Lower Deer Creek

Flood and Ecosystem Improvement Project, Phase 1

Draft Environmental Impact Report

State Clearinghouse Number 2020120149

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Draft

Lower Deer Creek Flood and Ecosystem Improvement Project, Phase 1 Environmental Impact Report

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Acronyms and Abbreviations

AADT	annual average daily traffic
AB	Assembly Bill
Abbey	Abbey of New Clairvaux
AG-1	Agricultural, Upland District
AG-2	Agricultural, Valley District
ARA	aquatic resources assessment
ATCM	airborne toxic control measure
Basin Plan	Water Quality Control Plan
BLM	Bureau of Land Management
BP	before present
BRA	biological resources assessment
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEPA	California Environmental Protection Agency
CalEEMod	California Emissions Estimator Model
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CARB	California Air Resources Board

CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CNRA	California Natural Resource Agency
CO	carbon monoxide
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank
CTCP	construction traffic control plan
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan

CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
DCWC	Deer Creek Watershed Conservancy
DPM	diesel particulate matter
DPS	distinct population segment
DOC	California Department of Conservation
DOGGR	California Department of Oil, Gas, and Geothermal Resources
DWR	California Department of Water Resources
EIR	environmental impact report
EFH	essential fish habitat
EOP	emergency operations plan
EO	Executive Order
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act of 1973
ESU	evolutionary significant unit
FEMA	Federal Emergency Management Agency

FHSZ	fire hazard severity zone
FMMP	Farmland Mapping and Monitoring Program
FTA	Federal Transit Administration
GHG	greenhouse gas
HAP	hazardous air pollutant
HAPC	habitat areas of particular concern
HCP	habitat conservation plan
I-5	Interstate 5
lbs/day	pounds per day
L_{dn}	day-night noise level
L_{eq}	equivalent noise level
LOS	level of service
Ln	percentile noise level
$L_{eq}(24)$	equivalent noise level averaged over 24 hours
L_{max}	maximum sound level
LRA	local responsibility area
MT CO_2e	metric tons of carbon dioxide equivalent
MMT CO_2e	million metric tons of carbon dioxide equivalent

mph	miles per hour
NAAQS	National Ambient Air Quality Standards
NAHC	California Native American Heritage Commission
NCCP	natural community conservation plan
NEIC	Northeast Information Center
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOD	notice of determination
NO_x	nitrous oxide
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSVAB	North Sacramento Valley Air Basin
NSVPA	Northern Sacramento Valley Planning Area
NWP	Nationwide Permit Program
OPR	California Governor's Office of Planning and Research
O&M	operation and maintenance

PCE	primary constituent element
PM	particulate matter
$PM_{2.5}$	particulate matter with diameters 2.5 micrometers and smaller
PM_{10}	particulate matter with diameters 10 micrometers and smaller
PRC	Public Resources Code
proposed project, or project	Lower Deer Creek Flood and Ecosystem Improvement Project
PVC	polymer of vinyl chloride
RCRA	Resource Conservation and Recovery Act
RM	river mile
ROG	reactive organic gas
SB	Senate Bill
SO_2	sulfur dioxide
SPCCP	spill prevention control and countermeasure plan
SRA	State responsibility area
State	State of California
SR 99	State Route 99
SVAB	Sacramento Valley Air Basin

SVP	Society of Vertebrate Paleontology
SVRIC	Stanford-Vina Ranch Irrigation Company
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminants
TCAPCD	Tehama County Air Pollution Control District
TCFCWCD	Tehama County Flood Control and Water Conservation District
TCP	traditional cultural property
TCR	traditional cultural resource
TCTC	Tehama County Transportation Commission
Tehama County General Plan	Tehama County General Plan Update 2009-2029
TMDL	total maximum daily load
TRAX	Tehama Rural Area eXpress
UA	Upland Agricultural
USACE	United States Army Corps of Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

VELB	valley elderberry longhorn beetle
VFA	Valley Floor Agriculture
VMT	vehicle miles traveled
vpd	vehicles per day
WEAP	Worker Environmental Awareness Program
WBWG	Western Bat Working Group
WDR	waste discharge requirement
VOC	volatile organic compound
$\mu g/m^3$	micrograms per cubic meter
°F	degrees Fahrenheit
2018 Plan	Northern Sacramento Valley Planning Area Air Quality Attainment Plan
3H:1V	3-foot-horizontal to 1-foot-vertical ratio

Executive Summary

ES.1 Introduction

This chapter summarizes the contents of the draft environmental impact report (EIR) prepared for the Lower Deer Creek Flood and Ecosystem Improvement Project (proposed project, or project). The draft EIR discloses environmental information concerning the project and invites interested parties to comment on the information presented and the project proposed. The draft EIR also provides detailed information on the potential environmental impacts associated with the proposed project.

As defined by the California Environmental Quality Act (CEQA), the public agency that has principal authority over carrying out or approving the proposed project is called the lead agency (State CEQA Guidelines Section 15367). The lead agency also has the primary responsibility for determining what level of CEQA review is required for a project and for preparing and approving the appropriate document (e.g., negative declaration, mitigated negative declaration, or EIR).

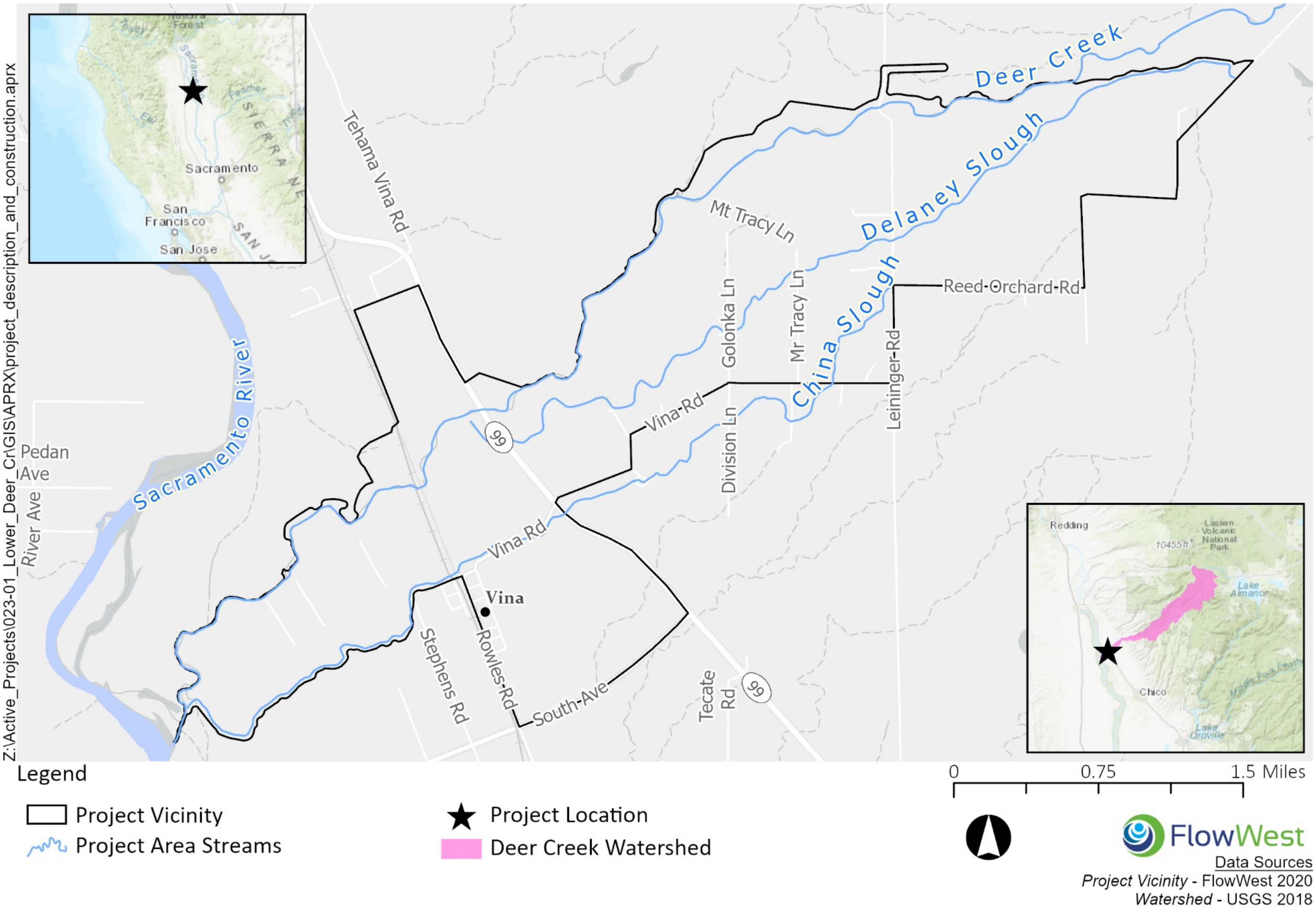
Pursuant to CEQA (California Public Resources Code [PRC] Section 21000 et seq.), the California Department of Water Resources (DWR) is the lead agency for this proposed project and has the primary responsibility for CEQA compliance during preparation of this EIR (PRC Section 21067). The Deer Creek Watershed Conservancy (DCWC) is the project proponent.

ES.2 Project Overview

The proposed project would be located along the lower 8 miles of Deer Creek in Tehama County, California, from 2 miles upstream of Red Bridge to the confluence with the Sacramento River and along the lower 2.6 miles of China Slough to the confluence with the Sacramento River (Figure ES-1). The proposed project is a multi-benefit project that would restore the design flood protection level of the United States Army Corps of Engineers (USACE) levee system on Lower Deer Creek. The proposed project would also create up to 43 acres of new seasonally inundated floodplain rearing habitat for juvenile salmonids between the Stanford-Vina Ranch Irrigation Company (SVRIC) Dam and Red Bridge. In addition, the proposed project would restore conveyance capacity in China Slough, a remnant distributary channel from Deer Creek.

Deer Creek is bounded by agricultural lands (in use as orchards, row crops, and for cattle grazing), by residences on the north and south banks, and by the town of Vina on the south bank downstream of State Route 99. China Slough, located south of Deer Creek but within its floodplain, is a remnant distributary channel from Deer Creek. The slough serves as a conduit for water on the floodplain from Deer Creek during high flow events (MacWilliams 2004).

Figure ES-1 Lower Deer Creek Flood and Ecosystem Improvement Project Location



ES.3 Project Purpose, Need, and Objectives

The purpose of the proposed project is to:

- Reduce flood risk to lands adjacent to Deer Creek by improving the flood management system.
- Improve the geomorphic function of Deer Creek.
- Increase and improve spawning and rearing habitat for protected fish species in Deer Creek.

The proposed project is needed to address damaging flooding that impacts farmland and infrastructure, existing sediment management problems, and degraded aquatic habitat diversity and complexity, and to restore floodplain habitat for native fish species, along Lower Deer Creek. The proposed project is also needed to address flooding along China Slough.

The proposed project objectives are to:

- Improve geomorphic function to increase the potential for more naturally graded sediment composition and related channel form and the development of more diverse and ecologically complex riparian habitat.
- Increase rearing habitat for spring-run Chinook salmon.
- Increase flood conveyance capacity in the Deer Creek watershed and restore USACE levee freeboard conditions for a 21,000 cubic-feet-per-second (cfs) event.
- Minimize levee maintenance requirements, repairs, and costs.
- Minimize flood control-related channel maintenance requirements and costs.
- Minimize impacts to viable agricultural operations for landowners in the project area along Deer Creek.

ES.4. EIR Preparation and Review Process

Consultation and coordination efforts with Native American Tribes and regulatory agencies combined with public outreach and involvement informed the preparation of the draft EIR, as described below.

ES.4.1 Agency and Stakeholder Consultation and Coordination

The project proponent and its consultants, in coordination with DWR, have conducted a series of outreach meetings since summer 2018 with various agencies and stakeholders to receive input on project components and other aspects of the proposed project. 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 representatives from federal and State agencies and regional and local interests. To date, outreach has been conducted with the DCWC (calls and in-person meetings quarterly or more frequent as needed), the SVRIC (calls approximately quarterly, as needed), and the Abbey of New Clairvaux (in-person meetings approximately twice per year). Outreach has also been conducted with the California Department of Fish and Wildlife (CDFW), U.S. Fish and Wildlife Service, USACE, the Tehama County Flood Control and Water Conservation District, The Nature Conservancy, the Northern California Land Trust, Trout Unlimited, and American Rivers.

