Sacramento Valley. Because of the wide variety of geographic environments and locations, it is unlikely that the related projects would combine together to result in a cumulatively significant disproportionate placement of environmental impacts on low-income and minority populations or communities. Furthermore, because the LEBLS project itself would have no impact related to environmental justice, the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact related to environmental justice.

5.3.10 Geology, Soils, and Paleontological Resources

Geology, Soils, and Seismicity

The cumulative geographic context for geology, soils, and seismicity is defined as the LEBLS project site and the immediate project vicinity However, the geologic formations and therefore the soil types vary depending on location, and thus are site-specific.

As discussed in Section 4.11, “Geology, Soils, and Paleontological Resources,” strong seismic ground-shaking and associated hazards such as liquefaction, surface fault rupture, and landslides generally do not pose a hazard at the project site, which is not located in a seismically active area or an area with steep slopes. Subsidence and shrink-swell potential may pose a hazard to the proposed LEBLS project facilities. However, all flood risk reduction facility construction or modification conducted as part of the LEBLS project proposed improvements (e.g., new setback levees, seepage berms, cutoff walls, drainage canals, relocation of County roads, etc.) would be designed based on the results of detailed geotechnical engineering studies and would be required to comply with standard engineering practices for levee design such as DWR’s *Urban Levee Design Criteria* (DWR 2012), which are the primary State standards applicable to the proposed levee improvements. In addition, the CVFPB’s standards also apply to the proposed levee improvements (CCR Title 23, Division 1, Article 8, Sections 111–137).CVFPB’s standards direct that levee design and construction be in accordance with Engineering Manual 1110-2-1913 *Engineering Design and Construction of Levees* (USACE 2000), the primary Federal standards applicable to levee improvements. Therefore, the LEBLS project’s impacts would be less than significant. Similar geologic, soils, and seismic hazards could be experienced by any or all of the related levee projects discussed in Subsection 5.2.4 above. However, the related projects are also required to comply with these engineering standards. Furthermore, any of the related projects that involve the construction of buildings must comply with the California Building Standards Code, which incorporates earthquake- and liquefaction-resistant design standards, in addition to design standards related to geologic and soil engineering properties. Therefore, the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact from geologic, soils, or seismic hazards.

LEBLS project-related construction activities would involve extensive grading, excavation, and other earth-moving activities, thereby exposing soil to erosion from wind in summer and from rainfall during late fall and winter storm events. Intense rainfall and associated stormwater runoff in relatively flat areas could result in periods of sheet erosion within areas of exposed soils. If uncontrolled, suspended sediment could enter adjacent water bodies and result in increased turbidity. However, Mitigation Measure GEO-2, in Section 4.11, “Geology, Soils, and Paleontological Resources,” would reduce the LEBLS project’s potentially significant construction-related erosion impacts to a less-than-significant level. Most of the related projects discussed in Section 5.3 above would also result in earth-moving activities that would expose soil to erosion from wind and water, and therefore the related projects could also have significant impacts. However, each related project that would disturb 1 acre of land or more would be required to comply with NPDES discharge permits from the CVRWQCB, which require preparation of a SWPPP and implementation of erosion control best management practices (BMPs). Furthermore, the LEBLS project includes installation of rock revetment along the waterside of the new setback levees, as well as along the South Sacramento Bypass Training Levee, which is specifically designed to reduce erosion. Therefore, the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact from construction-related erosion.

Paleontological Resources

The geographic context for paleontological resources is defined as the Sacramento Valley. Fossil discoveries resulting from excavation and earth-moving activities associated with all types of development are occurring with increasing frequency throughout the Sacramento Valley. The value or importance of different fossil groups varies depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions (such as for a research project). Unique, scientifically important fossil discoveries are relatively rare, and the likelihood of encountering them is site-specific and based on the type of geologic formations. These rock formations vary from location-to-location.

Most of the LEBLS project-related earth-moving activities would take place within Holocene-age rock formations, which are considered to be of low paleontological sensitivity. However, the Pleistocene-age Riverbank Formation occurs at depth beneath the LEBLS project site. The Riverbank Formation comprises an alluvial plain of widespread extent, and is present either at or beneath the ground surface throughout most of the central and eastern portions of the Sacramento Valley. The Riverbank Formation is paleontologically sensitive, and thus there is a potential that unique paleontological resources may be uncovered during deep excavation (i.e., slurry cutoff walls) in this formation at the project site. Implementing Mitigation Measure GEO-3, in Section 4.11, “Geology, Soils, and Paleontological Resources,” would reduce LEBLS project’s potentially significant impacts on previously undiscovered unique paleontological resources to a less-than-significant level. Some of the related projects would also occur in the Riverbank Formation, and may occur in other paleontologically sensitive rock formations. While some of the related projects, such as the CVFPP and NLIP, contain mitigation measures to protect paleontological resources, the other related projects may not. Therefore, some of the related projects may result in significant impacts to unique paleontological resources. However, the presence of unique paleontological resources is site-specific, and a low probability exists that any related project would encounter unique, scientifically important fossils. With implementation of Mitigation Measure GEO-3, the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact from damage to or destruction of unique paleontological resources.

5.3.11 Groundwater Resources

The implementation of cutoff walls in the new levees could restrict the movement of groundwater, potentially increasing or decreasing localized near-surface groundwater levels in the areas immediately adjacent to the cutoff walls along the LEBLS project setback levee alignment. A substantial change in groundwater levels could affect groundwater levels, groundwater-dependent wetlands, or cause waterlogging of the root zone for adjacent agricultural crops. However, because a substantial short- or long-term change in groundwater levels is not expected to be caused by the cutoff walls, this impact is considered to be less than significant at the project site and vicinity.

Although the weir improvements associated with the ARCF GRR project, along with some of the other related projects, could occur in the LEBLS project study area, there are no other levee improvements which would require cutoff walls planned in the foreseeable future in the immediate LEBLS project area. This is a highly localized effect, and for a significant cumulative impact to occur, levee cutoff walls would have need to be constructed in the immediate project vicinity and within the same period. Because there are currently no plans for levee construction that would take place at the same time and place as the LEBLS project’s cutoff walls, and the presence of cutoff walls from the LEBLS’s project is not expected to affect groundwater levels, the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact related to groundwater resources.

5.3.12 Hazards and Hazardous Materials

Health and safety impacts associated with the past or current uses of a project site usually occur on a project-by-project basis, and are generally limited to the specific project site; in this case, the LEBLS project improvements within the project site and in the immediate vicinity.

LEBLS project implementation would result in the handling of small quantities of hazardous materials used in construction equipment (e.g., fuels, oils, lubricants) and a bentonite slurry used for cutoff walls. However, permits are required for the use, handling, and storage of these materials and compliance with appropriate standards of regulatory agencies is also required to avoid inadvertent releases of hazardous waste. The storage, use, disposal, and transport of hazardous materials are extensively regulated by various Federal, State, regional, and local agencies. Construction companies that handle hazardous substances are required by law to implement and comply with these existing regulations. Mitigation Measure HAZ-1 in Section 4.13, "Hazards and Hazardous Materials," includes requirements and BMPs to reduce the LEBLS project's potentially significant impacts to a less-than-significant level. The related projects discussed in Section 5.3 above could also result in accidental spills of hazardous materials used during construction activities. However, any impact that might occur would be localized to the area where the materials are being used and would not be additive to other hazardous materials-related impacts. Thus, a significant cumulative impact related to this issue would not occur, and the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact from the potential for accidental spills of materials used during construction activities.

Workers and the public could be exposed to on-site existing hazardous materials during LEBLS project-related construction, including construction on a Cortese-listed site. For example, potential sources of hazardous materials such as underground storage tanks and septic systems, demolition of structures containing asbestos and lead-based paint, and soils contaminated with agricultural chemicals could be encountered during excavation and other earth-moving activities. Implementing Mitigation Measures HAZ-2a, HAZ-2b, and HAZ-2c in Section 4.13, "Hazards and Hazardous Materials," and UTL-1 in Section 4.21, "Utilities and Service Systems," would reduce the LEBLS project's potentially significant impacts to a less-than-significant level. It is unknown whether any of the related project sites discussed above in Section 5.3 contain existing hazards materials (e.g., piles of debris, underground or aboveground storage tanks, underground pipelines, stained soils [indicating potential contamination]). However, if hazardous materials were encountered on-site during construction of the related projects, the associated effects would be localized to each related project site and would not be additive to other hazardous materials-related effects associated with other projects. The former Old Bryte Landfill is on the Cortese list and is located in the southwestern corner of the project site. As discussed in detail in Section 4.13, "Hazards and Hazardous Materials," soil at the approximately 17-acre site has been contaminated with lead, zinc, PCBs, and dioxins, and further analysis of potential groundwater contamination is needed. SAFCA has proposed, and is the process of discussions with California Department of Toxic Substances Control related to, a Presumptive Remedy that could entail, but is not limited to, the following actions:

- moving the approximately 60,000 cubic yards of contaminated waste approximately 1,500 feet (so that it would not be located within the enlarged Sacramento Bypass or the Yolo Bypass);
- treating the existing Resource Conservation and Recovery Act (RCRA) hazardous waste to make it non-RCRA waste as part of the removal process;
- consolidating the waste under an appropriate cap;
- recording a land use covenant to limit land use; and
- entering into an Operation and Maintenance Agreement to maintain the area as a Corrective Action Management Unit (CAMU).

In addition, further samples from on-site groundwater monitoring wells would be submitted for laboratory analysis (and potential additional action) as part of the Remedial Investigation/Feasibility Study. Before the LEBLS project is fully implemented, the former landfill must be remediated. SAFCA has committed funds to prepare a separate CEQA compliance document that will examine the environmental impacts of landfill remediation. Remedial activities would be implemented by a contractor licensed to handle hazardous materials. LEBLS project activities would not take place at the landfill site until after it was remediated, and remediation of the landfill would result in a beneficial impact to people and the environment. Therefore, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to past and existing hazardous materials.

The LEBLS project site and vicinity contain numerous natural gas wells, most of which have been plugged and abandoned. Project-related earth-moving activities could encounter and accidentally damage or destroy portions of the well plugs, potentially resulting in groundwater contamination. In addition, one active natural gas well is located in the northern portion of the project site, and at the conclusion of LEBLS project-related activities, this active well would be located within the widened Yolo Bypass. Thus, the above-ground facilities associated with this active natural gas well could be damaged or destroyed during borrow excavation activities and from flood flows when water from the Sacramento River is diverted through the widened Yolo Bypass. Implementing Mitigation Measures HAZ-3a and HAZ-3b would reduce the LEBLS project's significant impacts to a less-than-significant level. Numerous individual natural gas wells and larger well fields are located within and adjacent to the Yolo Bypass throughout its length. Therefore, earth-moving activities associated with some of the related projects discussed above in Subsection 5.2.4 could also result in accidental damage to or destruction of well plugs. Furthermore, where any related project may entail widening of the Yolo Bypass, could subject active well facilities to similar hazards from destruction in the event high flows in the Bypass. Therefore, the related projects could also result in significant impacts. However, because the LEBLS project would implement the necessary measures to appropriately reduce these hazards, the LEBLS project would not result in a cumulatively considerable incremental contribution to any significant cumulative impact related to environmental contamination from damage to well plugs or from loss of access to existing active natural gas wells.

The potential for inundation of the Yolo Bypass East Levee and Sacramento Bypass North Levee setback areas during high flows in the Bypasses and changes in crops that may be grown in the new setback areas would change the seasonal habitat types on the project site. These changes may, in turn, increase the numbers of bird species considered to pose a high risk for damage to aircraft from wildlife strikes (e.g., primarily waterfowl) at the nearby Sacramento International Airport and CHP Academy Airport. The landscape surrounding Sacramento International Airport and CHP Academy Airport air operations areas currently supports many thousands of acres of hazardous wildlife attractant habitat. The LEBLS project site is located within 5 miles of these airports, but generally outside the recommended primary airport separation areas. Implementation of the LEBLS project could slightly increase attractiveness of wildlife due to the implementation of the expanded floodplain and ecosystem project elements, but it is unlikely to substantially increase populations of hazardous species in the region or movement of hazardous wildlife into or across the approach or departure airspace zones. However, because there could be a slight increase in wildlife attractant hazards, the impact would be considered significant because Sacramento International Airport is ranked as one of the highest for birdstrike incidences in the United States.