ES.4.2 Public Outreach

Outreach meetings were also conducted with some of the individual landowners adjacent to the proposed project boundaries to receive input on project components and other aspects of the proposed project. Landowner outreach has included the Leininger, Sunseri, Hamilton, Amato, Wood, and Rumsey families (calls and in-person meetings monthly to twice per year depending on landowner interest).

In addition, notices regarding the proposed project were mailed to landowners located along China Slough who would be affected by project construction. No responses were received.

ES.4.3 Tribal Consultation

Assembly Bill (AB) 52 coordination is required when a Tribe has requested that a CEQA lead agency consult with them for a specific geographic area. DWR has not received notification requests pursuant to AB 52 that include the project area, so AB 52 coordination is not required for the proposed project. Although AB 52 coordination is not required, consultation efforts were conducted by DWR in compliance with the California Natural Resources Agency Tribal Consultation Policy and the DWR Tribal Engagement Policy to ensure effective government-to-government consultation between DWR and Native American Tribes affiliated with the geographic area of the project. A letter of invitation for tribal engagement was mailed in December 2020 to the Paskenta Band of Nomlaki Indians, which was identified as being traditionally and culturally affiliated with the project area. To date, no response has been received.

ES.4.4 Notice of Preparation

On December 9, 2020, DWR issued a notice of preparation (NOP) to inform agencies and the general public that an EIR was being prepared for the project. The NOP was published on the DWR project website and the State Clearinghouse website. The NOP was also mailed to federal, State, and local regulatory agencies; a Native American Tribe culturally affiliated with the geographic area of the proposed project; landowners in the project vicinity; stakeholders; and other interested parties. The NOP included information regarding the project location, background, objectives, description, and potential environmental impacts. Written comments on the NOP were received by DWR from the Native American Heritage Commission and CDFW.

An online public EIR scoping meeting was held on December 15, 2020, to solicit input on the scope and content of the EIR. Nine comments were received during the meeting. Written and public comments were taken into consideration and addressed during preparation of the EIR.

ES.4.5 Review of Draft EIR

This draft EIR is being circulated for a 45-day public review period beginning November 30, 2021. A notice of availability of the draft EIR is available on DWR's website. The draft EIR is available for review during the 45-day public review period on the CEQAnet web portal by searching for State Clearinghouse Number 2020120149. Written comments on the draft EIR must be postmarked no later than 5:00 p.m. on January 14, 2022. Written comments should be emailed to DWR Environmental Services Section Manager Amy Lyons with the subject line "Lower Deer Creek Flood and Ecosystem Improvement Project Public Comment" or mailed to the following address:

> California Department of Water Resources
> Attn: Amy Lyons
> 2440 Main Street
> Red Bluff, CA 96080

All comments received by DWR are public records, subject to disclosure under the Public Records Act. Responses to public comments received on the draft EIR during the 45-day public and agency comment period will be included in the final EIR. Public agencies will be provided a minimum 10-day opportunity to review responses to their comments pursuant to CEQA requirements. If the proposed project is approved, DWR will publish a notice of determination, which will trigger a 30-day period in which a legal challenge to the document may be filed.

ES.5 Description of Project Alternatives

The alternatives evaluated in the draft EIR include a no project alternative and six project (i.e., build) alternatives.

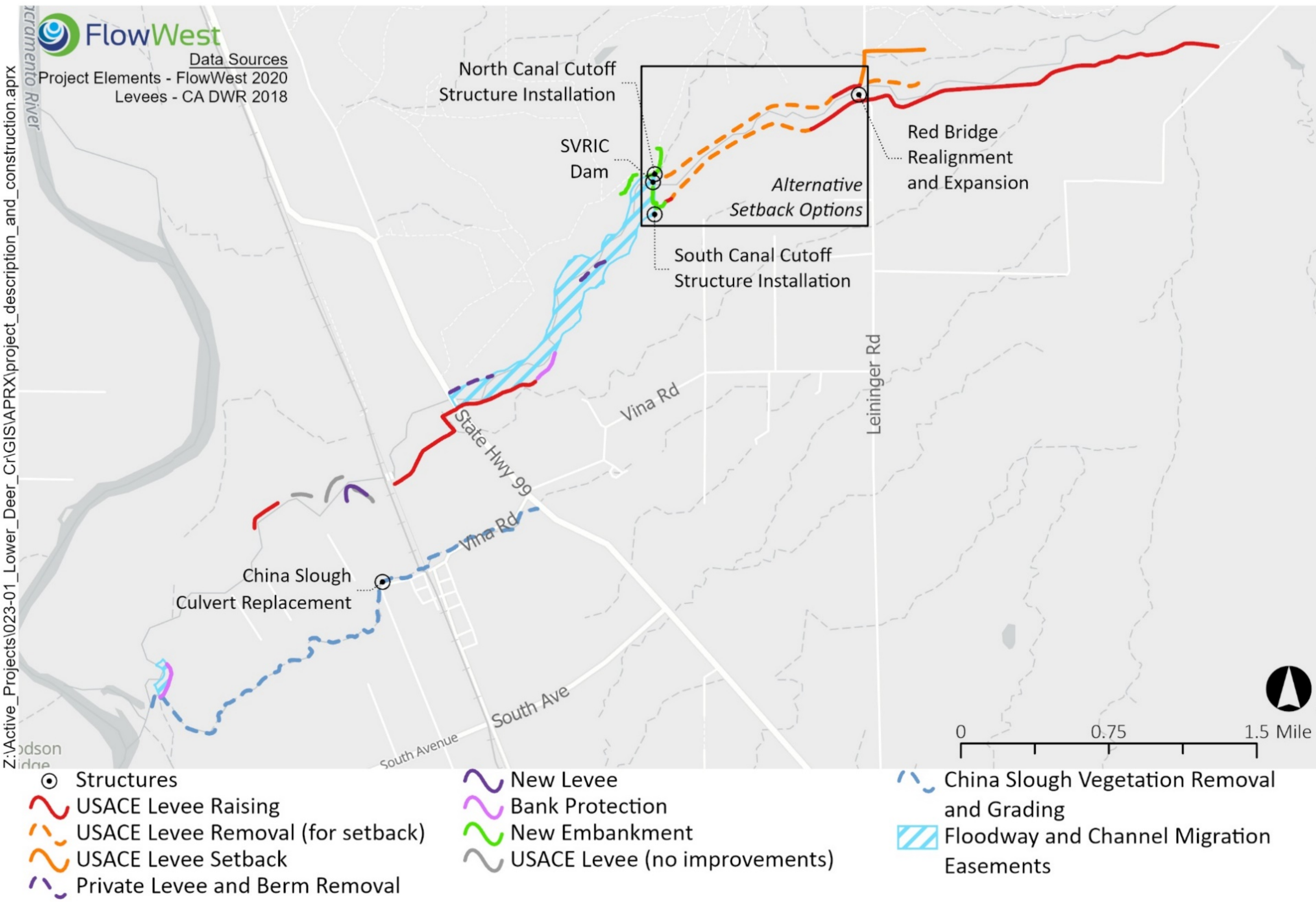
ES.5.1 No Project Alternative

Under the no project alternative, no construction would occur. There would be no levee setbacks and improvements or other flood risk reduction measures in Lower Deer Creek or China Slough. The no project alternative would allow a continued risk of flooding from levee deficiencies resulting from the inability to meet levee freeboard criteria. Channel maintenance would continue to be hindered by regulatory constraints.

ES.5.2 Alternatives A through F

The six project alternatives are referred to as Alternatives A through F. All six alternatives share common project elements, and each of the six includes a different levee setback option. The common project elements include USACE levee raising, floodway and channel migration easements, a new levee, private levee and berm removal, Red Bridge realignment and expansion, Leininger road raise, access road raising, a new embankment, north and south canal cutoff structure installation, and bank protection along Lower Deer Creek. The common project elements also include vegetation removal, excavation, and culvert replacement along China Slough (Figure ES-2).

Figure ES-2 Project Elements Common to Alternatives A through F



The levee setback options that differentiate each of the project alternatives differ by how far the existing levees would be set back or moved from their existing alignment in the area between the SVRIC Dam and Red Bridge. The floodplain ground surface between the setback levees and the channel would be lowered through grading to improve geomorphic function. Floodway and channel migration easements would also be established in this reach, and private infrastructure affected by levee setbacks and floodplain lowering would be repaired or replaced. Discussions with adjacent landowners prompted the evaluation of the multiple setback options (A through F) described below and shown in Figure ES-3:

- Setback Option A totals 74 acres and includes the maximum acreage of levee setbacks and floodplain lowering. The maximum levee height increase would be approximately 2.5 feet, and the maximum levee height decrease would be approximately 2 feet.
- Setback Option B totals 69.9 acres and includes the maximum acreage of levee setbacks and floodplain lowering, minus the southern bank parcel upstream of the SVRIC Dam. The maximum levee height increase would be approximately 2.5 feet, and the maximum levee height decrease would be approximately 2 feet.
- Setback Option C totals 57.1 acres and includes the maximum acreage of levee setbacks and floodplain lowering on the north bank, and a reduced setback and floodplain lowering extent on the south bank. The maximum levee height increase would be approximately 2.5 feet, and the maximum levee height decrease would be approximately 1.5 feet.
- Setback Option D totals 39.7 acres and includes a smaller acreage of levee setbacks and floodplain lowering on the north bank compared to Setback Options A through C, and the maximum setback and floodplain lowering extent on the south bank. The maximum levee height increase would be approximately 2 feet, and the maximum levee height decrease would be approximately 1.5 feet.
- Setback Option E totals 29.3 acres of setback area and easements and includes a smaller acreage of USACE levee setbacks and floodplain lowering on both north and south banks compared to Setback Options A through D. The maximum levee height increase would be approximately 2 feet, and the maximum levee height decrease would be approximately 1.5 feet.

- Setback Option F would involve no USACE levee setbacks or floodplain lowering between the SVRIC Dam and Red Bridge, but the levees in the reach would be raised to meet the freeboard criteria. The maximum levee height increase would be approximately 5.5 feet, and the minimum levee height increase would be approximately 1 foot.

Figure ES-3 Levee Setback Options for Alternatives A through F between the SVRIC Dam and Red Bridge

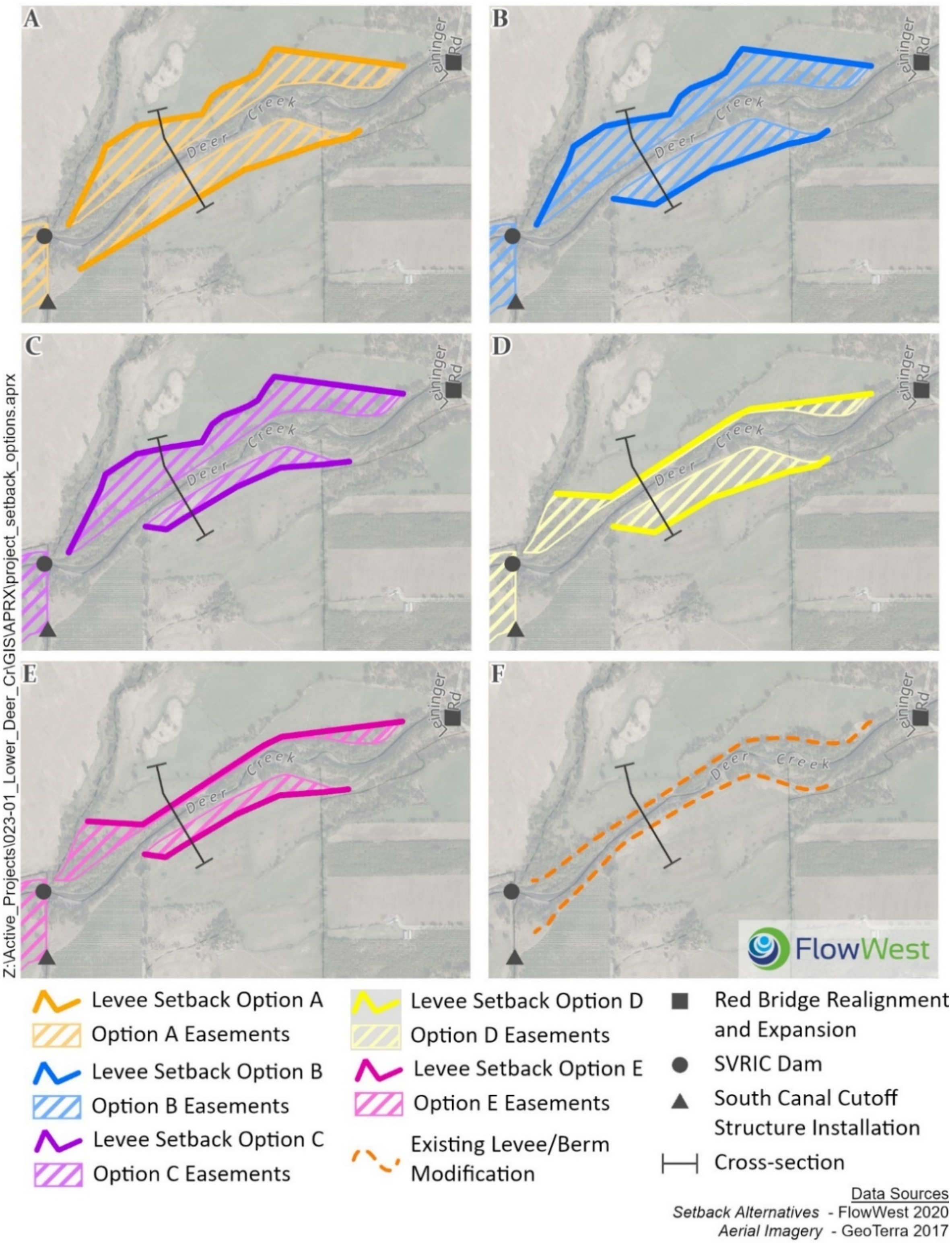


Table ES-1 presents the anticipated excavation and fill amount estimates in cubic yards for the construction of all six project alternatives. Table ES-2 shows the estimated amount of rearing habitat by alternative at the two-year and five-year return interval flows (5,500 feet per second [cfs] and 9,900 cfs, respectively) based on hydrodynamic modeling conducted for the proposed project. Several of the alternatives show similar suitable habitat acres at the two-year flow, after which they start to diverge. These groups of similar floodplain habitat have been designated by group number in Table ES-2.

Table ES-1 Excavation and Fill Estimates in Cubic Yards for Construction of the Six Project Alternatives

	Alt A	Alt A	Alt A	Alt B	Alt B	Alt B	Alt C	Alt C	Alt C	Alt D	Alt D	Alt D	Alt E	Alt E	Alt E	Alt F	Alt F	Alt F
	Cut	Fill	Rock Fill	Cut	Fill	Rock Fill	Cut	Fill	Rock Fill	Cut	Fill	Rock Fill	Cut	Fill	Rock Fill	Cut	Fill	Rock Fill
Red Bridge Replacement and Upstream Activities	21,945	16,099	0	21,945	16,099	0	21,945	16,099	0	21,945	16,099	0	21,945	16,099	0	21,945	16,099	0
Levee Setbacks and Floodplain Lowering	760,268	88,360	0	681,829	81,196	0	616,849	88,704	0	491,725	90,478	0	424,776	101,918	0	108	68,696	0
Activities from SVRIC Dam to State Route 99	32,637	1,161	380	32,637	1,161	380	32,637	1,161	380	32,637	1,161	380	32,637	1,161	380	32,637	1,161	380
Activities Downstream of State Route 99	74,856	1,768	1,291	74,856	1,768	1,291	74,856	1,768	1,291	74,856	1,768	1,291	74,856	1,768	1,291	74,856	1,768	1,291
Total	889,706	107,388	1,670	811,267	100,224	1,670	746,287	107,732	1,670	621,163	109,506	1,670	554,214	120,946	1,670	129,546	87,724	1,670

Notes:

Alt = Alternative
SVRIC = Stanford-Vina Ranch Irrigation Company

Table ES-2 Acres of Suitable Floodplain Habitat by Alternative

Group	Alternative	Suitable Acres			
		Chinook and Steelhead		Hardhead	
		2-Year Flow	5-Year Flow	2-Year Flow	5-Year Flow
1	A	249.6	276.8	135.6	165.3
2	B	241.6	269.7	131.7	157.6
2	C	237.7	259.4	131.5	156.3
3	D	223.2	241.9	123.3	141.1
3	E	217.9	230.9	122.6	137.6
4	F	185.5	214.5	100	114.7
4	Existing	183.8	212.0	99.5	115.3

ES.6 Preferred Alternative — Alternative A

The preferred alternative includes the common project elements and Levee Setback Option A. Alternative A was selected as the preferred alternative because it includes the largest proposed area in the levee setback reach, which would provide the greatest environmental benefits compared to other alternatives and would meet all of the project objectives.

ES.7 Summary of Impacts and Mitigation Measures

CEQA Guidelines require an EIR to include an evaluation of potentially significant effects on the physical environment associated with a proposed project and to identify feasible mitigation for any significant adverse effects. During the environmental analysis conducted for the proposed project, the following resources were eliminated from detailed analysis because no significant impacts from project implementation are anticipated:

- Energy.
- Forestry Resources.
- Mineral Resources.
- Population and Housing.
- Public Services.
- Recreation.

Implementation of the proposed project would result in potentially significant and unavoidable impacts to the following resources:

- Agricultural Resources.
- Air Quality.
- Greenhouse Gas Emissions.
- Noise.

During the impact evaluation, it was also determined that the proposed project would result in a cumulatively considerable incremental contribution to a cumulatively significant impact on the following resources:

- Air Quality — Increases in emissions above established thresholds.
- Agricultural Resources and Land Use — Permanent loss of important farmland.
- Greenhouse Gas Emissions — Increases in emissions above established thresholds.

Several key differences among the six project alternatives are summarized below:

- Alternative A would provide the greatest fish rearing habitat benefits and Alternative F would provide the least; benefits would decrease from greatest to least in alphabetical order by alternative.
- Alternative A would result in the greatest impacts to agricultural resources and Alternative F would result in the least; impacts would decrease from greatest to least in alphabetical order by alternative.
- The wider the setback reach, the less levee maintenance is expected to be required.

A summary of impact evaluations for all resource topics is presented in Table ES-3.

Table ES-3 **Summary of Impacts and Mitigation Measures by Resource Topic**

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Aesthetics				
Impact AES-1: Substantially degrade the existing visual character or quality of public views of the site and its surroundings.	No Project	NI	None required.	NI
	A through F	LTS	None required.	LTS
Impact AES-2: Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.	No Project	NI	None required.	NI
	A through F	LTS	None required.	LTS
Agricultural Resources and Land Use				
Impact AG-1: Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural use, or cause a significant environmental impact due to a conflict with a land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure AG-1:** If Determined to be Necessary, Establish Conservation Easements for the Loss of Prime Farmland.	LTS
	A through F	LTS (m)	**Mitigation Measure GEO-2:** Store and Reuse Topsoil.	LTS
Impact AG-2*:* Conflict with existing zoning for agricultural use, or a Williamson Act contract.	No Project	NI	None required.	NI
	A through F	PS	**Mitigation Measure AG-1:** If Determined to be Necessary, Establish Conservation Easements for the Loss of Prime Farmland.	SU

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Air Quality				
Impact AIR-1: Conflict with or obstruct implementation of the applicable air quality plan.	No Project	LTS	None required.	LTS
	A through F	LTS	None required.	LTS
Impact AIR-2: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or State ambient air quality standard.	No Project	LTS	None required.	LTS
	A through F	PS	**Mitigation Measure AQ-1:** Implement Fugitive Dust and Equipment Exhaust Control Measures	SU
	A through F	PS	**Mitigation Measure AQ-2:** Implement Material Hauling NO_x Control Measures	
Impact AIR-3: Expose sensitive receptors to substantial pollutant concentrations.	No Project	LTS	None required.	
	A through F	PS	**Mitigation Measure AQ-1:** Implement Fugitive Dust and Equipment Exhaust Control Measures	SU
	A through F	PS	**Mitigation Measure AQ-2:** Implement Material Hauling NO_x Control Measures	
Impact AIR-4: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	No Project	NI	None required.	NI
	A through F	LTS	Mitigation Measure AQ-3: Cover Odorous Stockpiles When Not in Use	LTS

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Biological Resources — Fish and Aquatic Habitat				
Impact FISH-1: Have a substantial adverse effect, either directly or through habitat modifications, on any fish species identified as a sensitive or special-status species in local or regional plans, policies, or regulations, or by NMFS, USFWS, or CDFW.	No Project	S	None	S
	A through F	LTS (m)	**Mitigation Measure FISH-1:** Implement Avoidance Work Windows.	LTS
	A through F	LTS (m)	**Mitigation Measure FISH-2:** Implement Measures to Minimize Injury or Mortality to Fish Species During Dewatering and Diversion Activities.	
	A through F	LTS (m)	**Mitigation Measure FISH-3:** Construction Activities requiring Pile Driving will be conducted with a Vibratory Pile Driver.	
	A through F	LTS (m)	**Mitigation Measure GEO-1:** Acquire Appropriate Regulatory Permits, Prepare and Implement a Stormwater Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.	
	A through F	LTS (m)	**Mitigation Measure HAZ-1:** Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.	
	A through F	LTS (m)	**Mitigation Measure WQ-1:** Obtain Appropriate Discharge and Dewatering Permit and Implementation Provisions for Dewatering.	
Impact FISH-2: Interfere Substantially with the Movement of any Native Resident or Migratory Fish Species.	No Project	NI	None required.	NI
	A through F	LTS	None required.	LTS

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Biological Resources — Wetlands				
Impact WETLAND-1: Have a substantial adverse effect on State or federally protected wetlands or waters through direct removal, filling, hydrological interruption, or other means.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure WETLAND-1:** Implement avoidance and minimization measures for identified wetlands and other waters.	LTS
	A through F	LTS (m)	**Mitigation Measure WETLAND-2:** Compensate for the loss of state or federally protected wetlands.	
	A through F	LTS (m)	**Mitigation Measure WQ-1:** Obtain Appropriate Discharge and Dewatering Permit and Implementation Provisions for Dewatering.	
	A through F	LTS (m)	**Mitigation Measure GEO-1:** Acquire Appropriate Regulatory Permits, Prepare and Implement a Stormwater Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.	
	A through F	LTS (m)	**Mitigation Measure HAZ-1:** Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.	

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Biological Resources — Vegetation				
Impact VEG-1: Have a substantial adverse effect, either directly or through habitat modification, on any plant species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or CDFW or USFWS regulations.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure VEG-1:** Conduct Focused Surveys for Special-status Plants and Avoid Impacts, where Feasible.	LTS
	A through F	LTS (m)	**Mitigation Measure VEG-2:** If Avoidance of Special-Status Plant Species is Infeasible, Develop and Implement a Compensatory Mitigation Plan.	
	A through F	LTS (m)	**Mitigation Measure VEG-3:** Prevent the Introduction of Invasive Plant Species.	
	A through F	LTS (m)	**Mitigation Measure GEO-1:** Acquire Appropriate Regulatory Permits, Prepare and Implement a Stormwater Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.	
	A through F	LTS (m)	**Mitigation Measure HAZ-1:** Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.	
Impact VEG-2: Have a substantial adverse effect on any riparian habitat or other sensitive natural species or communities identified in the local or regional plans, policies, regulations or by the CDFW or USFWS through direct removal, filling, hydrological interruption, or other means.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measures VEG-4:** If a Net Loss of Riparian Woodland Habitat Occurs, Develop and Implement a Compensatory Mitigation Plan.	LTS
Impact VEG-3: Conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance, or conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan.	No Project	NI	None required.	NI
	A through F	NI	None required.	NI