Implementation of Mitigation Measure HAZ-4 would minimize the wildlife attractant impacts by considering Federal Aviation Administration guidelines and coordination with the Sacramento County

Airport System. Some of the related projects discussed in Subsection 5.2.4, may result in increases in habitat that are attractive to waterfowl, which could result in a significant impact related to airport safety. However, it is typical for airports to actively monitor planned projects in their vicinity and address potential increases in birdstrike hazards through interactive local and regional project plan review as required by individual airport land use compatibility plans. Therefore, related projects that would occur near the Sacramento International and CHP Academy Airports would also be required to address, and if necessary to mitigate for, potential increases in birdstrike hazards. The possibility of bird strikes at these airports, however, is considered to be an existing significant cumulative impact. It is reasonable that the increased habitat within the Yolo Bypass from several existing and reasonably foreseeable projects could increase bird populations and birdstrikes. Although the LEBLS project's contribution to potential increases in birdstrikes is negligible given the substantial acreages of habitats surrounding the airports that support waterfowl habitat within the Pacific Flyway, any incremental contribution to this significant cumulative impact is considered to be cumulatively considerable. Therefore, it is concluded that the LEBLS project would make a cumulatively considerable incremental contribution to the overall significant cumulative impact related to airport safety hazards from increased birdstrikes at the Sacramento International Airport and the CHP Airport.

Wildland fire represents a hazard particularly during the hot, dry summer and fall in the Sacramento Valley. The LEBLS project site is in an agricultural area, and does not contain any very high fire hazard areas as classified by the California Department of Forestry and Fire Protection (CAL FIRE 2007). However, areas of heavy vegetation are present in some areas of the project site, in areas adjacent to the project site, and on the related project sites discussed in Subsection 5.2.4. The operation of construction equipment, for both the LEBLS project and the related projects, could emit sparks which may ignite wildfires. Implementing Mitigation Measure HAZ-5 would reduce the LEBLS project's potentially significant impact to a less-than-significant level. Some of the related projects also include measures to reduce fire hazards, such as a fire prevention plan and/or compliance with the Occupational Safety & Health Administration (OSHA) regulations (CFR Title 29, Section 1926.150, Subpart F), which require employers to implement various measures to minimize and address wildland fire risk. Therefore, although some of the related projects may result in significant impacts, because the wildland fire risks for the LEBLS project would be reduced through implementation of a fire prevention plan, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to increased creation of wildland fire hazards.

LEBLS project implementation could increase mosquito-breeding habitat because increasing the floodplain size could cause a substantial increase in the amount of standing water. The creation of additional mosquito-breeding habitat and the associated increase in mosquitoes and mosquito-borne diseases affects each regional area covered by applicable mosquito and vector control districts. The project site is located within the Sacramento-Yolo Mosquito and Vector Control District. When necessary, each district employs a variety of BMPs such as biological vector controls and chemical sprays to reduce populations of mosquitoes throughout its service area. Implementing Mitigation Measure HAZ-6 would reduce the LEBLS project's significant impact to a less-than-significant level. The related projects that would include a substantial increase in the acreage of standing water (either from habitat improvements or from an increase in the size of the floodplain), may also result in an increase in mosquito-breeding habitat and, therefore, may also result in significant impacts. However, because the LEBLS project would reduce mosquito-borne hazards to the maximum extent feasible and the increased potential would only occur during high-flow events (i.e., very infrequently), the LEBLS project would not generate a cumulatively considerable incremental contribution to a potentially significant cumulative impact from increased mosquito-breeding habitat.

5.3.13 Hydraulics, Hydrology, and Flood Risk Management

Cumulative hydraulic conditions are represented by the "Future With-Project" scenarios presented in Section 4.14, "Hydrology, Hydraulics, and Flood Risk Management" (see Table 4.14-3, Future With-Project vs. Existing Conditions), with more detailed discussion of methods in Appendix G, "Lower Elkhorn Basin Levee Setback Hydraulic Analysis Report (Draft)."

Future Conditions With-Project effects during 100- and 200-year flood events would be beneficial as most Bypass and river stages would be reduced, including substantial stage reductions at three key locations under Alternative 2: Yolo Bypass Upstream of I-5 (-0.72, -0.65 feet), Sacramento River at the I Street Bridge (-1.91, -1.98 feet), and Sacramento River at Freeport (-1.42, 1.59 feet). Similar hydraulic results would occur under Alternatives 3, 4, and 5, with less risk reduction with Alternatives 4 and 5. There would be substantial cumulative benefits from the LEBLS and ARCF projects at the critical three sites mentioned above, as well as generally throughout the Sacramento River Flood Control System. The project would also replace aging levees with stronger levees that meet more stringent levee construction requirements, which also reduces flood risk at the project site. Considering the context and intensity of these impacts to stage throughout the Sacramento River Flood Control System, including critical sites on the Sacramento and American Rivers, hydraulic impacts under the Future With-Project (cumulative) scenario for a 200-year flood event would be beneficial for all alternatives. Therefore, the LEBLS project would have a beneficial incremental contribution to reducing flood risks in the Sacramento River flood system, along with the ARCF GRR, and the overall cumulative contribution would be beneficial.

The LEBLS project would have no impact on agricultural water supplies at the project site; therefore, the LEBLS project would not make any incremental contribution to any significant cumulative impact regarding available agricultural water supplies.

The LEBLS project would expand the existing flood conveyance capacity of the Yolo and Sacramento Bypasses and by setting back these Bypass levees and would place the new levees on existing agricultural lands. The new levees would modify the existing drainage patterns at the LEBLS project site, but not in a manner that would alter the course of a stream or river, or in a manner that would cause substantial erosion and siltation during project operations. Because one of the project objectives is to expand the Yolo Bypass conveyance, there would be increased flooding over the expanded floodplain area during high-flow conditions. The Sacramento Bypass would still receive floodwaters during managed overflow of the Sacramento Weir and local agricultural drainages. The Yolo Bypass would still receive floodwaters from passive overflow of the Fremont Weir, managed overflow of the Sacramento Weir, and agricultural drainage and treated wastewater discharges into the Tule Canal and other local agricultural drainages. Additionally, the project design and grading plan minimize erosion- and siltation-related impacts during and after flood flows in the Bypasses and the new expanded floodplains to less-than-significant levels. Expanding the Sacramento Weir would be the primary reasonably foreseeable and related project at the LEBLS project site. The LEBLS project would not make a cumulatively considerable incremental contribution, and the overall cumulative impact from these projects relative to altering drainage patterns would be less than significant.

Because the LEBLS project would have no impacts in the following areas, the project would not make a cumulatively considerable incremental contribution to significant cumulative impacts related to the following impacts: (1) place housing or structures within a 100-year flood hazard area as mapped on a Federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation which would impede or redirect flood flows; (2) expose people or structures to a significant risk of loss, injury or death involving flooding as a result of the failure of a dam; or (3) cause inundation by tsunami, mudflow, or seiche.

5.3.14 Land Use and Planning, and Agricultural and Forestry Resources

Land Use and Planning

The cumulative geographic context for land use and planning consists of the Lower Elkhorn Basin and Yolo County. California's planning laws delegate the authority over land use and land use planning to local jurisdictions. The LEBLS project's impacts related to consistency with existing adopted land use and zoning designations would be less than significant. Some of the related projects listed above in Section 5.3 may result in a variety of effects related to consistency with adopted land use plans and zoning. However, effects involving adopted land use plans or policies and zoning are project-specific and generally would not combine to result in cumulative impacts. The determination of significance for impacts related to these issues is whether a project would conflict with any applicable adopted land use plan or policy that has been adopted for the purpose of avoiding or mitigating an environmental effect. Such a conflict is site-specific and is addressed on an issue-by-issue basis throughout the topic area analyses in this EIS/EIR. Because the impact is a conflict with an adopted land use regulation, not a physical environmental impact, any land use inconsistencies of future projects, by themselves, are not cumulatively considerable and there is no significant cumulative impact. Therefore, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact on land use and planning.

Agricultural and Forestry Resources

The cumulative geographic context for agricultural resources includes the Lower Elkhorn Basin, Yolo County, and the Sacramento Valley region. For purposes of this analysis, Important Farmland is considered to be "Agricultural Land" as defined in California Public Resources Code Section 21060.1 and the State CEQA Guidelines. Thus, Important Farmland encompasses the designations of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance. As shown in Table 5-4, the acreage of Important Farmland decreased in Sutter, Yolo, and Sacramento Counties between 2010 and 2014. During this same time period, the acreage of Important Farmland increased slightly in Yuba and Solano Counties. The primary causes for conversion of Important Farmland were new urban development, development of habitat conservation areas, changes to nonirrigated grain crops, and land left fallow for three or more California Department of Conservation (DOC) update cycles.

Table 5-4. Summary of Cumulative Important Farmland[1] Conversion 2010–2014

	Acres		Net Change (2010–2014)	
Total Important Farmland	2010	2014	Acres	Percent[2]
Yolo County	374,535	365,535	(9,000)	(2.4)
Sacramento County	211,745	208,650	(3,095)	(1.5)
Sutter County	285,821	281,109	(4,712)	(1.6)
Yuba County	82,536	82,838	302	0.4
Solano County	145,935	146,059	124	0.08

Notes:

1 Important Farmland is considered to be "Agricultural Land," as defined in California Public Resources Code Section 21060.1 and the State CEQA Guidelines, which encompasses the designations of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance.

2 Percentages have been rounded.

Source: California Department of Conservation 2014, adapted by GEI Consultants, Inc. in 2017

Urbanization, particularly from housing developments, has resulted in substantial loss of agricultural land in the State. However, since the economic downtown of 2008, construction of new housing (and other types of urban development) in the State has slowed substantially, which has in turn reduced the rate at which agricultural lands are being converted to nonagricultural uses. In addition to conversion to urban or other land uses (e.g., habitat restoration), other factors also affect the acreage of irrigated farmland. Regionally, factors related to the availability and reliability of surface water and groundwater supplies, crop markets, and anticipation of urban development affect the acreage of irrigated farmland. More locally, changes in annual water supplies, drainage, access, and compatibility with adjacent land uses also affect the productivity and value, and thus the use, of agricultural land.

As detailed in Section 4.15, “Land Use and Planning, and Agricultural and Forestry Resources,” the LEBLS project would directly and permanently convert Important Farmland to nonagricultural uses—namely, flood risk reduction facilities. In addition, implementation of these facilities may also cause Williamson Act contracts to be cancelled. (See Tables 4.15-2 and 4.15-3, in Section 4.15, “Land Use and Planning, and Agricultural and Forestry Resources,” for acreages of agricultural land and land held under Williamson Act contracts that would be converted to flood risk reduction facilities under each action alternative.)

Implementing Mitigation Measures AG-1a, AG-1b, and AG-1c, would lessen the project’s incremental contribution to significant cumulative impacts associated with conversion of Important Farmland and lands under Williamson Act contracts. Continued agricultural land uses would be encouraged where possible and conservation easements would be acquired, where feasible to replace agricultural lands converted to nonagricultural uses. These measures would lessen significant impacts associated with conversion of agricultural land uses because funding conservation easements would assist the public and private sectors in protecting other farmland from the pressures of development. However, the easements are often purchased for land that exhibits benefits to wildlife, including a combination of habitat, open space, and agricultural lands; therefore, the compensation provided by the fee contribution would not necessarily be applied exclusively to agricultural lands. In addition, it is likely that conservation easements would not provide new farmland and the productivity of existing farmland would not be improved as a result of the conservation easements. Consequently, a net loss of Important Farmland acreages would still occur.

Some of the related projects listed in Subsection 5.2.4 have in the past and would in the future also convert Important Farmland to nonagricultural uses. Often, conversions of Important Farmland also result in conversions of land held under Williamson Act contracts to uses inconsistent with the contracts, and therefore contract cancellations occur. Given these conditions, the cumulative losses of agricultural resources, including Important Farmland (Prime Farmland, Unique Farmland, or Farmland of Statewide Importance), that have occurred in the Sacramento Valley from past projects—and that would continue as a result of planned future projects—are considered to be a significant cumulative impact without the contribution of the LEBLS project. The LEBLS project would contribute to the loss of agricultural lands primarily due to the proposed new East Yolo Bypass levee footprint, and these impacts are significant (see Section 4.15, “Land Use and Planning, and Agricultural and Forestry Resources”). Consequently, the LEBLS project would result in a cumulatively considerable incremental contribution to an overall significant cumulative impact with respect to loss of agricultural lands.

5.3.15 Mineral Resources

The presence of mineral resources depends on the type of geologic formation, which varies from location to location, and thus is site-specific. Aggregate resources are typically located in or near channels or floodplains of major rivers and large streams. In general, the availability of aggregate resources in the

Sacramento-Fairfield Production-Consumption Region is declining; areas that may contain valuable mineral resources have either been developed for urban uses or are located in close proximity to existing urban development such that land use conflicts would ensue. Natural gas resources are located throughout the Yolo Bypass, and in Yolo, Sacramento, and Solano Counties on the west and east sides of the Bypass. Natural gas resources in California are also declining; prior to the 1940s, there was a natural gas surplus in California. Since that time, the situation has changed to one of inadequate supply because of growth in population and industry. Thus, California must import gas every year.