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Biological Resources — Wildlife				
Impact WILDLIFE-1: Have a substantial adverse effect, either directly or through habitat modification, on any wildlife species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or CDFW and USFWS regulations.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure WILDLIFE-1:** Implement a Worker Environmental Awareness Program.	LTS
	A through F	LTS (m)	**Mitigation Measure WILDLIFE-2:** Implement Protection Measures for the Western Pond Turtle.	
	A through F	LTS (m)	**Mitigation Measure WILDLIFE-3:** Implement Protective Measures for Nesting Raptors.	
	A through F	LTS (m)	**Mitigation Measure WILDLIFE-4:** Habitat Protection – Nesting Migratory Birds.	
	A through F	LTS (m)	**Mitigation Measure WILDLIFE-5:** Tricolored Blackbird Nesting.	
	A through F	LTS (m)	**Mitigation Measure WILDLIFE-6:** Habitat Protection Burrowing Owl.	
	A through F	LTS (m)	**Mitigation Measure WILDIFE-7:** Implement Protective Measures During Removal of Trees That Provide Suitable Bat Roosting Habitat.	
	A through F	LTS (m)	**Mitigation Measure WILDLIFE-8:** Implement Bat Protection Measures during Construction Activities Under or Within 100 Feet Red Bridge.	
	A through F	LTS (m)	**Mitigation Measure WILDLIFE-9:** Implement Protection Measures for the Valley Elderberry Longhorn Beetle.	
Impact WILDLIFE-2: Have a substantial adverse effect on any riparian habitat or other sensitive natural communities identified in the local or regional plans, policies, regulations or by the CDFW or USFWS.	No Project	NI	None required.	NI
	A through F	LTS	None required.	LTS

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Cultural and Tribal Cultural Resources				
Impact CR-1: Cause a substantial adverse change in the significance of a historical or archaeological resource as defined in Section 15064.5, or tribal cultural resources as defined in Public Resources Code 21074.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure CR-1:** Prepare a Treatment Plan and Perform Treatment to Address the Affected Resources Identified as Significant and Eligible for the NRHP or CRHR.	LTS
	A through F	LTS (m)	**Mitigation Measure CR-2:** Conduct Cultural Resource Awareness and Sensitivity Training.	
	A through F	LTS (m)	**Mitigation Measure CR-3:** Implement Procedures for Inadvertent Discovery of Archaeological Resources and Implement an Inadvertent Discovery Plan.	
	A through F	LTS (m)	**Mitigation Measure CR-4:** In the Event that Tribal Cultural Resources or Traditional Cultural Properties are Discovered during Construction, Implement Procedures to Evaluate and Properly Treat Them.	
Impact CR-2: Disturbance of Human Remains, including Outside of Formal Cemeteries	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure CR-5:** Implement Procedures for the Inadvertent Discovery of Human Remains.	LTS

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Geology, Soils, and Paleontological Resources				
Impact GEO-1: Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo earthquake fault zoning map, issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42.). Strong seismic ground shaking. Seismic-related ground failure, including liquefaction.	No Project	LTS	None required.	LTS
	A through F	LTS	None required.	LTS
Impact GEO-2: Result in substantial soil erosion or the loss of topsoil. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site lateral spreading, subsidence, liquefaction or collapse.	No Project	LTS	None required.	LTS
	A through F	LTS (m)	**Mitigation Measure GEO-1:** Acquire Appropriate Regulatory Permits, Prepare and Implement a Stormwater Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.	LTS
			Mitigation Measure GEO-2: Store and Reuse Topsoil.	
Impact GEO-3: Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	No Project	S	None required.	S
	A through F	LTS (m)	**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.	LTS
Greenhouse Gas Emissions and Climate Change				
Impact GHG-1: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	No Project	LTS	None required.	LTS
	A through F	PS	**Mitigation Measure AQ-2:** Implement Material Hauling NO_x Control Measures.	SU

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Impact GHG-2: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.	No Project	NI	None required.	NI
	A through F	PS	**Mitigation Measure AQ-2:** Implement Material Hauling NO_x Control Measures.	SU
Hazards and Hazardous Materials				
Impact HAZ-1: Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure HAZ-1:** Prepare and Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.	LTS
Impact HAZ-2: Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident condition involving the release of hazardous materials into the environment.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure HAZ-1:** Prepare and Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.	LTS
Impact HAZ-3: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure HAZ-1:** Prepare and Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.	LTS
Impact HAZ-4: For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area.	No Project	NI	None required.	NI
	A through F	NI	None required.	NI

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Impact HAZ-5: Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure TR-1:** Implement a Construction Traffic Control Plan	LTS
Impact HAZ-6: Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure HAZ-2:** Develop and Implement a Fire Protection and Prevention Plan.	LTS
Hydrology, Hydraulics, and Flood Risk				
Impact HH-1: Result in substantial erosion or siltation on or off site.	No Project	LTS	None required.	LTS
	A through E	LTS/B	None required.	LTS/B
	F	LTS	None required.	LTS
Impact HH-2: Result in flooding on or off site.	No Project	NI	None required.	NI
	A through E	LTS/B	None required.	LTS/B
	F	NI/B	None required.	NI/B
Impact HH-3: Impede or redirect flood flows.	No Project	NI	None required.	NI
	A through F	LTS/B	None required.	LTS/B
Noise and Vibration				
Impact NOI-1: Generate a substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	No Project	NI	None required.	NI
	A through F	S	**Mitigation Measure NOI-1:** Implement Feasible Measures to Reduce Construction Noise.	SU
Impact NOI-2: Exposure of person to or generation of excessive ground-borne vibration or ground-borne noise levels.	No Project	NI	None required.	NI
	A through F	LTS	None required.	LTS

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
Transportation				
Impact TR-1: Conflict with program, plan, ordinance or policy addressing the circulation system, including transit and roadway facilities.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure TR-1:** Prepare and Implement a Construction Traffic Control Plan.	LTS
Impact TR-2: Be inconsistent with CEQA Guidelines section 15064.3 subdivision (b) Vehicle Miles Traveled (VMT).	No Project	NI	None required.	NI
	A through F	LTS	None required.	LTS
Impact TR-3: Substantially increase hazards due to a geometric design feature or incompatible uses.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure TR-2:** Enter into a Road Repair Agreement with Tehama County.	LTS
Impact TR-4: Result in inadequate emergency access.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure TR-1:** Prepare and Implement a Construction Traffic Control Plan.	LTS
Utilities and Service Systems				
Impact UTL-1: Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities.	No Project	NI	None required.	NI
	A through F	LTS (m)	**Mitigation Measure UTL-1:** Verify Utility Locations, Coordinate with Affected Utility Providers, Prepare and Implement a Damage Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage.	LTS
Impact UTL-2: Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.	No Project	NI	None required.	NI
	A through F	LTS	None required.	LTS
Impact UTL-3: Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.	No Project	NI	None required.	NI

Impact	Alternative	Impact Significance Before Mitigation	Mitigation Measure	Impact Significance After Mitigation
	A through F	LTS	None required.	LTS
Water Quality				
Impact WQ-1: Violate any water quality standards or waste discharge requirements or create or contribute runoff water that would provide substantial additional sources of polluted runoff.	No Project	LTS	None required.	LTS
	A through F	LTS (m)	**Mitigation Measure WQ-1:** Obtain Appropriate Discharge and Dewatering Permit and Implementation Provisions for Dewatering.	LTS
	A through F	LTS (m)	**Mitigation Measure GEO-1:** Acquire Appropriate Regulatory Permits, Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.	
	A through F	LTS (m)	**Mitigation Measure HAZ-1:** Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities	
Wildfires				
Impact WF-1: Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.	NI	None required.	NI	

Notes:

CDFW = California Department of Fish and Wildlife; CEQA = California Environmental Quality Act; CRHR = California Register of Historic Resources; GHG = greenhouse gas; LTS = less than significant; LTS/B = less than significant/beneficial; LTS (m) = less than significant with mitigation incorporated; NI = no impact; NI/B = no impact/beneficial; NMFS = National Marine Fisheries Service; NOx = nitrogen oxide; NRHP = National Register of Historic Places; PS = potentially significant impact; S = significant impact; SU = significant and unavoidable; USFWS = United States Fish and Wildlife Service

Chapter 1. Introduction

An environmental impact report (EIR) is a document that is required by the State of California (State) to comply with the California Environmental Quality Act (CEQA). A draft EIR is the first review document released as part of the EIR process. Comments received during the draft EIR's public review process are evaluated as part of a final EIR process. The final EIR contains a public agency's response to comments received.

This draft EIR is for the proposed Lower Deer Creek Flood and Ecosystem Improvement Project (proposed project, or project), located along the lower 8 miles of Deer Creek in Tehama County, California, from 2 miles upstream of Red Bridge to the confluence with the Sacramento River and along the lower 2.6 miles of China Slough to its confluence with Deer Creek.

As defined by CEQA, the public agency that has principal authority over carrying out or approving the proposed project is called the lead agency (State CEQA Guidelines Section 15367). The lead agency also has the primary responsibility for determining what level of CEQA review is required for a project and for preparing and approving the appropriate document (e.g., negative declaration, mitigated negative declaration, or EIR).

Pursuant to CEQA (California Public Resources Code [PRC] Section 21000 et seq.), the California Department of Water Resources (DWR) is the lead agency for this proposed project and has the primary responsibility for CEQA compliance during preparation of this EIR (PRC Section 21067). The Deer Creek Watershed Conservancy (DCWC) is the project proponent.

This draft EIR was prepared by FlowWest, an environmental consultant (CEQA Guidelines Section 15084[d][2]), in close coordination with DWR. This draft EIR discloses environmental information concerning the project and invites interested parties to comment on the information presented and the project proposed. This draft EIR also provides detailed information on the potential environmental impacts associated with the proposed project.

1.1 Purpose of the Draft EIR

This draft EIR was prepared in compliance with CEQA guidelines and requirements. It serves as an informational document in the local planning and decision-making process and does not determine whether the project will be implemented. CEQA requires that State and local governmental agencies identify the significant environmental impacts of a project over which they have discretionary authority and avoid or mitigate those impacts, if feasible.

The purpose of this draft EIR is to analyze and disclose the proposed project's potential effects on the surrounding natural and human environment. This report informs decision-makers, public agencies, and the general public of the potential environmental effects of the proposed project, identifies and evaluates reasonable alternatives to the project, and proposes feasible mitigation measures to avoid or reduce the project's significant environmental effects.

This information must be made available for public review and comment prior to the proposed project's approval. In accordance with CEQA and the CEQA Guidelines (California Code of Regulations [CCR] Section 15000 et seq.), DWR will use the information contained in this draft EIR in deciding whether to approve the project. This draft EIR may also be considered by other public agencies when exercising their statutory authority to grant permits and provide approvals.

The CEQA requirement to determine a "significance threshold" for expected impacts presents an important or critical feature of the document. Impacts to be evaluated include those to endangered, threatened, and rare species and their habitat. If an EIR shows that a project has the potential to harm species officially listed under either the Endangered Species Act of 1973 (ESA) or California Endangered Species Act (CESA), the lead agency (DWR for this project) has a mandatory legal obligation to treat that impact as significant and to mitigate, if feasible (CEQA Guidelines Section 15065[a]). Thresholds of significance for other resource topics are developed using applicable regulations, where they exist, or professional judgement.

CEQA requires that an EIR propose mitigation measures for each significant effect of the project, subject to the approval of an agency governed by California law, even where the mitigation measure cannot be adopted by the lead agency. If the proposed project is approved, the lead agency (DWR for this project) will be responsible for ensuring that the implementation, monitoring, and reporting of applicable mitigation measures is properly completed. Where appropriate, DWR may delegate to another public agency or to a private entity responsibilities and tasks associated with implementing the mitigation measures. For the purposes of this document, it is assumed that all proposed mitigation measures are feasible and can be implemented.

1.2 Project Overview

The proposed project is a multi-benefit project that would restore the design flood protection level of the United States Army Corps of Engineers (USACE) levee system on Lower Deer Creek and construct additional flood control infrastructure to contain a 21,000 cubic-feet-per-second (cfs) flood event. The proposed project would also create up to 43 acres of new seasonally inundated floodplain rearing habitat for juvenile salmonids between the Stanford-Vina Ranch Irrigation Company (SVRIC) Dam and Red Bridge. In addition, the proposed project would restore conveyance capacity in China Slough, a remnant distributary channel from Deer Creek. The various project elements are intended to improve flood protection, enhance or create new fisheries habitat, and improve the sediment conditions throughout Lower Deer Creek, thereby reducing the need for extensive in-channel maintenance in the future. These project elements include a combination of levee improvements, bank protection, berm removal, floodway and migration easements, culvert replacement, vegetation removal, and in-channel and floodplain grading. More information about the project purpose, need, and objectives is provided below, and the detailed project description is provided in Chapter 3, "Project Description."

The proposed project was developed in close collaboration with the DCWC and landowners who will directly benefit from the project, as well as several other key stakeholders from local, State, and federal regulatory agencies. Working directly with the landowners whose land would be affected by construction of the project elements has resulted in a proposed project that would achieve flood protection and ecosystem objectives and would be responsive to the need to sustain the working agricultural landscape within the watershed.

1.3 Project Setting

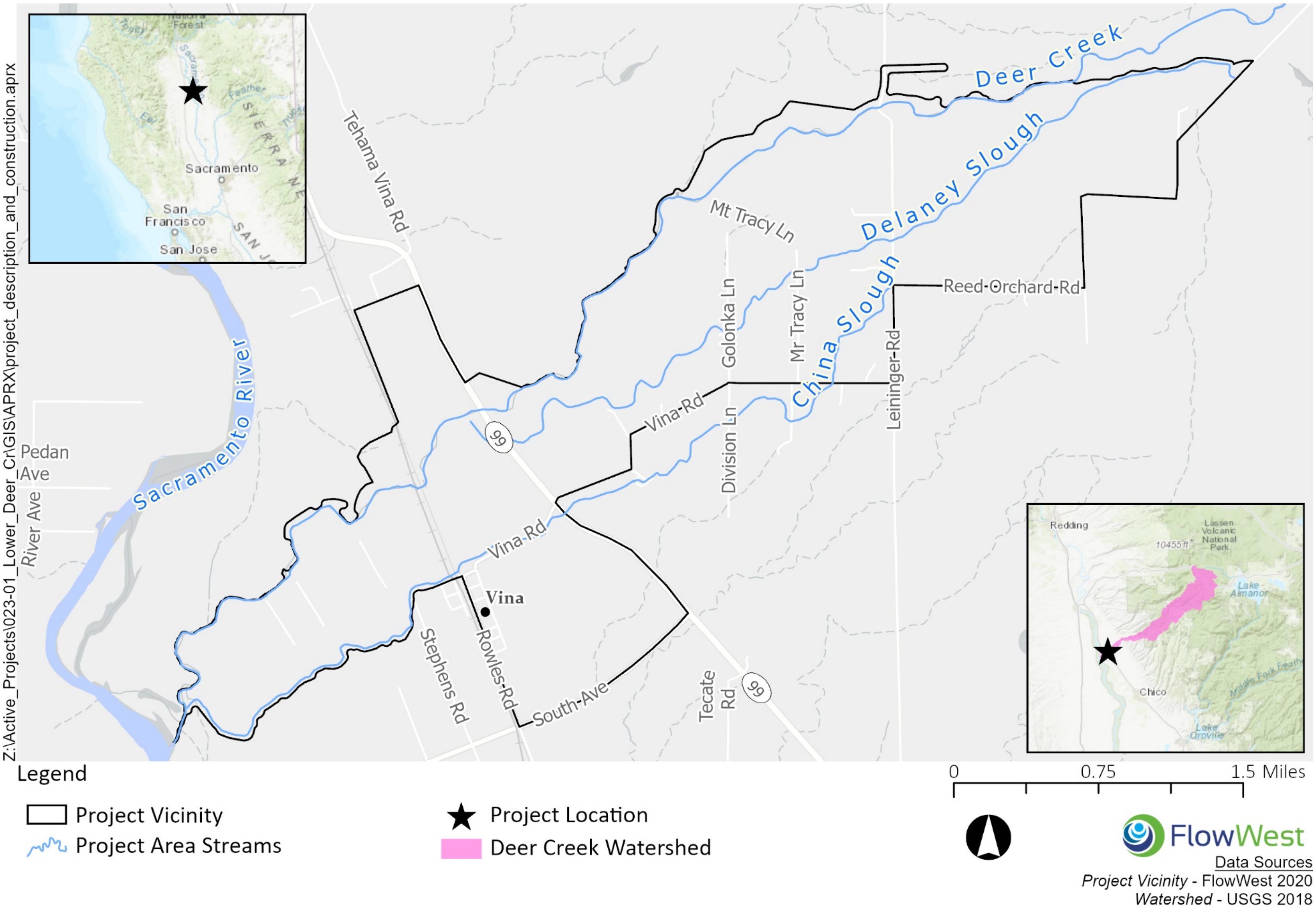
The proposed project would be located along the lower 8 miles of Deer Creek in Tehama County, California, from 2 miles upstream of Red Bridge to the confluence with the Sacramento River, and along the lower 2.6 miles of

China Slough to the confluence with the Sacramento River (see Figure 1-1). Delaney Slough is also located in the project vicinity.

Deer Creek is a tributary to the Sacramento River and drains from Mt. Lassen, flowing south and west through bedrock canyons, across a broad alluvial fan, and along the unincorporated town of Vina before joining the Sacramento River. Deer Creek is bounded by agricultural lands (in use as orchards, row crops, and for cattle grazing), by residences on the north and south banks, and by the town of Vina on the south bank downstream of State Route 99 (SR 99).

Delaney Slough and China Slough, located south of Deer Creek but within its floodplain, are remnant distributary channels from Deer Creek. The sloughs serve as conduits for water on the floodplain from Deer Creek during high flow events (MacWilliams 2004). Both sloughs drain a small watershed area south of Deer Creek within its floodplain (United States Geological Survey 2021).

Figure 1-1 Lower Deer Creek Flood and Ecosystem Improvement Project Location



1.4 Project Purpose, Need, and Objectives

Section 15124(b) of the CEQA Guidelines requires that the EIR contain a clear statement of the project objectives, including the underlying purpose of the project. The project has been formulated to address the purpose, need and objectives, and to be consistent with statewide planning efforts.

1.4.1 Project Purpose

The purpose of the proposed project is to:

- Reduce flood risk to lands adjacent to Deer Creek by improving the flood management system.
- Improve the geomorphic functions of Deer Creek.
- Increase and improve spawning and rearing habitat for protected fish species in Deer Creek.

1.4.2 Project Need

The proposed project is needed to address damaging flooding that impacts farmland and infrastructure along Lower Deer Creek approximately every 5 to 10 years. In 1949, USACE completed a leveed flood-control project on the lower 8 miles of Deer Creek, which separated the creek from its floodplain. The USACE levees were designed to convey a 21,000 cfs storm flow event with 3 feet of vertical freeboard (i.e., the distance from the levee crest down to the water surface elevation in the design storm event). A flow event of 21,000 cfs is approximately equivalent to the 50-year storm event (meaning there is a 1 in 50 chance that a streamflow of 21,000 cfs will occur during any year). Since the construction of the USACE levee system, periodic flooding has occurred as a result of levee failures and overtopping. Flows lower than 21,000 cfs have caused significant damage to levees, diversion structures, bank protection, and other infrastructure, as well as to agricultural lands, along Lower Deer Creek over the past 60 years, including an 11,900 cfs event in 1974, a 12,200 cfs event in 1983, and a 16,100 cfs event in 1986 (Deer Creek Watershed Conservancy 2011). The largest flood in Lower Deer Creek occurred in January 1997 at flows of 24,000 cfs (Deer Creek Watershed Conservancy 2011). This flood event caused numerous levee breaches, damaged bank protection, and resulted in costly damages to infrastructure (United States Army Corps of Engineers 2011). Under existing conditions, there are multiple locations within the Lower Deer Creek flood-control project where the levee freeboard criteria is not met and flows overtop the levee. The proposed project would increase the flood conveyance capacity of Lower Deer Creek by restoring the levee freeboard on the USACE-built levees to design criteria, implementing additional flood protection measures, and managing vegetation.

The proposed project is also needed to address flooding along China Slough. China Slough is a source of localized flooding during high flow events from Sacramento River backwater and flow from Deer Creek. China Slough is currently overgrown with invasive plant species, including Giant Reed *(Arundo Donax)* and Himalayan Blackberry *(Rubus armeniacus)*. During flood events, excess flows from Deer Creek combine with flows in China Slough. These flows pass under a road in the town of Vina near the entrance to the Abbey of New Clairvaux (Abbey), where excessive vegetation and accumulation of sediment cause it to flood the road during high flows. The proposed project would remove this invasive vegetation and restore flood capacity to China Slough.

The proposed project is needed to address existing sediment management problems that affect flood conveyance capacity, cause excessive erosion, and degrade habitat. Because of the narrow, confined nature of the leveed channel, sediment is constrained and unable to move freely under typical flow conditions, thereby reducing the distribution of sediments of different sizes throughout the watershed. In higher flow conditions, sediment is mobilized, consequently creating the scour and erosion issues along the creek corridor. The scour and erosion exacerbate both flood protection and habitat degradation issues. Floodplains are critical to maintaining balance in stream systems, not only for habitat, but because they provide space adjacent to the creek channel to dissipate high energy (and the associated increased flow rates of sediment and water) during flood events. Active in-channel maintenance, dredging, or other activities to remove accumulated sediment have been limited because of regulatory constraints and have not occurred regularly since 1987. As a result, additional sediment has accumulated within the levee corridor and vegetation has established in those areas of sedimentation, further reducing flood conveyance capacity. The proposed project would remove vegetation and restore sediment transport by widening the channel corridor and floodplain.

The proposed project is also needed to address degraded aquatic habitat diversity and complexity, and to restore floodplain habitat for native fish species. Deer Creek is one of only three streams in the Central Valley that still supports a viable, naturally spawning population of federally threatened spring-run Chinook salmon (Lindley et al. 2007). Deer Creek was also recently identified as providing non-natal rearing habitat for the federally endangered winter-run Chinook salmon (Phillis et al. 2018). Because of the leveed channel corridor, much of the floodplain along Deer Creek no longer regularly experiences overbank flows, which has resulted in the elimination, fragmentation, and degradation of floodplain and instream habitat, and has reduced potential rearing habitat for juvenile salmonids. In addition, disturbance of riparian vegetation and the alteration of channel form has degraded habitat diversity, including habitat for spring-run Chinook salmon (Deer Creek Watershed Conservancy 2011). Although some rearing habitat exists in Deer Creek, the existing levee system has effectively eliminated historical floodplain rearing habitat, likely resulting in reduced survival and growth of juvenile salmonids in Deer Creek that has been demonstrated on floodplains in other watersheds (Sommer et al. 2001). The proposed project would address these recurring habitat, ecosystem, and geomorphic issues associated with Deer Creek flows by removing vegetation and widening the channel corridor and floodplain.

1.4.3 Project Objectives

The proposed project is intended to restore the design flood protection level of the USACE-built levees and enhance it with additional flood protection measures based on recent hydrodynamic modeling, including widening the channel, where possible, to restore floodplain connectivity throughout the watershed. By restoring floodplain connectivity, Deer Creek would be enabled in many ways to “self-restore” (Deer Creek Watershed Conservancy 2011), in that “the natural processes of flood overflow, sediment transport, erosion, deposition, native riparian vegetation establishment, and large tree recruitment” would restore channel and habitat complexity in connected riparian and floodplain areas. This approach is also intended to reduce the need for extensive ongoing channel maintenance to preserve flood conveyance capacity. The levee system must be inspected and maintained periodically, but the intent of floodplain restoration is that once connectivity is established, the channel will be self-sustaining and will require little maintenance.

The proposed project objectives are to:

- Improve geomorphic function to increase the potential for more naturally graded sediment composition and related channel form and the development of more diverse and ecologically complex riparian habitat.
- Increase rearing habitat for spring-run Chinook salmon.
- Increase flood conveyance capacity in the Deer Creek watershed and restore USACE levee freeboard conditions for a 21,000 cfs event.
- Minimize levee maintenance requirements, repairs, and costs.
- Minimize flood control-related channel maintenance requirements and costs.
- Minimize impacts to viable agricultural operations for landowners in the proposed project area along Deer Creek.

The project objectives are consistent with statewide planning efforts including the *Central Valley Flood Protection Plan* (CVFPP) (California Department of Water Resources 2020), the *California Water Action Plan* (California Natural Resources Agency 2016), and the *Water Resilience Portfolio* (California Natural Resources Agency 2020), as described below.

1.4.3.1 Central Valley Flood Protection Plan Consistency

The proposed project is well-aligned with the goals and objectives of the CVFPP. The CVFPP was developed to improve flood risk management in the Central Valley. The flood risk objectives identified in the CVFPP 2017 Update (California Department of Water Resources 2017) include improving "flood conveyance capacity and reducing flood stages in the flood management system while improving flood system resiliency and facilitating adaptation to future climate and land use changes" (California Department of Water Resources 2017). The proposed project meets these goals through the restoration of the existing flood control infrastructure, addition of new flood protection measures where needed, and through the installation of additional floodplain area to buffer the impacts of high flows, creating a more naturally flood resilient system. In addition, the CVFPP 2017 Update outlines three "Ecosystem Vitality Outcomes" that the project is set to achieve by reducing stressors related to the channel confinement on the Lower Deer Creek ecosystem, improving the riverine and floodplain habitat for spring-run Chinook salmon and other native species, and increasing the abundance and diversity of native species in floodplain ecosystems.