LEBLS project implementation would not affect that ability of the mining operator to continue to obtain natural gas from the one active natural gas well in the northern portion of the project site. Furthermore, proposed slurry cutoff walls (approximately 150 feet below the ground surface) would not be deep enough to affect the flow of natural gas into any well in the project vicinity because natural gas in the region is located approximately 2,850–5,300 feet below the ground surface (Campion and Johnson 1980; California Division of Oil, Gas, and Geothermal Resources 1982). Therefore, the LEBLS project would have a less-than-significant impact. Some of the related projects discussed in Subsection 5.2.4, would also be implemented in the vicinity of existing natural gas wells and known natural gas deposits. However, because of the depth at which natural gas resources are located throughout the region, the related projects would have similar less-than-significant impacts. Thus, a significant cumulative impact related to this issue would not occur, and the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact from loss of natural gas resources.

Because the project site is not expected to urbanize, it has not been included in a California Geological Survey (CGS) mineral land classification report. Therefore, it does not contain a designated regionally important source of known mineral resources. It is presently unknown whether or not the project site contains an economically viable source of aggregate mineral resources. Expanding the Yolo and Sacramento Bypass floodplains would remove those areas from potential future aggregate mining activities because the areas would be flooded during high flows. However, there is no existing information that suggests the project site has aggregate mineral resources and it would be speculative to assume so. Therefore, based on existing information, the LEBLS project impact to existing mineral resources would be less than significant.

Many of the related projects discussed in Subsection 5.2.4 would take place within the Sacramento-Fairfield Production-Consumption Region or within the Yuba City-Marysville Production Consumption Region. Some of the related project facilities could be implemented in areas where economically valuable aggregate mineral resources are known to be present, but it is not possible to determine whether all of the related projects would incorporate the use of any known aggregate resource deposits in their construction plans. Therefore, the related projects could result in significant impacts. However, because the LEBLS project site does not contain any known aggregate deposits, and because such deposits (if present) would be used in project construction and would continue to be available for mining in the future in the setback areas, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact from loss of aggregate mineral resources.

5.3.16 Noise and Vibration

Ambient noise levels in the project site and vicinity are generated by local and distant traffic, aircraft operations, rail operations, agricultural activities, and natural sources (e.g., wind and birds). LEBLS project-generated construction traffic and equipment noise would exceed the relevant noise thresholds, and would result in significant temporary and short-term construction-related noise and vibration effects to occupants of the residences closest to on-site construction activities and along truck haul routes.

The project site is relatively isolated from other development projects or levee improvement projects that may occur in the Sacramento area. It is highly unlikely that the noise and vibration effects of other construction projects would be cumulative to the LEBLS project in the project vicinity. The Old Bryte Landfill remediation project by SAFCA would generate noise and vibration but this project would be completed prior to the LEBLS project so noise and vibration impacts from both projects would not overlap. The LEBLS project would not make a cumulatively considerable incremental contribution to a significant cumulative impact with respect to Old Bryte Landfill remediation activities.

Noise effects adjacent to local haul routes could be cumulative to other development projects if those projects generated substantial traffic volumes during the peak construction periods of the LEBLS project. There is a high degree of uncertainty regarding the construction schedule of future projects and insufficient information is available to quantitatively or even qualitatively describe potential cumulative noise effects along haul routes at this time. However, the project mitigation measures include a requirement to prepare and implement a traffic management plan in coordination with local jurisdictions, and this plan would be prepared closer to construction and would consider other construction-generated traffic as understood by Yolo County and the City of West Sacramento at the time of the plan's development. It is reasonable to assume that the jurisdictions would require traffic to be managed to avoid significant cumulative noise impacts. Therefore, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to traffic noise and vibration.

5.3.17 Recreation

The cumulative context for recreation is defined as the local area within and in the project vicinity. Recreational facilities in the cumulative study area consist of the Tule Canal, Yolo Bypass East Levee, Sacramento Bypass North and South Levees, Sacramento River adjacent to the Lower Elkhorn Basin, Elkhorn Regional Park, Sacramento Bypass Wildlife Area, the northern portion of the Yolo Bypass Wildlife Area, Old River Road south of I-5, and the Woodland Branch Line of the Sacramento River Excursion Train.

Project-related construction activities would result in temporary and short-term changes in recreational activities. Recreational use of the Sacramento Bypass North Levee, the western end of the Sacramento Bypass South Levee, the Yolo Bypass East Levee, and the Tule Canal would be restricted and potentially eliminated during project construction to facilitate access for construction equipment, materials, and personnel. Although the levee crowns do not contain officially designated trails, they are used as pedestrian and bicycle paths throughout the LEBLS project site. In addition, temporary road closures and/or road detours may affect access to the Class II bicycle lane along the west side of Old River Road. Finally, recreationists using the Sacramento Bypass Wildlife Area may experience a temporary reduction in the quality of recreational opportunities as a result of noise and vibration, dust, traffic, and visual disturbance from construction activities. Implementing Mitigation Measure REC-1 would provide notice of closure and alternative bicycle routes during construction activities that would reduce the LEBLS project's significant impacts to a less-than-significant level. Remediation of the former Old Bryte Landfill (which is located in the southwestern corner of the project site), would take place on the north side of the existing Sacramento Bypass North Levee, which is used by pedestrians and bicyclists as described above. Remediation of the former landfill is a separate action being undertaken by SAFA and would not overlap with LEBLS project-related construction activities because the landfill must be remediated before project implementation. Therefore, the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact from temporary changes in recreational opportunities during project construction activities.

Project implementation would result in a long-term and permanent loss of use of informal parking opportunities along the shoulders of County Road 126 for recreationists accessing the Sacramento Bypass Wildlife Area, after the existing Sacramento Bypass North Levee is degraded. In addition, conflicts could arise between recreational users in the wildlife area and private landowners to the north because the existing levee, which currently serves as a clear barrier demarking the wildlife area boundaries, would no longer be present. Implementing Mitigation Measure REC-2 would reduce these significant project impacts to a less-than-significant level. The related projects discussed in Section 5.2.4 may also result in significant impacts from permanent loss of recreational facilities or permanent loss of recreational access, as well as conflicts between recreational users and private landowners. Because there is no guarantee that all of the related projects would include mitigation measures to replace recreation facilities and access, some the related projects could result in significant impacts. However, because the LEBLS project would replace the lost recreational parking and would provide new signage to reduce recreational and private land use conflicts, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact from substantial long-term disruption of institutionally recognized recreational activities.

5.3.18 Socioeconomics (including Population, Housing, and Employment)

Increases in Population and Housing Demand, and Employment Changes (NEPA and CEQA)

The LEBLS project and many of the related projects considered in this cumulative analysis are located in the Sacramento Region, and no additional housing or business development is expected with implementation of the related projects, which are primarily flood risk reduction and ecosystem restoration projects. The construction labor force in the Sacramento region, the northern Sacramento Valley, and the eastern Delta/San Joaquin Valley is more than sufficient to meet the needs of both the LEBLS project and the related projects. Because construction workers serving the LEBLS project and the related projects are likely to come from nearby cities and the counties in which construction would occur, neither substantial population growth nor changes in the local economy relative to current employment conditions nor an increase in housing demand are cumulatively anticipated as a result of these construction jobs. Finally, neither the LEBLS project nor the related projects involve the creation of new housing or commercial development or extension of roadways or other infrastructure that would cumulatively induce substantial population growth. Therefore, a significant cumulative impact related to population and housing growth would not occur, and the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact.

Changes in Agricultural Economics and Values (NEPA Only)

Implementing the LEBLS project would remove land within the footprint of the proposed new setback levee and associated improvements (including seepage berm, road, and toe drain) from agricultural cultivation. Implementing the LEBLS project would also place areas that are currently in agricultural use outside the Lower Elkhorn Basin levees, subjecting them to the potential for more frequent inundation and changing the likely agricultural production of these lands (see Table 4.19-9 for acreages of land that would be placed into the Bypass from the LEBLS project). It is assumed that the existing crop land in the new setback areas would be converted to rice production, which would be fallow during winter when flooding may occur. See Section 4.15, “Land Use and Planning, and Agricultural and Forestry Resources,” for additional information regarding agricultural land conversion.

As a result of LEBLS project implementation, the net-revenue-per-acre would decline from conversion of the existing crops to rice production; under Alternative 2, the net-revenue-per-acre would decline approximately 20 percent (from $324 per acre in summer 2016 to $261 per acre under rice cultivation in a future condition). In addition to the per-acre loss of productivity, the loss of agricultural land within the LEBLS project footprint of the permanent levee improvements would reduce the total value of agricultural production on the project site. It should also be noted, however, that the LEBLS project would provide a benefit in the form of protecting agricultural lands in the Sacramento Valley (that are outside the Yolo Bypass) by providing increased flood risk reduction for those agricultural lands. However, LEBLS project implementation would result in a loss of agricultural values, both on a value-per-acre and a total basis.

Implementation of Mitigation Measures AG-1a, AG-1b, and AG-1c would reduce the LEBLS project's permanent long-term effects on changes in agricultural production and hence, minimize revenue losses thereof under all action alternatives. Even with the implementation of Mitigation Measures AG-1a, AG-1b, and AG-1c, however, some agricultural lands likely will be taken out of production permanently within the footprints of the new setback levees, and crop shifts to rice would further reduce the net revenue. USACE does not have the authority to require implementation of additional measures to further reduce this economic impact. Therefore, revenue losses would occur as described above. USACE considers this impact to be **significant and unavoidable**.

At least some other projects in Yolo County and the Yolo Bypass, and the broader region, would also likely contribute to the loss of agricultural productivity, primarily through loss of land base with restoration and other projects, but also potentially through increasing the time that the Yolo Bypass would be inundated each year. These impacts collectively contribute to a significant cumulative impact on local agricultural economies, agricultural revenues, and crop values. When considering the impacts of other past, present, and reasonably foreseeable projects, the LEBLS project would result in a cumulatively considerable incremental contribution to this significant cumulative impact.

5.3.19 Traffic and Transportation

The geographic scope of effects on transportation and traffic consists of the publicly available roadways connecting the LEBLS project site to the region. The majority of traffic effects related to the project would occur along the routes connecting the project site to I-5 on the north, and I-80 on the south. There may be other construction projects in the Sacramento Metropolitan area and Yolo County that would affect traffic volumes on I-5 and I-80. Other levee projects (NLIP, Sacramento River East Levee Accreditation Project, and West Sacramento Levee Improvement Project) would occur either at locations that are not closely connected by the roadway network [i.e., across the Sacramento River], or have not scheduled construction. There are no known projects that would affect the local haul routes shown in Tables 4.20-2 and 4.20-3. Because potentially significant traffic impacts are only expected to occur for 8 to 9 months during each of the one to two construction years, it is difficult to predict if other specific projects would have traffic volumes that would cumulatively affect traffic during these same time periods. Because other major construction projects would also implement traffic control plans specifically designed to provide appropriate emergency access, the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact related to traffic, emergency vehicle access or response times, or hazards related to incompatible uses.

Bicycle routes affected by the LEBLS project would be in the immediate area of the project site, primarily Old River Road. No other construction projects are known that would affect this route. Furthermore, major construction projects would likely implement traffic control plans specifically designed to provide for continued safe routes for alternative modes of transportation during construction, similar to that required for the LEBLS project. Therefore, the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact related to performance or safety of alternative modes of transportation.

5.3.20 Utilities and Service Systems

The appropriate service providers are responsible for ensuring adequate provision of public utilities within their service boundaries. At the project site, these include PG&E, AT&T, and multiple communications service providers. (Cumulative impacts related to the demand for natural gas and electricity are addressed above in Subsection 5.3.8, “Energy.”)

Construction activities could result in damage to or temporary disruptions of, or require relocation of, utility services including agricultural irrigation pump stations, irrigation canals, and ditches, PG&E gas pipelines and overhead electrical transmission lines, coaxial communication cables, and the Sacramento International Airport jet fuel pipeline. However, implementing Mitigation Measure UTL-1 would reduce the LEBLS project’s potentially significant impact to a less-than-significant level. Simultaneous construction of some of the other related projects discussed above in Subsection 5.2.4 that are also within the service areas of these providers, could also cause temporary disruptions of utility services resulting from necessary utility relocations or inadvertent damage to existing utility infrastructure. As part of the project, the Sacramento International Airport jet fuel pipeline would be realigned to the east beneath the Sacramento Bypass Wildlife Area; therefore, remediation activities (to be conducted by SAFCA) at the former Old Bryte Landfill would not affect this pipeline. Furthermore, because the landfill site has been used for that purpose since the 1940s, there are no underground utilities or any buildings present at the landfill site. Any utility and service system impacts from the LEBLS project as well as the related projects would be geographically isolated and short in duration. Therefore, the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact from potential disruption of utility services. Furthermore, implementing the LEBLS project would reduce flood risks to utility infrastructure in the project region, thus minimizing incidents of future service disruptions resulting from flood events.