1.4.3.2 California Water Action Plan Consistency

The *California Water Action Plan* is intended to guide sustainable water management in California. The three primary goals of the plan are "more reliable water supplies, the restoration of important species and habitat, and a more resilient, sustainably managed water resources system (water supply, water quality, flood protection, and environment) that can better withstand inevitable and unforeseen pressures in the coming decades" (California Natural Resources Agency 2016). The proposed project is directly aligned with two of the actions outlined in the plan: #4- "Protect and restore important ecosystems" and #8- "Increase flood protection."

1.4.3.3 Water Resilience Portfolio Consistency

In April 2019, Governor Newsom directed State agencies through Executive Order (EO) N-10-19 to develop a "water resilience portfolio" that included a set of actions to meet California's water needs through the twenty-first century. The portfolio identified actions needed to help California move toward regional water resilience, including measures to "Protect and Enhance Natural Systems." The proposed project is directly aligned with the portfolio action that supports expansion of multi-benefit floodplain projects across the Central Valley, including projects that reduce flood risk and restore historical river and floodplain processes.

1.5 EIR Preparation Process

1.5.1 Overview

An EIR is required by CEQA when the lead agency (DWR for this project) determines that there is substantial evidence that the proposed project may have impacts on the environment. Based on a preliminary evaluation, DWR determined that the project could have a significant effect on the environment and that an EIR should be prepared to analyze those potential environmental impacts.

1.5.2 Notice of Preparation

After determining that an EIR is required for a project, the lead agency must send a notice of preparation (NOP) stating that an EIR will be prepared (CEQA Guidelines Section 15082). The NOP for this draft EIR was circulated from December 9, 2020, to January 11, 2021. To solicit public input on the scope and content of the EIR, the NOP was mailed to appropriate local, State, and federal agencies, a Native American tribe affiliated with the project area, and nearby property owners, as well as emailed to other interested parties (pursuant to PRC 21092.2). The NOP included a general description of the project location, project background, proposed project alternatives, and project description, as well as a summary of the potential environmental impacts of the project. A public EIR scoping meeting was held online on December 15, 2020. Comments received during the comment period were taken into consideration during the preparation of this draft EIR and are summarized in Chapter 7, "Consultation, Coordination, and Outreach."

1.6 Organization of the Draft EIR

This draft EIR is organized into the following chapters:

- Chapter 1. Introduction: This chapter describes the purpose of the EIR, its contents, and the associated EIR review and certification process; provides an overview of the proposed project; and describes the project setting, purpose, need, and objectives.
- Chapter 2. Consistency with Applicable Plans and Policies: This chapter describes the proposed project's consistency with applicable federal, State, and local plans, policies, regulations, and laws.
- Chapter 3. Description of Project Alternatives: This chapter includes a detailed description of the common project elements, the levee setback options under each project alternative, the construction techniques and equipment that would be used, and anticipated maintenance requirements. It also identifies the preferred alternative.
- Chapter 4. Environmental Impact Analysis: This chapter analyzes the potential environmental impacts of the proposed project. Impact discussions are organized by environmental resource topics. Each resource section includes the environmental setting, regulatory setting, significance criteria, and a discussion of potential project-related impacts, including mitigation measures and levels of significance after mitigation measures are incorporated. Justifications are provided for eliminating some resource topics from further discussion. The remaining environmental resource topics that are addressed within this chapter are as follows:
    - Aesthetics
    - Agricultural Resources and Land Use

  - Air Quality
  - Biological Resources — Fish and Aquatic Habitat
  - Biological Resources — Wetlands and Other Waters
  - Biological Resources — Vegetation
  - Biological Resources — Wildlife
  - Cultural and Tribal Cultural Resources
  - Geology, Soils, and Paleontological Resources
  - Greenhouse Gas Emissions and Climate Change
  - Hazards and Hazardous Materials
  - Hydrology, Hydraulics, and Flood Risk Management
  - Noise and Vibration
  - Transportation
  - Utilities and Service Systems
  - Water Quality
  - Wildfires

- Chapter 5. Other CEQA Considerations: This chapter summarizes the potential project-related cumulative impacts to the resource topics evaluated in Chapter 4, the significant and irreversible environmental changes associated with the proposed project, the significant and unavoidable impacts that would remain after implementation of mitigation measures, and evaluates the potential for growth-inducing impacts.
- Chapter 6. Project Alternatives Comparison: This chapter summarizes and compares the potential environmental impacts of the six build alternatives and the "no project" alternative. An environmentally superior alternative is identified, and alternatives initially considered but rejected from further consideration are discussed.
- Chapter 7. Consultation, Coordination, and Outreach: This chapter describes the public scoping process and the agencies, organizations, and Native American tribe that were consulted during preparation of this EIR.
- Chapter 8. List of Preparers: This chapter provides a list of EIR contributors and persons consulted by name and affiliation.

- Chapter 9. References: This chapter includes a list of references that were used in the preparation of this EIR, organized by chapter resource sections.

1.7 Review of the Draft EIR

This draft EIR is being circulated in accordance with PRC Section 21092.2 and will be available for public review for 45 days, pursuant to Section 15105 of the State CEQA Guidelines.

1.7.1 Where to Review the Draft EIR

DWR filed a notice of completion of this draft EIR with the State Office of Planning and Research to begin the public review period (PRC Section 21161) on November 30, 2021. A notice of availability of this draft EIR has been distributed to responsible and trustee agencies and interested parties and is available on DWR's website.

This draft EIR is available for review during the 45-day public review period on the CEQAnet web portal by searching for State Clearinghouse Number 2020120149.

1.7.2 Commenting on the Draft EIR

Agencies, organizations, and interested parties have the opportunity to comment on this draft EIR during the 45-day public review period, from November 30, 2021, to January 14, 2022. Public comments received during this review period will become part of the public record and will be included in the final EIR for consideration by decision-makers. Written comments on the draft EIR must be postmarked no later than 5:00 p.m. on January 14, 2022. Written comments on this draft EIR should be emailed to DWR Environmental Services Section Manager Amy Lyons with the subject line "Lower Deer Creek Flood and Ecosystem Improvement Project Public Comment" or mailed to the following address:

California Department of Water Resources
Attn: Amy Lyons
2440 Main Street
Red Bluff, CA 96080

All comments received by DWR are public records, subject to disclosure under the Public Records Act.

1.7.3 Final EIR

Responses to public comments received on the draft EIR during the 45-day public and agency comment period will be included in the final EIR. Public agencies will be provided a minimum 10-day opportunity to review responses to their comments pursuant to CEQA requirements. DWR will then consider, among other things, the information contained in the final EIR as well as determine the adequacy of the environmental documentation under CEQA. In compliance with CEQA (CCR Section 15090 [CCR 15090]), prior to approving the project, DWR shall certify that (1) the final EIR has been completed in compliance with CEQA; (2) the final EIR was presented to the decision-making body of DWR and that the decision-making body reviewed and considered the information contained in the final EIR prior to approving the project; and (3) the final EIR reflects the lead agency's independent judgment and analysis.

If the project is approved, DWR will file a notice of determination (NOD) with the State Clearinghouse within five days of project approval. This filing will trigger a 30-day period in which a legal challenge to the document may be filed. CEQA requires that a lead agency neither approve nor carry out a project, as proposed, unless the significant environmental effects have been reduced to an acceptable level, or unless specific findings are made attesting to the infeasibility of altering the project to reduce or avoid environmental impacts (CEQA Guidelines Sections 15091, 15092, and 15093). CEQA also requires that decision-makers balance the benefits of a proposed project against its unavoidable environmental risks. If environmental impacts from the proposed project are identified as significant and unavoidable, DWR may still approve the project if it is demonstrated that social, economic, or other benefits of the project outweigh the unavoidable impacts. DWR would then be required to state in writing the specific reasons for approving the project based on information presented in the final EIR, as well as other information in the administrative record for the project. This process is defined as a "Statement of Overriding Considerations" (CEQA Guidelines Section 15093).

1.8 Agency Approvals and Permits

Pursuant to the State CEQA Guidelines (CCR 15124[d]), a number of responsible, trustee, and other affected agencies are anticipated to rely on this draft EIR and related documentation for discretionary actions they may take in conjunction with the proposed project. The responsible and trustee agencies for this project, as well as other public agencies with a non-permitting interest, may include the following State and local agencies and entities:

- California Air Resources Board (CARB)
- California Department of Conservation (DOC)
- California Department of Fish and Wildlife (CDFW)
- California Department of Toxic Substances Control
- California Department of Transportation (Caltrans)
- California Native American Heritage Commission (NAHC)
- California Office of Historic Preservation
- California State Lands Commission
- Central Valley Flood Protection Board (CVFPB)
- Central Valley Regional Water Quality Control Board (CVRWQCB)
- State Water Resources Control Board (SWRCB)
- Tehama County Agricultural Commissioner
- Tehama County Air Pollution Control District (TCAPCD)
- Tehama County Flood Control and Water Conservation District (TCFCWCD)

DWR has also extended the same courtesy afforded to trustee agencies to a Native American tribe affiliated with the project area.

Additionally, this draft EIR may be used by federal, State, and local permitting agencies to support project decisions and to inform their review of the project. Table 1-1 presents a list of agencies and their relevant permits and approvals.

Table 1-1 Anticipated Permits and Approvals for the Lower Deer Creek Flood and Ecosystem Improvement Project

Agency	Potential Approval/Permit
State	
California Department of Fish and Wildlife	• CFGC Section 1602, Lake or Streambed Alteration Agreement. • California Endangered Species Act consultation. • CFGC Section 2081(b) Incidental Take Permit and CFGC Section 2080.1 Determination (if required).
California State Historic Preservation Officer	• Letter of concurrence with USACE via the National Historic Preservation Act (Section 106).
Central Valley Flood Protection Board	• CCR, Title 23 Water Code, Floodway Encroachment Permit • Consultation on related matters associated with project implementation and within CVFPB jurisdiction.
Central Valley Regional Water Quality Control Board	• Federal CWA Section 401 Water Quality Certification. • Porter Cologne Water Quality Control Act Waste Discharge Requirement. • CWA Section 402 NPDES General Permit for Storm-water Discharge associated with construction and land disturbance activities (Construction General Permit),General NPDES Permit under CWA Section 402 for discharging biological and residual pesticides to the waters of the United States for vector control in association with post-construction activities, as needed.

Agency	Potential Approval/Permit
	• Consultation on related matters associated with project implementation and within CVRWQCB jurisdiction.
California State Lands Commission	• State Lands Lease Amendment.
Federal	
United States Fish and Wildlife Service	• ESA Section 7 Consultation (Biological Opinion). • Federal Fish and Wildlife Coordination Act Report.
National Marine Fisheries Service	• ESA Section 7 Consultation (Biological Opinion) • Essential Fish Habitat Conservation Recommendations.
United States Army Corps of Engineers	• CWA Section 404 Permit • RHA Section 14 (33 USC 408) Permission

Notes:

CCR = California Code of Regulations

CFGC = Fish and Game Code

CVFPB = Central Valley Flood Protection Board

CVRWQCB = Central Valley Regional Water Quality Control Board

CWA = Clean Water Act

ESA = Endangered Species Act

NHPA = National Historic Preservation Act

NPDES = National Pollution Discharge Elimination System

RHA = Rivers and Harbors Act of 1899

USACE = U.S. Army Corps of Engineers

USC = United States Code

Chapter 2. Consistency with Applicable Plans and Policies

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 laws and regulations listed below, the proposed project would be in partial compliance at the time of issuance of the draft EIR. Full compliance would be achieved prior to, or at the time of, issuance of the NOD under CEQA. The receipt of federal approvals and/or a signed record of decision 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, a NOD is required to begin securing State permits.

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 the name with a reference to the corresponding USC section.

2.1 Federal Plans, Policies, Regulations, or Laws

2.1.1 Aesthetics

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

2.1.2 Agricultural Resources and Land Use

No federal plans, policies, regulations, or laws related to agricultural resources or land use apply to the alternatives under consideration.