LEBLS project implementation would generate debris and waste during construction activities. The landfills to be used for disposal of construction-related waste would be determined by the construction contractor at the beginning of construction, based on landfill capacity, types of waste, and other factors. Most likely, the Yolo County Central Landfill, located in Davis, would be used. The Yolo County Central Landfill has sufficient available capacity to accommodate the LEBLS project’s construction disposal needs, and therefore the project’s impact would be less than significant. The related projects discussed above in Section 5.3 vary in size and would generate different amounts of solid waste; disposal of solid waste would also occur at landfills determined to have sufficient capacity. In addition, the related projects would be implemented in various geographic locations; therefore, no one landfill would accept all construction-related solid waste associated with the LEBLS project and the related projects. Waste removed during remediation of the former Old Bryte Landfill would require disposal at a landfill permitted to accept hazardous waste, and therefore the Yolo County Central Landfill would not be used for that project. Thus, a significant cumulative impact related to generation and disposal of construction waste would not occur, and implementing the LEBLS project would not result in a cumulatively considerable incremental contribution to a significant cumulative impact from disposal of construction-generated debris and waste.

5.3.21 Water Quality

The geographic scope for water quality is considered on a local and a regional basis for both temporary, short-term and potential long-term impacts.

Ground-disturbing activities associated with LEBLS project construction throughout the project site could cause soil erosion and sedimentation of local drainages and waterways. Construction activities could also discharge waste petroleum products or other construction-related substances that could enter these waterways in runoff. Excavation, grading, and shaping of the project site could increase turbidity, sedimentation, and contaminants above ambient levels identified in the Basin Plan for the Sacramento River.

However, a SWPPP would be prepared and implemented as part of the LEBLS project. BMPs designed to control erosion and sedimentation would be developed in compliance with the CVRWQCB NPDES permit. The related projects, including future ARCF GRR projects proposed for the Sacramento Weir, would also result in earth-moving activities that would expose soil to erosion from wind and water, and therefore the related projects could also have significant impacts. However, each related project that would disturb 1 acre of land or more would be required to comply with NPDES discharge permits from CVRWQCB, which also requires preparation of a SWPPP and implementation of erosion control BMPs. Therefore, it is anticipated that the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact related to temporary, short-term construction-related water quality effects.

Installation of relief wells, cutoff walls, and 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 release contaminants to groundwater or surface waters. The related projects considered in this cumulative analysis could also result in adverse water quality effects from construction dewatering.

However, implementation of Mitigation Measure WQ-7 would reduce the LEBLS project’s potential impacts associated with release of contaminants to surface or groundwater from construction dewatering to a less-than-significant level because implementation of dewatering provisions would decrease the potential for release of these contaminants, and would provide for cleanup should these releases occur. The related projects would also be required to comply with CVRWQCB provisions that require a dewatering permit and implementation of measures designed to reduce adverse temporary and short-term water quality impacts from construction dewatering. Therefore, the LEBLS project would not generate a cumulatively considerable incremental contribution to a significant cumulative impact related to construction dewatering.

Chapter 6. Other Statutory Requirements

6.1 Growth-Inducement

The LEBLS project would consist of flood management system improvements to reduce flood risk in the Lower Sacramento River Basin. The project would also implement several ecosystem project components to increase habitat for special-status and Central Valley Flood System Conservation Strategy (CVFSCS) target species at the project site. Because the project would not involve construction of housing, the project would not directly induce growth. Project-related construction activities would generate temporary and short-term employment, but these construction jobs are anticipated to be filled from the existing local employment pool, and would not indirectly result in a population increase or induce growth by creating permanent new jobs. Furthermore, the project would not involve constructing businesses or extending roadways or other infrastructure and it would not indirectly induce population growth. Although the LEBLS project would replace deficient levees protecting the Lower Elkhorn Basin, levees along the Sacramento River would not be improved, and the project would not bring the Lower Elkhorn Basin to a 200-year level of flood protection that could enable new urban development beyond that currently present in the Lower Elkhorn Basin. Consequently, the project would not induce growth leading to changes in land use patterns, population densities, or related impacts on environmental resources.

Proposed flood management system improvements in the Lower Elkhorn Basin would benefit areas identified for future growth anticipated in the Cities of West Sacramento and Woodland, and metropolitan Sacramento. As discussed in Section 4.15, “Land Use Planning, and Agricultural and Forestry Resources,” local land use decisions are within the jurisdictions of Yolo County and the Cities of West Sacramento, Woodland, Sacramento, which have adopted general plans consistent with State law. The *Yolo County 2030 General Plan* (Yolo County 2009), *City of West Sacramento 2035 General Plan* (City of West Sacramento 2016), *City of Woodland General* Plan (City of Woodland 2002), and *City of Sacramento 2035 General Plan* (City of Sacramento 2015) provide an overall framework for growth and development in the County and these Cities.

6.2 Irreversible and Irretrievable Commitment of Resources

The irreversible and irretrievable commitment of resources are the permanent loss of resources for future or alternative purposes. Irreversible and irretrievable resources are those that cannot be recovered or recycled, or those that are consumed or reduced to unrecoverable forms. Project implementation would result in the irreversible and irretrievable commitments of energy and material resources during project construction and O&M, including the following:

- construction materials, including such resources as soil and rocks;
- land and water area committed to new/expanded project facilities; and

- energy expended in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for project construction, and O&M.

The use of these nonrenewable resources is expected to account for only a negligible portion of the region's resources and would not affect the availability of these resources for other needs within the region. Construction activities would not result in inefficient use of energy or natural resources.

As described throughout this EIS/EIR, without implementation of the project, the risk of levee failure during large flood events would remain high. While a precise quantification of environmental effects associated with potential levee failure is not possible, there is a potential for a variety of substantial adverse environmental impacts, as discussed under "Consequences of No Action," in Subsection 3.5.2 of Chapter 3, "Alternatives." Levee failure and the resulting emergency and reconstruction efforts would expend orders of magnitude more energy, overall, than construction of the project. A large volume of debris would result from a flood event including cars, appliances, building and housing materials, roads, vegetation, and other materials that would likely need to be disposed of in a landfill. After debris removal is completed, rebuilding would occur and new materials would be required to construct homes, businesses, roads, and other urban infrastructure. Thus, project implementation preempts potentially substantial future consumption, and is likely to result in long-term energy and materials conservation.

6.3 Relationship between Short-term Use of the Environment and the Maintenance and Enhancement of Long-term Productivity

A discussion of the relationship between short-term uses of the environment and long-term productivity is provided below. Within the context of this EIS/EIR, "short-term" refers to the construction period, while "long-term" refers to the operational life of the project and beyond.

6.3.1 Short-term Uses

Project construction would result in short-term construction-related effects such as interference with local traffic and recreation facilities, increased air and greenhouse gas (GHG) emissions, increased ambient noise levels, vibration, dust generation, and other construction-related effects summarized in the "Executive Summary." These short-term effects are not expected to alter the long-term productivity of the natural environment. Project implementation would also result in long-term effects, including flood risk reduction and reduced potential for impacts associated with flooding; permanent loss of and changes in farmland; changes in visual resources; increased riparian and terrestrial habitats; and increased fish and aquatic habitat during inundation of the expanded floodway at the project site.

6.3.2 Long-term Uses

Project implementation would contribute to long-term productivity of the environment by improving the flood management system that helps protect the Cities of Sacramento, West Sacramento, and Woodland by reducing the overall flood risk. The new setback levees would expand capacity in the Yolo Bypass; reduce river stage at critical locations in the Sacramento River and elsewhere; increase public safety for urban, small, and rural communities; and create an estimated 900 acres of inundated floodplain essential for enhanced fish-rearing and riparian vegetation. The project would also create opportunities to expand wetland and riparian habitat and increase the value as a wildlife corridor. These long-term beneficial effects of the project would outweigh its potentially significant short- and long-term impacts to the environment.

6.4 Compliance with Executive Order 11988 – Floodplain Management

Executive Order (EO) 11988 (Floodplain Management) directs all Federal agencies approving or implementing a project to avoid, to the extent possible, the short- and long-term adverse effects associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.

The Water Resources Council Floodplain Management Guidelines for implementing EO 11988, as referenced in USACE's Engineer Regulation (ER) 1165-2-26, require an eight-step process that USACE is to conduct as part of its decision-making on projects that have potential impacts to or within the floodplain (in this case, the LEBLS project). The decision-making process required in Section 2(a) of the EO is reflected in the eight steps described below, along with information on how each step is being addressed for the project.

1. Determine if the proposed action is in the base floodplain.

A key component of the overall project purpose is to reduce flood risk by improving flood management system function, efficiency, resiliency, and capacity. The project includes levee setbacks on a portion of the Yolo Bypass and the Sacramento Bypass to reduce the risk of flooding during a 100-year flood event (i.e., would occur, on average, once in every 100 years but could occur more or less frequently). The base floodplain is delineated as all areas that are at risk of flooding by the 100-year flood event. In other words, the base floodplain has been delineated by assuming that existing levees do not provide protection from the 100-year flood event. This is because this definition of the base floodplain addresses the USACE requirement in ER 1105-2-101 to describe a project's performance using risk and uncertainty methods, and ER 1105-2-101 does not require USACE to give deference to current Federal Emergency Management Agency (FEMA) accreditation of the levee system. For this reason, the entire project was evaluated for EO 11988 compliance.

2. If the action is in the base flood plain, identify and evaluate practicable alternatives to the action or to location of the action in the base floodplain.

The Water Resources Council Floodplain Management Guidelines and ER 1165-2-26 define "practicable" as "capable of being done within existing constraints. The test of what is practicable depends upon the situation and includes consideration of the pertinent factors, such as environment, cost or technology." The alternatives considered in this EIS/EIR are discussed in detail in Chapter 3, "Alternatives," but only alternatives analyzed in detail in the EIS/EIR are discussed below.

- ***Alternative 1: No Action Alternative* –** This alternative would involve no action within the base floodplain. Under this alternative, no new setback levees or related improvements would be constructed. The existing levees would remain in their existing configurations and the existing flood risk would remain.

- ***Alternative 2: 7-Mile Setback Partial Degrade (DWR's Preferred Alternative)* –** This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south, which would be set back approximately 1,500 feet east of the existing alignment. It would begin just south of I-5 and continue approximately 5.5 miles south, ending at the new Sacramento Bypass Levee. The Sacramento Bypass would be expanded by constructing a new setback levee 1,500 feet north of the existing levee, which would be approximately 1.6 miles long. Although most of the existing Yolo Bypass Levee and Sacramento Bypass North Levee would be degraded following construction of the setback levees, up to 4,500 linear feet of levee would remain to provide riparian and upland habitat for special-status species in the Yolo Bypass.

- ***Alternative 3: 7-Mile Expanded Setback Full Degrade* –** Alternative 3 includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south. It would begin just south of I-5 and would be set back approximately 1,500 feet east of the existing levee in the northern and middle portions of the Basin, continuing south approximately 4.2 miles. From there, the levee setback would expand to 3,000 feet in the southern portion of the Basin, and continue for about 1.3 miles, ending at the new Sacramento Bypass Levee. The Sacramento Bypass would be expanded by constructing a new setback levee 1,500 feet north of the existing levee and would be approximately 1.3 miles long. Following construction of the new setback levees, the existing Yolo Bypass East Levee and Sacramento Bypass North Levee would be degraded at the project site, with the exception of remnant levee sections left for riparian and upland habitat for special-status species in the Yolo Bypass.

- ***Alternative 4: 5-Mile Expanded Setback Partial Degrade* –** Alternative 4 excludes new levee setbacks in the northern part of the Lower Elkhorn Basin and reduces construction footprint impacts and avoids potential land acquisition constraints. This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south. It would begin approximately 2.5 miles south of I-5 (just south of the existing Reclamation District [RD] 784 Cross Levee), where it would be set back approximately 1,500 feet, and would continue south approximately 1.7 miles. From there, the new levee setback would expand to 3,000 feet in the southern portion of the Basin, spanning 1.3 miles and ending at the new Sacramento Bypass Levee. The Sacramento Bypass would be expanded by constructing a new setback levee 1,500 feet north of the existing levee, which would be approximately 1.3 miles long. Although most of the existing Yolo Bypass Levee and Sacramento Bypass North Levee would be degraded following construction of the setback levees, up to 4,500 linear feet of levee would remain to provide riparian and upland habitat for special-status species in the Yolo Bypass.

- ***Alternative 5: 5-Mile Setback Full Degrade* –** Similar to Alternative 4, Alternative 5 excludes new levee setbacks in the northern part of the Lower Elkhorn Basin and reduce construction footprint impacts and avoids potential land acquisition constraints, but maintains a full degrade of the affected portion of the Yolo Bypass Levee. This alternative includes a new setback levee in the Yolo Bypass along the Lower Elkhorn Basin, aligned north to south, which would be set back approximately 1,500 feet east of the existing alignment. It would begin approximately 2.5 miles south of I-5 (just south of the existing RD 784 Cross Levee), and continue approximately 3 miles south, ending at the new Sacramento Bypass Levee. The Sacramento Bypass would be expanded by constructing a new setback levee 1,500 feet north of the existing levee and would be approximately 1.6 miles long. Following construction of the setback levees, the existing Yolo Bypass East Levee and Sacramento Bypass North Levee would be degraded at the project site.

3. If the action must be in the flood plain, advise the general public in the affected area and obtain their views and comments.

Early public review has been conducted through public scoping via a published NEPA Notice of Intent (NOI) and CEQA Notice of Preparation (NOP) to prepare a joint EIS/EIR, and to solicit comments on the scope and content of the EIS/EIR. A public scoping meeting was held on September 15, 2016 in West Sacramento to receive public comments. Moreover, interested parties, including affected landowners, stakeholders, Tribes, and several key regulatory agencies, have been coordinated with since mid-2016; more than 30 meetings have been held with various stakeholders, agencies, Tribes, and landowners. The DEIS/DEIR was released in 2017 for public comment. Additional opportunities for public and comment will be provided during the DEIS/DEIR review period, public workshop to receive comments on the DEIS/DEIR, and the FEIS/FEIR review period.

4. Identify beneficial and adverse impacts due to the action and any expected losses of natural and beneficial flood plain values. Where actions proposed to be located outside the base floodplain will affect the base floodplain, impacts resulting from these actions should also be identified.

Beneficial impacts because of the action

The project would reduce flood risk for urban areas in the Lower Sacramento Basin, including portions of the Cities of Sacramento, West Sacramento, and Woodland. Approximately 780,000 people in the Lower Sacramento River Basin area would no longer be subject to an unacceptable high risk of levee failure and subsequent catastrophic flooding because the system capacity would be increased and flood stages would be reduced. Achieving flood risk reduction for these urban areas without the project could require much more costly and higher risk options. These options might include increasing the height of levees in other parts of the system, which could be substantially more costly and may have greater environmental impacts (depending on location). The project would also support continued agriculture as well as improve habitat in the Lower Elkhorn Basin portion of the Yolo and Sacramento Bypasses.

Adverse impacts because of the action

As described in detail in each topic area of the EIS/EIR and summarized below, implementing the project would have some adverse impacts on the environment, most of which could be reduced to a less-than-significant level by implementing mitigation measures identified in Table ES-1. The project would also result in a few impacts that would be significant and unavoidable after implementing all feasible and available mitigation measures, which are also identified in Table ES-1. The project site is within an agricultural area, and it would continue to be used for agriculture after project construction.

Expected losses of natural and beneficial floodplain values

The project includes widening both the Yolo and Sacramento Bypasses in the Lower Elkhorn Basin, which would result in additional land being placed into the floodplain. The existing levees reduce the beneficial values of water resources (i.e., natural moderation of floods, water quality maintenance, and ground water recharge); and living resource values (i.e., fish, wildlife, and plant resources). The project would provide increased natural moderation of floods, better water quality outside of the floodplain from a flood event, and increased and improved habitat for fish, wildlife, and plant resources from the expanded floodplain, levee remnants, and mitigation.

5. If the action is likely to induce development in the base floodplain, determine if a practicable non-floodplain alternative for the project exists.

The project is located in the Lower Elkhorn Basin within the designed Yolo County Resource Conservation District, which encompasses an estimated 505,000 acres and was created to assist local growers and landowners implement practices that protect, improve, and sustain the agricultural and natural resources of Yolo County (Yolo County Local Agency Formation Commission 2016). Lands at the project site are currently used primarily for agricultural purposes (primarily row crops), and these agricultural uses would continue after the flood risk reduction facilities are constructed. Growth in the project vicinity has already been planned for as part of the *City of West Sacramento 2035 General Plan* (City of West Sacramento 2016), *City of Woodland General Plan* (City of Woodland 2002), and *City of Sacramento 2035 General Plan* (City of Sacramento 2015).

The project site and the Lower Elkhorn Basin are primarily designated for continued agricultural use, along with a small area designated as future Specific Plan (if a development proposal were ever brought forth and approved by Yolo County) in the northern portion of the Lower Elkhorn Basin, under the *Yolo County 2030 General Plan* (Yolo County 2009). Although the project would replace deficient levees protecting the Lower Elkhorn Basin, levees along the Sacramento River would not be improved, and the project would not bring the Lower Elkhorn Basin to a 200-year level of flood protection that could enable new urban development in the Lower Elkhorn Basin. The project would not allow additional growth to occur other than what has already been planned, nor would it change the locations where this growth is planned to occur. Consequently, implementation of the project would not affect current and/or projected population growth patterns within Yolo or Sacramento Counties or in the Cities of Sacramento, West Sacramento, or Woodland as they have already been evaluated and planned for in the County and these Cities' General Plans. Therefore, the project would not be growth-inducing. The project would mitigate flood risks by providing localized flood stage reduction directly upstream and downstream of the Sacramento Weir for 200-year flood events, primarily in the Sacramento River at the I Street Bridge and at Freeport. The project would not alter protection for the 100-year event. The project would not directly or indirectly induce or support development in the base floodplain.

6. Determine viable methods to minimize any adverse impact of the action including any likely induced development for which there is no practicable alternative and methods to restore and preserve the natural and beneficial floodplain values. This should include reevaluation of the "no action" alternative.

As described in Step 5 above, the project would not induce development in the floodplain. The project would place additional land into the Yolo and Sacramento Bypasses, and therefore would expand the floodplain and facilitate reduced flows in the Sacramento River within Sacramento during 200-year flood events. The project also includes a suite of ecosystem benefits designed to increase floodplain habitats to benefit fish species; provide floodplain and emergent wetland habitat adjacent to the existing Tule Canal; continue wildlife-friendly agricultural practices on most of the project site; provide native grassland habitat; and make riparian plantings along the Tule Canal and Sacramento Bypass North

Levee. Additionally, CEQA requires DWR to describe any feasible mitigation available to avoid, minimize, rectify, reduce or eliminate, and/or compensate for all potentially significant environmental impacts of the project (State CEQA Guidelines Sections 15126.4 and 15370). Unlike NEPA, the State CEQA Guidelines are more stringent on defining feasible mitigation for every potentially significant impact and implementing and monitoring such mitigation.

The No Action Alternative would not provide improved flood risk reduction for the Cities of Sacramento, West Sacramento, and Woodland; expand the Yolo and Sacramento Bypasses; and provide additional fish, wildlife and plant habitats.

7. If the final determination is made that no practicable alternative exists to locating the action in the floodplain, advise the general public in the affected area of the findings.

As described in Step 3 above, the public has been notified of the project through the NEPA/CEQA scoping processes, a public scoping meeting, numerous meetings with stakeholders, release of this DEIS/DEIR for public comment, a public hearing to receive comments on the DEIS/DEIR, release of the FEIS/FEIR, and public interest notice through the Section 408 process.

8. Issue findings

The results and findings of the EO 11988 analysis will be included in the FEIS/FEIR and the NEPA Record of Decision. Based on the analysis required for compliance with EO 11988 as discussed above, the project would not induce growth in the floodplain or development of the floodplain, either in the floodplain or in other locations outside the floodplain. Project implementation is required to protect approximately 780,000 people in the Lower Sacramento River Basin area from an unacceptable high risk of levee failure and subsequent catastrophic flooding by increasing system capacity and reducing 200-year flood stages. The project also supports continued agricultural uses, and improving fish, wildlife, and plant habitats. Feasible mitigation has been proposed under CEQA for all potentially significant and significant environmental impacts that DWR will implement and monitor. Achieving 200-year flood risk reduction for these urban areas without the project could require much more costly and higher risk options, sustained and potentially increasing flood risks associated with climate change if more frequent and larger floods persist, and potentially greater environmental impacts without opportunities to benefit fish, wildlife, and plant habitats.

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Chapter 7. Consultation and Coordination

This chapter summarizes USACE and DWR consultation and coordination with Native American Tribes and regulatory agencies—particularly the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), Central Valley Flood Protection Board (CVFPB), and Yolo County—which satisfy NEPA and CEQA requirements for consultation and coordination to date. USACE and DWR are continuing to consult with Native American Tribes, stakeholders, and regulatory agencies with jurisdiction over, or interest in, the project. Chapter 9, "Public Involvement," summarizes the overall public involvement process while Appendix A, "Lower Elkhorn Basin Levee Setback Project Public Scoping Report," provides information on all public scoping activities.

7.1 Native American Tribes

Native American Tribal consultation is being conducted by both USACE and DWR. Consultation by USACE is being conducted in compliance with Section 106 of the National Historic Preservation Act (NHPA). Consultation by DWR is being conducted in compliance with CEQA requirements, including Assembly Bill 52 (AB 52), and the Natural Resources Agency's published Tribal Policy which DWR has adopted. The policy states, "The purpose of this policy is to ensure effective government-to-government consultation between the Natural Resources Agency, its Departments…and Indian Tribes…to provide meaningful input into the development of regulations, rules, policies, programs, projects, plans, property decisions, and activities that may affect tribal communities." (See Appendix F, "Native American Correspondence," for copies of correspondence between USACE, DWR, and Native American Tribes.) Native American consultation is summarized in Section 4.8, "Cultural Resources," beginning at page 4.8-18.

7.2 Agency Consultation and Coordination

In addition to the public involvement activities presented in Chapter 9, "Public Involvement," USACE sent letters on October 6, 2016 to NMFS and USFWS inviting them to serve as NEPA Cooperating Agencies. Both agencies accepted this invitation. (Cooperating Agency correspondence is included in Appendix A, "Lower Elkhorn Basin Setback Levee Scoping Report.) USACE is also consulting with NMFS and USFWS under Section 7 of the Endangered Species Act.

DWR has conducted a series of outreach meetings since summer 2016 with various agencies and stakeholders to receive input on project components and other aspects of the project. More than 30 meetings have been held. The primary focus of these meetings has been to present project information and obtain input on project components, as well as generally collaborate with agencies and stakeholders to discuss project components and issues. Meetings have included Federal and State agencies and regional and local interests. To date, outreach has been conducted with: USACE, USFWS, NMFS, CDFW, CVFPB, Yolo County (including Department of Parks and Recreation and HCP/NCCP planning staff), the Lower Sacramento/Delta North Regional Flood Management Planning Group, and planning team members from the California EcoRestore and Yolo Bypass Salmonid Habitat Restoration and Fish Passage Projects.

A list of agencies and stakeholders who received notices regarding the project is provided below.

U.S. Government

- Bureau of Indian Affairs – Pacific Region
- Bureau of Reclamation
- Coast Guard
- Environmental Protection Agency
- Fish and Wildlife Service
- National Marine Fisheries Service
- Natural Resources Conservation Service

Tribal Government

- Buena Vista Rancheria of Me-Wuk Indians
- Cortina Band of Indians
- Ione Band of Miwok Indians
- Nashville Eldorado Miwok
- Reno-Sparks Indian Council
- Shingle Springs Band of Miwok Indians
- Tsi-Akim Maidu
- United Auburn Indian Community of Auburn Rancheria
- Wilton Rancheria
- Yocha Dehe Wintun Nation

State of California

- Caltrans
- Central Valley Flood Protection Board
- Central Valley Regional Water Quality Control Board
- Delta Conservancy
- Delta Protection Commission
- Delta Stewardship Council
- Department of Fish and Wildlife
- Native American Heritage Commission
- Sacramento – San Joaquin Delta Conservancy
- State Historic Preservation Officer
- State Lands Commission
- State Parks
- State Water Resources Control Board
- University of California, Davis

Regional, County, City, and Other Local Agencies

- County of Sacramento
- County of Yolo
- County of Yolo Flood Control & Water Conservation District
- Sacramento – Yolo Mosquito and Vector Control District

Other Organizations

- California Farm Bureau Federation
- Ducks Unlimited
- Lower Sacramento/Delta North Regional Flood Management Plan participants
- Mother Lode Chapter Sierra Club
- Pacifica Gas and Electric Company
- Restore the Delta
- The Nature Conservancy
- Yolo Basin Foundation

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Chapter 8. Compliance with Applicable Laws, Regulations, and Policies

This chapter summarizes the project's compliance with Federal and State environmental laws and regulations. Applicable Federal and State laws and regulations, as well as applicable regional and local plans and policies, are described in more detail in Appendix C, "Summary of Applicable Laws, Regulations, Policies, Plans."