2.1.3 Air Quality

2.1.3.1 Clean Air Act of 1963

The Clean Air Act (CAA) requires the adoption of National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare from the effects of air pollution. As discussed in Section 4.4, “Air Quality,” there are six criteria air pollutants of nationwide concern: ozone, carbon monoxide

(CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead, particulate matter with diameters 10 micrometers and smaller (PM_{10}), and particulate matter with diameters 2.5 micrometers and smaller ($PM_{2.5}$). 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.

The project incorporates mitigation measures to address air quality impacts; but, project construction activities may exceed air quality standards, as discussed in Section 4.4, "Air Quality."

2.1.4 Biological Resources — Fish and Aquatic Habitat

2.1.4.1 Endangered Species Act of 1973

Pursuant to the 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. 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. ESA 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 critical habitat that may be affected by the project was obtained from USFWS in 2018 (see Appendix E, "Biological Resources Assessment"), and impacts are described in Sections 4.5, "Biological Resources — Fish and Aquatic Habitat," 4.7 "Biological Resources — Vegetation" and 4.8 "Biological Resources — Wildlife."

2.1.4.2 Magnuson-Stevens Fishery Conservation and Management Act

NMFS is the lead agency responsible for the Magnuson-Stevens Fishery Conservation and Management Act. Compliance with this act is required once consultation under Section 7 of the federal ESA is underway. Requirements of this act will be met through the Section 7 consultation process in the next phase of the project.

2.1.4.3 Clean Water Act, Section 401

The 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 the EPA as well as the State. CWA Section 401 establishes a requirement that a federal agency may not issue a permit or waiver for any activity that involves the discharge into waters of the United States unless a Section 401 water qualification is issued.

By complying with these laws and obtaining necessary permits, the proposed project would be consistent with the CWA, Section 401.

2.1.4.4 Clean Water Act, Section 402

CWA Section 402 regulates discharges through National Pollutant Discharge Elimination System (NPDES) and State waste discharge requirements (WDRs). By complying with this law and obtaining necessary permits for any discharges into navigable waters during construction of the proposed project, the proposed project would be consistent with the CWA, Section 402.

2.1.4.5 Clean Water Act, Section 404

CWA Section 404 establishes a requirement for a project applicant 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 0.5 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" (Code of Federal Regulations [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 effects 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.

By complying with these laws and obtaining necessary permits, the proposed project would be consistent with the federal CWA, Section 404.

2.1.5 Biological Resources — Wetlands

2.1.5.1 Clean Water Act, Section 401

For more information on the CWA, Section 401, please see the description provided above in Section 2.1.4.3.

2.1.5.2 Clean Water Act, Section 402

For more information on the CWA, Section 402, please see the description provided above in Section 2.1.4.4.

2.1.5.3 Clean Water Act, Section 404

For more information on the CWA, Section 404, please see the description provided above in Section 2.1.4.5.

2.1.6 Biological Resources — Vegetation

2.1.6.1 Endangered Species Act of 1973

For more information on the ESA, please see the description provided above in Section 2.1.4.1.

2.1.6.2 Clean Water Act, Section 401

For more information on the CWA, Section 401, please see the description provided above in Section 2.1.4.3.

2.1.6.3 Clean Water Act, Section 402

For more information on the CWA, Section 402, please see the description provided above in Section 2.1.4.4.

2.1.6.1.4 Clean Water Act, Section 404

For more information on the CWA, Section 404, please see the description provided above in Section 2.1.4.5.

2.1.7 Biological Resources — Wildlife

2.1.7.1 Endangered Species Act of 1973

For more information on the ESA, please see the description provided above in Section 2.1.4.1.

2.1.7.2 Clean Water Act, Section 401

For more information on the CWA, Section 401, please see the description provided above in Section 2.1.4.3.

2.1.7.3 Clean Water Act, Section 402

For more information on the CWA, Section 402, please see the description provided above in Section 2.1.4.4.

2.1.7.4 Clean Water Act, Section 404

For more information on the CWA, Section 404, please see the description provided above in Section 2.1.4.5.

2.1.7.5 Migratory Bird Treaty Act

The Migratory Bird Treaty Act, established in 1918, prohibits the take of protected migratory bird species without prior authorization by the Department of Interior USFWS to ensure the sustainability of populations of all protected migratory bird species.

2.1.8 Cultural and Tribal Cultural Resources

2.1.8.1. National Historic Preservation Act of 1966

Section 106 of the National Historic Preservation Act of 1966 (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, or are eligible for listing, on the National Register of Historic Places (NRHP) (36 CFR 800.16[1]). Undertakings include activities directly carried out, funded, or permitted by federal agencies. Federal agencies must also allow the Advisory Council on Historic Properties to comment on the proposed undertaking and its potential effects on historic properties.

2.1.8.2. National Register of Historic Places

The NRHP is the official list of the United States' historic places worthy of preservation. It was authorized by the NHPA to support public and private efforts to identify, evaluate, and protect America's historic and archaeological resources.

2.1.9 Geology, Soils, and Paleontological Resources

2.1.9.1 Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was established as a long-term earthquake hazard reduction program for the United States. The program is led by the United States Geological Survey (USGS) and National Science Foundation. The goal of the Act is to minimize losses resulting from earthquakes.

The proposed project would comply with the Act by adopting earthquake hazard reduction guidelines by federal, State, and local governments.

2.1.9.2 Federal Emergency Management Agency and Code of Federal Regulations, Title 44, Section 65.10

Section 65.10 describes the information that Federal Emergency Management Agency (FEMA) required in order to recognize in its flood hazard and risk mapping effort those levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards that are consistent with the level of protection sought through floodplain management criteria (Federal Emergency Management Agency 2012). Design of the project would be consistent with FEMA's floodplain management criteria.

2.1.9.3 U.S. Army Corps of Engineers' Engineering Criteria, Technical Letters, and Engineering Regulations

USACE has developed engineering criteria related to incorporating safety into the design of levees. Levees included in the project vicinity are federally authorized and fall within USACE's jurisdiction. USACE technical criteria in the following list would be used as guidance unless noted otherwise.

- Design and Construction of Levees. Engineering Criteria 1110-2-1913. (U.S. Army Corps of Engineers 2000)
- Design Guidance for Levee Underseepage. Engineering Technical Letter 1110-2-569. (U.S. Army Corps of Engineers 2005).
- USACE Process for the National Flood Insurance Program Levee Systems Evaluation. Engineering Circular 1110-2-6067. (U.S. Army Corps of Engineers 2010).
- Earthquake Design and Evaluation for Civil Works Projects. Engineer Regulation 1110-2-1806. (U.S. Army Corps of Engineers 2016).

The levee evaluation for the project area conforms to the engineering criteria established by USACE for assessing and repairing levees.

2.1.10 Greenhouse Gas Emissions and Climate Change

2.1.10.1 Safe Affordable Fuel-Efficient "SAFE" Vehicles Rule

This rule, issued on March 31, 2020, by the National Highway Traffic Safety Administration and EPA, developed energy resources regulations to improve the efficiency of cars and light-, medium-, and heavy-duty vehicles. Project construction would use the appropriate vehicles for construction to minimize energy waste.

2.1.11 Hazards and Hazardous Materials

2.1.11.1 Federal Emergency Planning and Community Right to Know Act of 1986

The Emergency Planning and Community Right-to-Know Act was created in 1986 by the EPA to help communities plan for chemical emergencies. The Act also requires industry to report on the storage, use, and releases of hazardous substances to federal, State, and local governments. This information is used by State and local governments and Indian tribes to prepare for potential risks resulting from chemical emergencies.

The proposed project would report the storage, use, and release of hazardous substances during the construction phase to federal, State, and local governments.

2.1.11.2 Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) was adopted in 1976. The law governs the disposal of solid and hazardous waste. The RCRA is an amendment to the Solid Waste Disposal Act of 1965. Under the RCRA, the solid waste program, hazardous waste program, and underground storage tank program were established.

Construction during the proposed project would involve outlining and following processes in which solid or hazardous waste would be disposed.

2.1.12 Hydrology, Hydraulics, and Flood Risk Management

2.1.12.1 National Flood Insurance Program

The National Flood Insurance Program (NFIP) covers communities that adopt and enforce ordinances that meet or exceed FEMA requirements. Consistency with the NFIP would be achieved through the project's improvement of flood protection.

2.1.12.2 U.S. Army Corps of Engineers Section 408 Permission

The sole authority to grant permission for temporary or permanent alterations of USACE-constructed public works projects, including the Deer Creek Flood Control Project, is contained in Section 14 of the Rivers and Harbors Act of 1899 and codified in 33 USC 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, operation and maintenance (O&M), National Environmental Policy Act requirements, and flood-fighting capabilities, as well as meeting USACE policy and criteria. Engineering Circular 1165-2-216 provides the policies and procedural guidance that USACE districts follow in processing requests.

Section 408 applies to the USACE levee raising and levee setback elements of the project, and consistency will be determined through continued coordination with USACE.

2.1.12.3 U.S. Army Corps of Engineers Design and Construction of Levees Manual

The USACE *Design and Construction of Levees Manual* outlines design and construction requirements for levees that are constructed, reconstructed, raised, enlarged, or modified within floodways (U.S. Army Corps of Engineers 2000).

2.1.13 Noise and Vibration

2.1.13.1 Federal Noise Control Act of 1972

The EPA 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. The proposed project would follow the guidelines for noise set by the EPA.

2.1.13.2 Federal Transit Administration Guidelines for Assessing Groundborne Vibration

The Federal Transit Administration (FTA) (Federal Transit Administration 2018) developed guidelines for assessing the significance of vibration produced by transportation sources and construction activity. To address human response (annoyance) to ground-borne vibration, the FTA has established maximum-acceptable vibration thresholds for different land uses. These guidelines recommend 72 vibration decibels (dB) for residential uses and buildings where people normally sleep when the source of vibrations is frequent in nature. FTA guidelines also provide criteria for ground-borne vibration effects with respect to building damage during construction activities (Federal Transit Administration 2018). 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.

2.1.14 Transportation

No federal plans, policies, regulations, or laws related to transportation apply to the alternatives under consideration.

2.1.15 Utilities and Service Systems

No federal plans, policies, regulations, or laws related to utilities and service systems apply to the alternatives under consideration.

2.1.16 Water Quality

2.1.16.1 Clean Water Act, Section 303(d)

Section 303(d) of the CWA authorizes the EPA to assist States, territories, and authorized tribes in listing impaired waters and developing total maximum daily loads for these waterbodies.

2.1.16.2 Clean Water Act, Section 401

For more information on the CWA, Section 401, please see the description provided above in Section 2.1.4.3.

2.1.16.3 Clean Water Act, Section 402

For more information on the CWA, Section 402, please see the description provided above in Section 2.1.4.4.

2.1.16.4 Clean Water Act, Section 404

For more information on the CWA, Section 404, please see the description provided above in Section 2.1.4.5.

2.1.17 Wildfires

No federal plans, policies, regulations, or laws related to wildfires apply to the alternatives under consideration.

2.2 State Plans, Policies, Regulations, and Laws

2.2.1 Aesthetics

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

2.2.2 Agricultural Resources and Land Use

2.2.2.1 California Land Conservation Act of 1965 (Williamson Act)

The Williamson Act is one of California'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 contract initial terms are required to be a minimum 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 to not renew the contract. In return, the landowner is guaranteed a relatively stable tax rate, based on the value of the land for agricultural or open space use only, which is unaffected by its development potential.

The Williamson Act addresses "compatible" uses. CCR 51238.1 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 in Section 4.3, "Agricultural Resources and Land Use," the proposed project would comply with the

Williamson Act by following appropriate procedures to cancel Williamson Act contracts (if cancellation is necessary) and would implement additional mitigation if determined to be necessary.

2.2.2.2 California Farmland Mapping and Monitoring Program

Under the DOC, this program produces maps and statistical data used for analyzing impacts on California's agricultural resources. Agricultural land is rated according to soil quality and irrigation status, with the best quality land classified as Prime Farmland. The maps are updated every two years with the use of a computer mapping system, aerial imagery, public review, and field reconnaissance (California Department of Conservation 2021).

Farmland impacts are described in Section 4.3, "Agricultural Resources and Land Use." The proposed project would conflict with laws that protect important farmland.