Certain regulations require issuance of permits before project implementation; other regulations require agency consultation but may not require issuance of any authorization, permits, or entitlements before project implementation. For each of the listed laws and regulations, the project would be in partial compliance at the time of issuance of the DEIS/DEIR. Full compliance would be achieved prior to, or at the time of, issuance of the Record of Decision (ROD) under NEPA and/or Notice of Determination under CEQA. The receipt of Federal approvals and/or a signed ROD are required for the project to demonstrate full compliance of many Federal laws, regulations, and policies, and to receive Federal authorizations and permits. For CEQA, the NOD is required to begin securing State permits (e.g., Section 401, Section 1600, Central Valley Flood Protection Board encroachment permit, California State Lands Commission lease).

Many of the requirements of the Federal government are codified under the United States Code (USC), as described below. Where a more common name for a law or regulation is typically used, it is listed by that name with a reference to the corresponding USC section.

8.1 Federal Laws, Regulations, and Policies

Federal Aviation Regulations, Title 14 Part 77. Part 77 of the Federal Aviation Regulations, "Objects Affecting Navigable Airspace," regulates the height and placement of new structures within airport safety zones, as well as other safety hazards, including lights and attractants for large numbers of birds. The project would include expansion of the Yolo and Sacramento Bypasses, potentially contributing to the existing attraction of birds to these features.

Bald Eagle Protection Act of 1940, as amended, 16 USC 668-668c. The Bald Eagle Protection Act provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds.

The project site does not contain bald eagle or golden eagle nesting habitat, and the project would not result in the take of bald eagles. The project incorporates mitigation measures that would ensure that construction activities do not result in the take of any raptors, as discussed in Section 4.5, "Biological Resources – Vegetation and Wildlife." The project could result in the expansion of available open space hunting habitat for bald eagle through the widening of the Bypasses.

Clean Air Act of 1963, as amended, 42 USC 7401, et seq. The Clean Air Act (CAA) requires the adoption of National Ambient Air Quality Standard (NAAQS) to protect the public health and welfare from the effects of air pollution. As discussed in Section 4.3, "Air Quality," there are six criteria air pollutants of nationwide concern: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead, and PM (subdivided into PM_{10} [particles less than 10 microns in diameter]and $PM_{2.5}$ [particles less than 2.5 microns in diameter]). The U.S. Environmental Protection Agency (EPA) established primary and secondary NAAQS that specify allowable ambient concentrations for the criteria pollutants. The CAA also requires each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP).

An analysis of air quality effects of the project is presented in Section 4.3, "Air Quality." The project is expected to exceed the Federal air quality standards for nitrogen oxide (NOx, which is a precursor of ozone), exceed EPA's general conformity *de minimis* thresholds for NOx, and hinder the attainment of air quality objectives in the local air basin (NOx). Implementation of BMPs would reduce NOx emissions, but not below Federal thresholds. Therefore, a Conformity Determination would be required, and the project would be in partial compliance with this act when the ROD is issued.

Endangered Species Act of 1973, as amended, 16 USC 1531, et seq. Pursuant to the Endangered Species Act (ESA), the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) have regulatory authority over Federally listed species. Under the ESA, an incidental take statement is required for any Federal action that may harm an individual of that species. Take is defined under ESA Section 9 as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Under Federal regulation, take is further defined to include habitat modification or degradation where it would be expected to result in death or injury to listed wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. ESA Section 7 outlines procedures for Federal interagency cooperation to conserve Federally listed species and designated critical habitat. Section 7(a)(2) requires Federal agencies to consult with USFWS and NMFS to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species, or result in destruction or adverse modification of designated critical habitat.

A list of threatened and endangered species and designated habitat that may be affected by the project was obtained from USFWS in 2016 (see Appendix E2, "U.S. Fish and Wildlife Service Species List"), and impacts are described in Sections 4.4, "Biological Resources – Fish and Aquatic Organisms," and 4.5 "Biological Resources – Vegetation and Wildlife." USACE has initiated and is actively engaged in consultation with USFWS and NMFS concerning impacts to listed species and critical habitat. A letter requesting to initiate consultation and a Biological Assessment were transmitted to USFWS and NMFS on October 24, 2017. NMFS sent a letter requesting additional information on February 1, 2018, and withdrew from consultation on April 5, 2018, pending receipt of additional information.

Executive Order 11988, Floodplain Management. This Executive Order (EO) directs all Federal agencies approving or implementing a project to avoid, to the extent possible, the short- and long-term adverse effects associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Engineer Regulation (ER) 1165-2-26 provides the general guidance and policy for USACE's implementation of EO 11988. EO 11988 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. To comply with EO 11988, the policy of USACE is to formulate projects which, to the extent possible, avoid or minimize significant effects associated with the use of the without-project floodplain, and avoid inducing development in the existing floodplain unless no practicable alternative exists. The EO 11988 analysis is provided in Chapter 6, “Other Statutory Requirements.”

Executive Order 11990, Protection of Wetlands. The purpose of EO 11990 is to “minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.” To meet these objectives, EO 11990 requires Federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. EO 11990 applies to:

- acquisition, management, and disposition of Federal lands and facilities construction;
- improvement projects which are undertaken, financed, or assisted by Federal agencies; and
- Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

As discussed in Section 4.6, “Biological Resources – Wetlands and Other Waters of the United States,” wetlands are located at the project site and would be affected by the project. Section 4.6 presents mitigation measures to minimize impacts to wetlands, and a Section 404 Individual Permit will be required prior to project construction.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations. The purpose of EO 12898 is to identify and address the disproportionate placement of adverse environmental, economic, social, or health effects from Federal actions and policies on minority and/or low-income communities. EO 12898 requires that adverse effects on minority or low-income populations be taken into account during preparation of environmental and socioeconomic analyses of projects or programs that are proposed, funded, or licensed by Federal agencies.

Section 2-2 of EO 12898 requires all Federal agencies to conduct programs, policies, and activities that substantially affect human health or the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons the benefits of, or subjecting persons to discrimination because of their race, color, or national origin. Section 1-101 of EO 12898 requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of programs on minority and low-income populations.

The project would reduce the risk of flooding to existing residential, commercial, and industrial development protected by the Sacramento River East and West Levees and the Yolo and Sacramento Bypasses. This benefit would accrue to all segments of the population at the project site and in the surrounding area and would have no disproportionately high adverse environmental effect on any minority or low-income population. Additional information is provided in Section 4.10, “Environmental Justice.”

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (62 Federal Register 19885). EO 13045 refers to risks to health or safety that are attributable to products or substances that a child is likely to come in contact with or ingest (e.g., air, food, water, soils, and products used in daily life). EO 13045 requires that each Federal agency: (a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. Project construction and haul routes would avoid parks and schools commonly used by children. With implementation of mitigation measures identified throughout Sections 4.2 through 4.22 of this EIS/EIR, the project would be in compliance with this EO.

Executive Order 13112, Invasive Species. EO 13112 directs Federal agencies to take actions to prevent the introduction of invasive species, provide for control of invasive species, and minimize the economic, ecological, and human health impacts that invasive species cause. EO 13112 also calls for the restoration of native plants and tree species. Project construction activities have potential to introduce new invasive plants or spread existing invasive plants on the project site, but an Invasive Plant Management Plan would be prepared and implemented to minimize this potential. In addition, the new setback levee slopes, seepage berms, and staging areas would be hydroseeded with a native seed mix for erosion protection and to prevent colonization of exotic vegetation and ecosystem project elements would include planting of native riparian species. Additional information is provided in Section 4.4, “Biological Resources – Fish and Aquatic Organisms,” and Section 4.5, “Biological Resources – Vegetation and Wildlife.”

Farmland Protection Policy Act 7, USC 4201 et seq. The Farmland Protection Policy Act (FPPA) is intended to minimize the effect of Federal programs with respect to the conversion of farmland to nonagricultural uses. It ensures that, to the extent possible, Federal programs are administered to be compatible with State, local, and private programs and policies to protect farmland. The Natural Resources Conservation Service (NRCS) is the agency primarily responsible for implementing the FPPA. The FPPA does not apply to Federal permitting or licensing and is not applicable to the project.

Federal Clean Water Act and Section 404 as amended, 33 USC 1251, et seq. EPA is the lead Federal agency responsible for water quality management. The Clean Water Act (CWA) of 1972 is the primary Federal law that governs and authorizes water quality control activities by EPA as well as the State. Various elements of the CWA address water quality, as discussed below.

Under Federal law, EPA has published water quality regulations under 40 Code of Federal Regulations (CFR). Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards consist of two elements: (1) designated beneficial uses of the water body in question, and (2) criteria that protect the designated uses. Section 304(a) requires EPA to publish advisory water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use. In California, EPA has delegated responsibility to the State Water Resources Control Board (SWRCB) and its nine Regional Water Quality Control Boards (RWQCBs) for identifying beneficial uses and adopting applicable water quality objectives. Section 303(d) of the CWA requires the identification of water bodies that do not meet, or are not expected to meet, water quality standards (i.e., impaired water bodies). The affected water body, and associated pollutant or stressor, is then prioritized in the 303(d) List. The CWA further requires the development of a Total Maximum Daily Load (TMDL) for each listing. In 2008, California began integrating the 303(d) List of Impaired

Waters and the 305(b) Water Quality Assessment Report into a single report (Integrated Report). This Integrated Report will satisfy the requirements of both CWA Sections 303(d) and 305(b).

CWA Section 404 establishes a requirement for a project applicant (i.e., DWR) to obtain a permit from USACE before engaging in any activity that involves discharge of dredged or fill material into "waters of the United States," including wetlands. Fill material means material placed in waters of the United States where the material has the effect of replacing any portion of a water of the United States with dry land, or changing the bottom elevation of any portion of a water of the United States. Under Section 404 of the CWA, USACE regulates and issues permits for activities that involve the discharge of dredged or fill materials into waters of the United States. Fill of less than 1/2 acre of non-tidal waters of the United States for a variety of projects can generally be authorized under USACE's Nationwide Permit (NWP) program, provided that the project satisfies the terms and conditions of the particular NWP. Fills that do not qualify for an NWP or regional general permit require an Individual Permit.

Before USACE can issue a permit under CWA Section 404, it must determine that the project is in compliance with the CWA Section 404(b)(1) Guidelines. The Section 404(b)(1) Guidelines specifically require that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences" (CFR Title 40, Section 230.10[a] [40 CFR 230.10(a)]). Based on this provision, DWR is required to evaluate opportunities that would result in less adverse effect on the aquatic ecosystem. A permit cannot be issued, therefore, in circumstances where a Least Environmentally Damaging Practicable Alternative exists that would fulfill the project purpose. An alternative is practicable if it is available and capable of being done after cost, existing technology, and logistics are taken into consideration in light of the overall project purpose as determined by USACE.

DWR is seeking an individual permit under CWA Section 404 for temporary effects to waters of the United States. A Section 404(b)(1) Alternatives Analysis is being conducted as part of DWR's application and will be included in the final EIS/EIR as an appendix.

Fish and Wildlife Coordination Act of 1958, as amended, 16 USC 661, et seq. The Fish and Wildlife Coordination Act (FWCA) ensures that fish and wildlife receive consideration equal to that of other project features for projects that are constructed, licensed, or permitted by Federal agencies. FWCA 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, and give full consideration to the views and recommendations of these agencies. FWCA requires that the views of USFWS, NMFS, and the applicable State fish and wildlife agency (CDFW) be considered when effects are evaluated and mitigation needs are determined. NMFS and USFWS are Cooperating Agencies under NEPA for this project, and USACE has engaged NMFS and USFWS throughout development of this EIS/EIR.

As NEPA Cooperating Agencies, NMFS and USFWS were provided with copies of the Administrative and Public DEIS/DEIR to evaluate the analyses pertaining to fish and wildlife, including special-status species, and associated habitat. Furthermore, consultation is underway with both NMFS and USFWS under Section 7 of the Federal ESA.

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. These laws 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 National Flood

Insurance Program (NFIP) to subsidize flood insurance to communities that comply with FEMA regulations limiting development in floodplains. 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 percent or 100-year flood). These specific requirements are outlined in 44 CFR 65.10. The project design must meet these requirements.

Magnuson-Stevens Fishery Conservation and Management Act, 16 USC 1801. NMFS is a Cooperating Agency under NEPA, and USACE has engaged NMFS throughout development of this EIS/EIR regarding the project's potential effects on essential fish habitat. Furthermore, consultation is underway with NMFS under Section 7 of the Federal ESA, and the requirements of this act will be met through these actions.

Migratory Bird Treaty Act of 1936, as amended, 16 USC 703 et seq. The Migratory Bird Treaty Act (MBTA) implements domestically a series of international treaties that provide for migratory bird protection. MBTA authorizes the Secretary of the Interior to regulate the taking of migratory birds; the act provides that it shall be unlawful, except as permitted by regulations, "to pursue, take, or kill any migratory bird, or any part, nest or egg of any such bird…." (USC Title 16, Section 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 nongame 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 with MBTA is addressed in Section 4.5, "Biological Resources – Vegetation and Wildlife," and the mitigation measures contained within that section would ensure that project activities do not result in the take of any migratory birds.

National Environmental Policy Act, 42 USC 4321 et seq. This EIS/EIR has been prepared to satisfy NEPA requirements and with issuance of a ROD by USACE, fulfills all NEPA requirements.

National Historic Preservation Act of 1966, as amended, 54 USC 306108. Section 106 of the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800, as amended in 2004) require Federal agencies to consider the potential effects of their proposed undertakings on historic properties. Historic properties are cultural resources that are listed on, or are eligible for listing on, the National Register of Historic Places (NRHP) (36 CFR 800.16[l]). Undertakings include activities directly carried out, funded, or permitted by Federal agencies. Federal agencies must also allow the Advisory Council on Historic Properties (ACHP) to comment on the proposed undertaking and its potential effects on historic properties.

The project incorporates treatment measures to protect resources listed on or eligible for listing on the NRHP, as discussed in Section 4.8, "Cultural Resources." Determinations of the specific mitigation measures to be implemented will be made by USACE and DWR in consultation with the State Historic Preservation Officer (SHPO) as part of the determination and eligibility and effect process, as required by NHPA Section 106.

In accordance with regulations implementing Section 106 of the NHPA (36 CFR 800.2[c][2]), USACE has consulted with Native Americans who attach religious or cultural significance to Historic Properties that may be affected by the proposed undertaking. A detailed description of consultation with Native Americans is provided under "Native American Consultation" in Section 4.8, and correspondence with Native American Tribes in compliance with Section 106 of the NHPA is provided in Appendix F, "Native American Correspondence." In accordance with 36 CFR Part 800.2 (c)(1), USACE will consult with the SHPO, requesting concurrence on the delineation of the project Area of Potential Effects, adequacy of inventory methods, and findings of the cultural investigations. Native American consultation is on-going.

Noise Pollution and Abatement Act of 1972 (42 USC Section 4901 et seq.). This Act initiated a Federal program to regulate noise pollution with the intent of protecting human health and minimizing annoyance of noise to the general public. The act also serves to (1) establish a means for effective coordination of Federal research and activities in noise control, (2) authorize the establishment of Federal noise emission standards for products distributed in commerce, and (3) provide information to the public regarding the noise emission and noise reduction characteristics of such products. With implementation of mitigation measures contained in Section 4.17, "Noise and Vibration," the project would be in compliance with this act.

Federal Noxious Weed Act (7 USC 2801 et seq.; 88 Stat. 2148). Enacted on January 3, 1975, the Federal Noxious Weed Act established a Federal program to control the spread of noxious weeds. The Secretary of Agriculture was given the authority to designate plants as noxious weeds by regulation, and the movement of all such weeds in interstate or foreign commerce was prohibited except under permit. The Secretary was also given authority to inspect, seize and destroy products, and to quarantine areas if necessary to prevent the spread of such weeds. The Secretary was also authorized to cooperate with other Federal, State, and local agencies; farmer's associations; and private individuals regarding measures to control, eradicate, or prevent or retard the spread of such weeds. Revegetation of the project site would be done in compliance with EO 13112 (discussed above), and an invasive plant management plan would be implemented to monitor and control noxious weeds.

Rivers and Harbors Act of 1899, 33 USC 408. Under Section 10 of the Rivers and Harbors Act of 1899, work in, over, or under "navigable waters" is regulated by USACE. Navigable waters of the United States are defined as those waters subject to the ebb and flow of the tide shoreward to the mean high-water mark or those that are currently used, have been used in the past, or may be susceptible to use to transport interstate or foreign commerce. A permit from USACE is required prior to any work in, over, or under navigable waters. The project would not place any dikes, dams, or other obstructions in navigable waters of the United States. Therefore, the project would not be subject to permission from USACE under Section 10.

Under Section 14 of the Rivers and Harbors Act of 1899 (33 USC 408), referred to as "Section 408," the Secretary of the Army, on the recommendation of the Chief of Engineers, may grant permission for the alteration of the Federal levee system by a non-Federal entity if the alteration would not be injurious to the public. The project is subject to Section 408 permission. This EIS/EIR will be used to support USACE's decision whether to grant permission for the project pursuant to Section 408, and DWR is actively working with USACE to obtain Section 408 permission.

Wild and Scenic Rivers Act, 16 USC 1271 et seq. The Wild and Scenic Rivers Act establishes a National Wild and Scenic Rivers System for the protection of rivers with important scenic, recreational, fish and wildlife, and other values. The Sacramento River (and Yolo Bypass) is not a designated Federal

Wild and Scenic River. The Lower American River is a Federally designated Wild and Scenic River but would not be adversely affected by the project, which would decrease river stage during potential high-flow flood events especially at and near the mouth of the American River when the Sacramento Weir is opened.

Resource Conservation and Recovery Act, 42 USC 6901. Under the Resource Conservation and Recovery Act (RCRA), EPA regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. As discussed in Section 4.13, “Hazards and Hazardous Materials,” some hazardous materials may be used during project construction, and the project site has several identified hazardous materials sites. Mitigation is proposed to reduce any potentially significant effects regarding hazardous wastes to less-than-significant levels. The Old Bryte Landfill is subject to RCRA, but remediation of the landfill is being done as a separate action by the Sacramento Area Flood Control Agency.

Federal Earthquake Hazards Reduction Act, 42 USC 7701. The Earthquake Hazards Reduction Act of 1977 reduces the risk of life and property from future earthquakes by establishing and maintaining an effective earthquake hazards reduction program. The Sacramento Valley has experienced relatively low seismic activity in the past and does not contain any Alquist-Priolo Earthquake Fault Zones, and the nearest known active fault is located approximately 17 miles to the northwest (see Section 4.11, “Geology, Soils, and Paleontological Resources”). Because no active faults are within or near the project site, the risk of ground rupture caused by a fault is low. In addition, geotechnical investigations of levee improvements are designed in consideration of the longevity of the levee system, including secondary seismic hazards such as shaking, liquefaction, subsidence, and seiches and would be designed to appropriate standards.

Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, 42 USC 4601 et seq. Federal, State, regional, and 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 (Uniform Act), and implementing regulation, 49 CFR Part 24. Relocation advisory services, moving costs reimbursement, replacement housing, and reimbursement for related expenses and rights of appeal are provided in the Uniform Act. All or portions of some parcels within the project footprint would need to be acquired for project construction. All property acquisition would be made in compliance with the Uniform Act.

8.2 State Laws, Regulations, and Policies

Alquist-Priolo Earthquake Fault Zoning Act. The purpose of this act is to ensure public safety by prohibiting the siting of structures designed for human occupancy across the traces of active faults, where those faults constitute a potential hazard to structures from surface faulting or fault creep. The project would not entail the construction of any structures, and there are no active faults within 17 miles of the project site.

California Assembly Bill 52. AB 52 established a consultation process with all California Native American Tribes on the Native American Heritage Commission list, including both Federally and Non-Federally Recognized Tribes. It also established a new class of resources, Tribal Cultural Resources, and requires consideration of Tribal Cultural Values in determining project impacts and mitigation along with requirements for Tribal notice and meaningful Tribal consultation. AB 52 (enacted in 2015) also required amendments to CEQA related to Tribal consultation and Tribal Cultural Resources, which were adopted in 2016. This EIS/EIR includes analysis of the required Tribal Cultural Resources, and DWR continues to conduct consultation with Native American Tribes in compliance with AB 52.

California Clean Air Act. The Yolo-Solano Air Quality Management District (YSAQMD) is responsible for air quality planning and development of the air quality plan for all of Yolo County, which encompasses the entire project site. The YSAQMD air quality plan establishes the strategies used to achieve compliance with the NAAQS and SAAQS in all areas within YSAQMD's jurisdiction. YSAQMD, in coordination with other local air agencies, develops rules and regulations and emission reduction programs to control emissions of criteria air pollutants, ozone precursors, TACs, and odors within its jurisdiction, and the Sacramento Federal Nonattainment Areas (SFNA) for ozone and $PM_{2.5}$. DWR will seek an authority to construct from YSAQMD, requiring compliance with the CCAA.

California Code of Regulations Title 26, Toxics. CCR Title 26 provides information about protecting California from harmful toxic substances. The information and regulations represent many different State agencies including Cal/OSHA, ARB, the California Department of Health Services, and many others. Mitigation measures and contract conditions will require that DWR and its construction contractors comply with CCR Title 26 by handling hazardous materials in accordance with the regulations.

California Endangered Species Act. CESA directs State agencies not to approve projects that would jeopardize the continued existence of an endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of a species. Furthermore, CESA states that reasonable and prudent alternatives shall be developed by CDFW, together with the project proponent and any State lead agency, consistent with conserving the species, while at the same time maintaining the project purpose to the greatest extent possible. With implementation of the mitigation measures contained in Sections 4.4, 4.5, and 4.6 of this EIS/EIR related to biological resources, and the Conservation Strategy measures listed in Chapter 3, "Alternatives" of this EIS/EIR, the project would be in compliance with CESA.

California Environmental Quality Act (California PRC Sections 21000–21178 and 14 CCR Section 753 and Chapter 3, Sections 15000–15387). CEQA requires consideration of environmental impacts prior to approving projects not covered under statutory or categorical exemptions. This EIS/EIR has been prepared to satisfy CEQA requirements. Through certification of the EIR and adoption of Findings of Fact, a Statement of Overriding Considerations, and a Mitigation Monitoring and Reporting Program, the project will comply with CEQA requirements.

California Fish and Game Code. Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs.

Four sections of the California Fish and Game Code—Sections 3511, 4700, 5050, and 5515—list 37 fully protected species. These statutes prohibit take or possession of fully protected species. With implementation of the mitigation measures contained in Sections 4.4, 4.5, and 4.6 of this EIS/EIR related to biological resources, and the Conservation Strategy measures listed in Chapter 3, "Alternatives" of this EIS/EIR, the project would be in compliance with sections 3503, 3511, 4700, 5050, and 5515 of the California Fish and Game Code.

California Fish and Game Code section 1602 requires an entity to notify CDFW prior to commencing any activity that may do one or more of the following: substantially divert or obstruct the natural flow of any river, stream or lake; substantially change or use any material from the bed, channel or bank of any river, stream, or lake; or deposit debris, waste or other materials that could pass into any river, stream or lake. A Streambed Alteration Agreement would be required by CDFW prior to construction of the project. After the DEIS/DEIR is publicly released, DWR will obtain this agreement prior to construction and comply with all agreement terms and conditions.

Central Valley Flood Protection Board Encroachment Permit (California Water Code, Title 23). CVFPB regulates any encroachments within an adopted plan of flood control and sets permissible work periods for regulated streams, including the excavation, borrow, and vegetation removal activities within the channel. DWR is in the process of working with both USACE (for Section 408 permission) and CVFPB (for an encroachment permit). If and when Section 408 permission is granted by USACE, CVFPB would approve the encroachment (post-certified CEQA document and NOD). DWR will comply with all lease or permit terms and conditions. At that point, the project would be in full compliance with all CVFPB regulations.

Fire Hazard Severity Zones. California PRC Sections 4201-4204 and California Government Code Sections 51175-51189 require identification of fire hazard severity zones within the State of California. Fire hazard severity zones are measured qualitatively, based on: vegetation, topography, weather, crown fire potential (a fire's tendency to burn upwards into trees and tall brush), and ember production and movement within the area of question. These codes require that where property abuts wildlands, a defensible space of at least 100 feet must be maintained between any structure and flammable wildland vegetation. CEQA requires that environmental analyses consider the potential exposure of people and structures to wildland fire hazards. This document includes an analysis of the potential exposure of people and structure to wildland fire hazards in compliance with CEQA.

Porter-Cologne Water Quality Control Act of 1969. The Porter-Cologne Act defines "Waters of the State" as water bodies with boundaries in the State, including any surface or groundwater, whether fresh or saline. The intent of the act is to provide a comprehensive program to protect water quality and beneficial uses of water by regulating waste discharges. Waste discharges may include such substances as discharges of fill and dredged material into waters of the State. Section 4.22, "Water Quality," identifies potentially significant impacts related to waste discharges and provides mitigation to reduce these potential impacts to a less-than-significant level. DWR will comply with all Central Valley RWQCB requirements.

Native American Heritage Commission and California Public Resources Code Requirements. The Native American Heritage Commission (NAHC) identifies and catalogs places of special religious or social significance to Native Americans and known graves and cemeteries of Native Americans on private lands, identifies the Native American group most likely descended from those Native Americans who may be interred on the project property, makes recommendations related to Native American sacred places that are located on private lands for acquisition by the State or other public agencies for the purpose of facilitating or assuring access thereto by Native Americans, assists Native Americans in obtaining appropriate access to sacred places that are located on public lands for ceremonial or spiritual activities, and performs other duties regarding the preservation and accessibility of sacred sites and burials and the disposition of Native American human remains and burial items.

NAHC makes recommendations to the Director of California State Parks and the California Arts Council relative to the California State Indian Museum and other Indian matters touched upon by department programs. NAHC may also bring action to prevent severe and irreparable damage to, or assure appropriate access for Native Americans to, a Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine located on public property, pursuant to Section 5097.97. NAHC mediates, upon application of either of the parties, disputes arising between landowners and known descendants relating to the treatment and disposition of Native American human burials, skeletal remains, and items associated with Native American burials.

NAHC provided a list of tribes associated with the project site to DWR, and has been consulted with by USACE as part of the Section 106 process. Chapter 7, "Consultation and Coordination," summarizes consultation and coordination between USACE, DWR, and Native Americans, and Appendix F, "Native American Correspondence," provides copies of correspondence with Native Americans.

California Regulatory Requirements Related to Human Remains. The State CEQA Guidelines (Section 15064.5 [d][e]) specifies the procedures that shall be implemented if Native American human remains are known to exist or if there is probable likelihood of their existence in a project area (California Public Resources Code [PRC] Section 5097.98); cites the prohibition on disinterring or otherwise disturbing human remains (California Health and Safety Code Section 7050.5); and specifies the procedures that will apply to the project and shall be followed in the event of the accidental discovery or recognition of human remains during project implementation (California PRC 5097.98).

California Code of Regulations Title 14, Division 2, Chapter 4, Article 3, Section 1723.1 Section 1723.1 regulates the plugging of oil and gas zones. These regulations, which are administered by the California Department of Oil, Gas, and Geothermal Resources (DOGGR), prescribe the depth intervals which must be cemented as well as the materials that are allowable in plugging practices. In order to receive a permit from DOGGR for a plugged and abandoned cased well, a cement plug must be inserted in the well, extending at least 100 feet above the top of a landed liner, the uppermost perforations, the casing cementing point, the water shut-off holes, or the oil or gas zone, whichever is highest. Natural gas facilities on the project site will be handled in accordance with this regulation.

Relocation Assistance and Property Acquisition, California Government Code Chapter 16, Section 7260 et seq. This chapter of the California Government Code establishes a uniform policy for the fair and equitable treatment of persons displaced as a direct result of programs or projects undertaken by a public entity. The primary purpose is to ensure that these persons do not suffer disproportionate injuries from programs and projects designed for the benefit of the public as a whole and to minimize the hardship of displacement on these persons. This chapter provides for various types of relocation assistance, including monetary payments. As discussed in Section 4.15, "Land Use and Planning, and Agriculture and Forestry Resources," DWR will implement the measures contained in California Government Code Section 7260 et seq.

California Surface Mining and Reclamation Act, PRC Section 2710 et seq. The California Surface Mining and Reclamation Act (SMARA) addresses surface mining of minerals and requires the prevention of adverse environmental effects caused by mining, the reclamation of mined lands for alternative uses, and the elimination of hazards to public health and safety from the effects of mining activities. 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. The general process consists of obtaining a permit to mine material, implementing a reclamation plan to return the land to a useable condition, and providing financial assurances to ensure the feasibility of the reclamation plan. The process of reclamation includes maintaining water and air quality and minimizing flooding, erosion, and damage to wildlife and aquatic habitats caused by surface mining. As discussed in Section 4.16, "Minerals," based on California PRC Section 2714(b), the proposed on-site borrow activities are exempt from the SMARA permitting requirements.

California Water Code Section 13240 – Water Quality Control Plan for the Sacramento and San Joaquin River Basins. The Central Valley Regional Water Quality Control Board (CVRWQCB) is responsible for preparing and updating the *Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins*. 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 project site is located within the CVRWQCB's 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, dissolved oxygen, turbidity, and pH; total dissolved solids, 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 and phosphorus), oil and grease, color, taste, odor, and aquatic toxicity. Narrative objectives are often precursors to numeric objectives. The primary method used by the CVRWQCB 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. The WDRs specify the terms and conditions that must be followed during implementation and operation of a project. By implementing the Conservation Strategy measures described in Chapter 3, "Alternatives," along with mitigation measures described in Section 4.11, "Geology, Soils, and Paleontological Resources," and Section 4.22, "Water Quality," the project would comply with all CVRWQCB requirements, including those contained in the Basin Plan.

California Land Conservation Act of 1976 (Williamson Act). The Williamson Act is one of the State's primary agricultural conservation tools. Under this law, local governments can enter into contracts with private property owners to protect land (within agricultural preserves) for agricultural and open space purposes. Williamson Act contracts are required to be a minimum initial term of 10 years, and are automatically extended each year for an additional year, unless either party (landowner or the contracting city or county) notifies the other of the intent not to renew the contract. In return, the landowner is guaranteed a relatively stable tax rate, based on the value of the land for agricultural/open space use only, and is unaffected by its development potential.

The Williamson Act addresses "compatible" uses. Section 51238.1 of the CCR, states that uses approved on contracted lands shall be consistent with the principles of compatibility, listed below.

- The use will not significantly compromise the long-term productive agricultural capability of the subject contracted parcel or parcels or on other contracted lands in agricultural preserves.
- The use will not significantly displace or impair current or reasonably foreseeable agricultural operations on the subject contracted parcel or parcels or on other contracted lands in agricultural preserves.
- The use will not result in the significant removal of adjacent contracted land from agricultural or open space use.

With implementation of Mitigation Measures AG-1a, AG-1b, and AG-1c contained in Section 4.15, “Land Use and Planning, and Agriculture and Forestry Resources,” DWR would comply with the Williamson Act by following appropriate procedures to cancel Williamson Act contracts (if cancellation is necessary), and would implement additional mitigation as determined to be necessary.

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Chapter 9. Public Involvement

This chapter summarizes public and agency involvement activities undertaken by USACE and DWR that have been conducted to date for this project, and which satisfy NEPA and CEQA requirements for public scoping and agency consultation and coordination to date. Appendix A, "Lower Elkhorn Basin Levee Setback Project Scoping Report," presents all of the public scoping materials, including the NEPA Notice of Intent (NOI), CEQA Notice of Preparation (NOP), public scoping meeting presentation and attendee list, and written letters in response to the NOI and NOP.

9.1 Public Scoping

On September 8, 2016, USACE issued the NOI to inform agencies and the general public that a joint EIS/EIR was being prepared for the project and invited comments on the scope and content of the document. The NOI was published in the *Federal Register* Vol. 81, No.174, on September 8, 2016. The NOI was also published on the USACE website at: http://www.spk.usace.army.mil/Media/Regulatory-Public-Notices/Article/939929/spk-2016-00457-notice-of-intent-noi-to-prepare-a-joint-environmental-impact-sta/. USACE posted the NOI on September 9, 2016, with an expiration date of October 7, 2016. Agencies and interested parties were given the opportunity to provide USACE with written comments on the proposed scope and content of the EIS/EIR until October 7, 2016 to align with the CEQA NOP time mandate.

On September 7, 2016, DWR and the State Clearinghouse issued the NOP to inform agencies and the general public that a joint EIS/EIR was being prepared for the project and invited comments on the scope and content of the document. The NOP contained information on the location, date, and time of the scoping meeting. The NOP was also published on the DWR project website at: http://water.ca.gov/floodmgmt/reduce/l-elkhorn.cfm. Additionally, the NOP release and announcement of the joint EIS/EIR scoping meeting was published in the *Sacramento Bee*, the newspaper of greatest general circulation.

As mandated under CEQA, the NOP was circulated for a minimum 30-day public review period, beginning on September 7, 2016, and ending on October 7, 2016. Agencies and interested parties were given the opportunity to provide DWR with written comments on the proposed scope and content of the EIS/EIR until 5 p.m. on October 7, 2016.

9.1.1 Public Scoping Meeting

USACE and DWR held a joint public scoping meeting on September 15, 2016. The public scoping meeting was held from 4 p.m. until 7 p.m., at the West Sacramento Civic Center, 1110 West Capitol Avenue, West Sacramento, CA 95691. Agencies and interested parties were given the opportunity to provide oral and written comments on the proposed scope and content of the EIS/EIR at the public scoping meeting. Six members of the public attended the public scoping meeting. No verbal or written comments were submitted during the public scoping meeting. As noted above, announcement of the joint scoping meeting was provided in the *Sacramento Bee*, and through customized notification conducted by USACE.

9.1.2 Public Scoping Comments and Responses

Written comments on the project were received by USACE and/or DWR from the following Federal agencies, State agencies, regional and local agencies, and nongovernmental organizations:

- U.S. Environmental Protection Agency
- California Department of Fish and Wildlife
- Central Valley Regional Water Quality Control Board
- Delta Stewardship Council
- Native American Heritage Commission
- County of Yolo
- Lower Sacramento/Delta North Region
- California Farm Bureau Federation
- Pacific Gas and Electric Company
- Yolo Basin Foundation

Each topic area analysis section contained in the EIS/EIR (i.e., Sections 4.2 through 4.22) contains a summary of the scoping comments that were received related to that topic area, along with a brief summary of how the comments were addressed. This information is contained in the "Analysis Methodology" subheadings of each section.

9.1.3 Other Public Scoping Activities

Informal Meetings

Upon request, DWR held and attended a total of more than 30 meetings with interested parties, including the National Marine Fisheries Service; U.S. Bureau of Reclamation; U.S. Fish and Wildlife Service; California Department of Fish and Wildlife; Yolo County; Sacramento Area Flood Control Agency; Reclamation Districts 537, 785, and 827; and local landowners.

Native American Tribes

USACE sent letters to the following Native American Tribes on September 2, 2016 notifying them of the project and inquiring about their interest in providing input:

- Cortina Band of Indians
- United Auburn Indian Community of the Auburn Rancheria (UAIC)
- Yocha Dehe Wintun Nation

On September 12, 2016, USACE sent an email to the three Native American Tribes listed above inviting them to attend the public scoping meeting.

USACE is continuing to consult with interested Tribes in accordance with standard procedures implementing Section 106 of the National Historic Preservation Act.

DWR sent letters to the following Native American Tribes on September 23, 2016 notifying them of the project and their interest in providing input in compliance with Assembly Bill 52:

- Buena Vista Rancheria of Me-Wuk Indians
- Cortina Band of Indians
- Ione Band of Miwok Indians

- Nashville Eldorado Miwok
- Shingle Springs Band of Miwok Indians
- Tsi-Akim Maidu
- UAIC
- Yocha Dehe Wintun Nation
- Wilton Rancheria

The Ione Band of Miwok Indians, Shingle Springs Band of Miwok Indians, UAIC, and Wilton Rancheria requested to be involved in the consultation process for this project. DWR is continuing to consult with interested Tribes in accordance with Assembly Bill 52.

9.2 Environmental Document Review

The DEIS/DEIR is being circulated for a 45-day public review period from May 25, 2018 to July 9, 2018, and a joint public meeting on the DEIS/DEIR will be conducted by USACE and DWR on Thursday, June 7, 2018 from 4 p.m. to 6 p.m. at West Sacramento City Hall, 1110 West Capitol Avenue, West Sacramento, California 95691. See Section 1.7, "Public Participation in the Environmental Review Process," in Chapter 1, "Introduction," on how to provide comments on the DEIS/DEIR, attend the public meeting on the DEIS/DEIR, and the remaining steps in the NEPA/CEQA processes.

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Chapter 10. List of Preparers

This EIS/EIR was prepared by GEI Consultants, Inc., at the direction of USACE and DWR.

The following is a list of the individuals who directed, managed, prepared, and/or reviewed sections of this EIS/EIR; conducted related fieldwork or modeling; and/or provided significant background materials.

U.S. Army Corps of Engineers, Sacramento District

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Lisa Clay	Deputy District Counsel (Environmental Law & Regulatory Programs)	J.D.; 25 years' experience
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California Department of Water Resources

Name	Title	Experience
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California Department of Water Resources

Name	Title	Experience
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GEI Consultants, Inc.

Name	Qualifications and Experience	Participation
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Phil Dunn	B.S. Zoology, M.S. Fisheries Biology; 37 years' experience	NEPA/CEQA Compliance and Document QA/QC
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Chapter 7. Consultation and Coordination

None.

Chapter 8. Compliance with Applicable Laws, Regulations, Policies, and Plans

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Chapter 9. Public Involvement

None.

Chapter 10. List of Preparers

None.

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Chapter 12. Index

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