2.2.3 Air Quality

2.2.3.1 California Air Resources Board — Airborne Toxic Control Measures

CARB is responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. CARB also establishes passenger vehicle fuel specifications. Airborne toxic control measures (ATCMs), including the following relevant measures, are implemented to address sources of toxic air contaminants (TACs):

- ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater.
- ATCM to Limit Diesel-Fueled Commercial Motor Vehicle Idling.
- ATCM to Reduce Particulate Emissions from Diesel-Fueled Engines — Standards for Non-vehicular Diesel Fuel.
- ATCM for Stationary Compression Ignition Engines.

2.2.3.1 California Clean Air Act

The TCAPCD is responsible for air quality planning and development of the air quality plan for all of Tehama County, which encompasses the entire proposed project area. The TCAPCD air quality plan establishes the strategies used to achieve compliance with the NAAQS and State Ambient Air Quality Standards in all areas within the TCAPCD jurisdiction. TCAPCD, 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, odors within its jurisdiction, and the Sacramento federal nonattainment areas of ozone and $PM_{2.5}$. Authority to construct would be requested from TCAPCD prior to the start of project implementation, which would ensure compliance with the California CAA.

2.2.4 Biological Resources — Fish and Aquatic Habitat

2.2.4.1 California Endangered Species Act

CESA directs State agencies to not 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. CESA also states that reasonable and prudent alternatives shall be developed by CDFW, together with the project proponent and any State lead agency, that are consistent with conserving the species, while also maintaining the project purpose to the greatest extent possible.

With implementation of the mitigation measures included in Section 4.5, "Biological Resources — Fish and Aquatic Habitat," Section 4.6, "Biological Resources — Vegetation," and Section 4.7, "Biological Resources — Wildlife," the proposed project would be in compliance with CESA.

2.2.4.2 California Fish and Game Code Section 1602

Section 1602 requires an entity to notify the 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.

CDFW would require a streambed alteration agreement prior to construction of the proposed project. This agreement would be obtained prior to construction and all agreement terms and conditions would be complied with during construction.

2.2.4.3 Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act was created in 1969, and requires regional water quality control boards to develop basin plans and water quality objectives. 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. CEQA requires that environmental analyses consider the impact of projects on water quality.

Section 4.17, "Water Quality," identifies potentially significant impacts related to waste discharges and provides mitigation to reduce these potential impacts to a less-than-significant level. All CVRWQCB requirements would be complied with during project implementation.

2.2.5 Biological Resources — Wetlands and Other Waters

2.2.5.1 California Fish and Game Code Section 1602

For more information on California Fish and Game Code (CFGC) Section 1602, please see the description provided above in Section 2.2.4.2.

2.2.5.2 Porter-Cologne Water Quality Control Act

For more information on the Porter-Cologne Water Quality Control Act, please see the description provided above in Section 2.2.4.3.

2.2.6 Biological Resources — Vegetation

2.2.6.1 California Endangered Species Act

For more information on CESA, please see the description provided above in Section 2.2.4.1.

2.2.6.2 California Fish and Game Code Section 1602

For more information on the CFGC Section 1602, please see the description provided above in Section 2.2.4.2.

2.2.6.3 Porter-Cologne Water Quality Control Act

For more information on the Porter-Cologne Water Quality Control Act, please see the description provided above in Section 2.2.4.3.

2.2.7 Biological Resources — Wildlife

2.2.7.1 California Endangered Species Act

For more information on CESA, please see the description provided above in Section 2.2.4.1.

2.2.7.2 California Fish and Game Code Section 1602

For more information on the CFGC Section 1602, please see the description provided above in Section 2.2.4.2.

2.2.7.3 California Fish and Game Code, Fully Protected Species

Four sections of the CFGC — Sections 3511, 4700, 5050, and 5515 — list a total of 37 fully protected species. These statutes prohibit take or possession of fully protected species. With implementation of the mitigation measures included in Section 4.8, "Biological Resources — Wildlife," the proposed project would be in compliance with Sections 3511, 4700, 5050, and 5515 of the CFGC.

2.2.7.4 California Fish and Game Code, Protection of Bird Nests and Raptors

Section 3503 of the CFGC states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird and any raptors (i.e., species in the orders Falconiformes and Strigiformes), including their nests or eggs. With implementation of the mitigation measures included in Section 4.8, "Biological Resources — Wildlife," the proposed project would be in compliance with Section 3503 of the CFGC.

2.2.7.5 Porter-Cologne Water Quality Control Act

For more information on the Porter-Cologne Water Quality Control Act, please see the description provided above in Section 2.2.4.3.

2.2.8 Cultural and Tribal Cultural Resources

2.2.8.1 California Assembly Bill 52

Assembly Bill (AB) 52 (enacted in 2015) 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 also required amendments to CEQA related to Tribal consultation and Tribal cultural resources, which were adopted in 2016.

DWR had no notification requests pursuant to AB 52 for the project area. DWR and California Natural Resource Agency (CNRA) do, however, have tribal engagement policies (see California Natural Resources Agency — Tribal Consultation Policy).

2.2.8.2 California Health and Safety Code 7050.5

California Health and Safety Code 7050.5 prohibits the disturbance of any human remains in or from any location other than a dedicated cemetery without authority of law. The general provisions also state that in the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area until the county coroner has made their determination.

2.2.8.3 California Native American Historical, Cultural, and Sacred Sites Act

The California Native American Historical, Cultural, and Sacred Sites Act applies to both State and private lands. The Act requires that upon discovery of human remains, that construction or excavation activity cease and that the county coroner be notified. If the remains are of a Native American, the coroner must notify the NAHC. The NAHC then notifies those persons most likely to be descended from the Native American's remains. The Act stipulates the procedures the descendants may follow for treating or disposing of the remains and associated grave goods. The project has incorporated mitigation measures to ensure protection of human remains in the event they are discovered, which are described in Section 4.9, "Cultural and Tribal Cultural Resources."

2.2.8.4 California Native American Graves Protection and Repatriation Act

The California Native American Graves Protection and Repatriation Act was adopted in 2001, and requires all agencies and museums that receive State funding that have possession or control over collections of California Native American human remains or cultural items, as defined, to inventory those remains and items for the identification and repatriation of the items to the appropriate Indian tribes.

2.2.8.5 California Natural Resources Agency — Tribal Consultation Policy

On September 19, 2011, Governor Edmund G. Brown, Jr., issued EO B-10-11, which provides, among other things, that it is the policy of the administration that every State agency and department subject to executive control to implement effective government-to-government consultation with California Indian Tribes. Key components of the CNRA Tribal Consultation Policy are outreach, designated tribal liaisons, a tribal liaison committee, access to contact information, and training for employees implementing this policy. DWR reached out to the one tribe identified by NAHC as geographically associated with the project area pursuant to this engagement policy.

2.2.8.6 California Register of Historical Resources

The California Register of Historical Resources (CRHR) established a list of those properties which are to be protected from substantial adverse change (PRC Section 5024.1). A historical resource may be listed in the CRHR if it meets any of the following criteria:

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

Similar to the criteria requirements of the National Register, a resource must meet one of the above criteria and retain integrity. The CRHR uses the same seven aspects of integrity as the National Register. The CRHR includes properties that are listed or have been formally determined to be eligible for listing in the National Register, State Historical Landmarks, and eligible Points of Historical Interest. Other resources require nomination for inclusion in the CRHR. These may include resources contributing to the significance of a local historic district, individual historical resources, historical resources identified in historic resource surveys conducted in accordance with State Historic Preservation Office procedures, historic resources or districts designated under a local ordinance consistent with State Historical Resources Commission procedures, and local landmarks or historic properties designated under local ordinance.

A cultural resources sensitivity analysis report was prepared for the proposed project by Horizon Water and Environment, LLC in April 2019. The report utilizes the CRHR for the analysis.

2.2.8.7 Native American Heritage Commission and California Public Resources Code Requirements

The 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 PRC 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.

Section 21084.3 identifies mitigation measures that include avoidance and preservation of tribal cultural resources and treating tribal cultural resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource. The project has incorporated mitigation measures to ensure protection of tribal cultural resources, which are described in Section 4.9, "Cultural and Tribal Cultural Resources."

2.2.9 Geology, Soils, and Paleontological Resources

2.2.9.1 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 proposed project would not entail the construction of any structures designed for human occupancy, and there are no active faults within 5 miles of the project area.

2.2.9.2 Central Valley Flood Protection Board Levee Standards (California Code of Regulations Title 23, Division 1, Article 8, Sections 111–137)

The CVFPB levee standards govern the design and construction of encroachments which affect the flood control works and floodways and are used by the board for the regulation of encroachments. The standards apply to any work within the limits of, or which can affect, any authorized flood control project or any adopted plan of flood control. These standards also provide the public with information needed to prepare and submit encroachment applications to the board.

Construction of the levee setbacks and improvements for the proposed project would abide by the standards set forth in CCR Title 23 (23 CCR), Division 1, Article 8, Sections 111-137.

2.2.9.3 National Pollutant Discharge Elimination System and Stormwater Pollution Prevention Plans

A stormwater pollution prevention plan (SWPPP) is required to obtain an NPDES permit. SWPPPs help the EPA to preserve and improve water quality. SWPPPs are site-specific documents that identify the site activities and conditions and steps that would be taken to prevent the discharge of any unpermitted pollution. A SWPPP would be prepared by the contractor for the project to comply with NPDES.

2.2.9.4 Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was established in 1990, and directs the Department of Conservation, California Geological Survey to identify and map areas prone to earthquake hazards of liquefaction, earthquake-induced landslides and amplified ground shaking (California Department of Conservation 2021). The act established a mapping program for areas that have the potential for liquefaction, landslide, strong ground shaking, or other earthquake and geologic hazards. The act also specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils. The risk of geologic hazards is analyzed in Section 4.10, "Geology, Soils, and Paleontological Resources."

2.2.10 Greenhouse Gas Emissions and Climate Change

2.2.10.1 California Assembly Bill 32, the Global Warming Solutions Act

AB 32 sets the overall goals for reducing California's greenhouse gas (GHG) emissions to 1990 levels by 2020. Senate Bill (SB) 32 codified an overall goal for reducing California's GHG emissions to 40 percent below 1990 levels by 2030. EOs S-3-05 and B-16-2012 further extend this goal to 80 percent below 1990 levels by 2050. CARB has completed rulemaking to implement several GHG emission reduction regulations and continues to investigate the feasibility of implementing additional GHG emission reduction regulations. These include the low-carbon fuel standard, which reduces GHG emissions associated with fuel usage, and the renewable portfolio standard, which requires electricity suppliers to increase the amount of electricity generated from renewable sources to 33 percent by 2020 and 50 percent by 2030.

CARB approved the first update to the AB 32 Scoping Plan on May 22, 2014 (California Air Quality Resources Board 2014). This update defines climate change priorities for the next 5 years and also sets the groundwork to reach long-term goals set forth in EOs S-3-05 and B-16-2012. The update also highlights California's progress toward meeting the near-term 2020 GHG emission reduction goals and evaluates how to align the State's longer term GHG reduction strategies with other State policy priorities for water, waste, natural resources, clean energy, transportation, and land use. CARB updated the Scoping Plan to reflect progress since 2005, additional reduction measures, and plans for reductions beyond 2020. CARB released and adopted a 2017 Scoping Plan Update (California Air Quality Resources Board 2017) to reflect the 2030 target set by EO B-30-15 and codified by SB 32.

Emissions from project construction would be consistent with AB 32.

2.2.10.2 California Senate Bill 32

The California Global Warming Solutions Act of 2006 designates CARB as the State agency charged with monitoring and regulating sources of emissions of greenhouse gases. CARB is required to approve a statewide GHG emissions limit equivalent to the statewide GHG emissions level in 1990 to be achieved by 2020 and to adopt rules and regulations in an open public process to achieve the maximum, technologically feasible, and cost-effective GHG emissions reductions.

2.2.10.3 California Senate Bill 100

SB 100 updated the Renewable Portfolio Standard in 2018 to require 50 percent renewable resources by the end of 2026, 60 percent by the end of 2030, and 100 percent renewable energy and zero carbon resources by 2045.

Construction for the proposed project would comply with SB 100 by quantifying and sharing energy use with the State of California.

2.2.10.4 California Senate Bill 350

SB 350 established a California GHG reduction target of 40 percent below 1990 levels and sets a renewable portfolio goal of 50 percent by 2030, along with encouraging energy efficiency savings and electrification of transportation.

Construction for the proposed project would comply with SB 350 by quantifying and sharing GHG use with the State of California.

2.2.10.5 California's 2017 Climate Change Scoping Plan

The California 2017 Climate Change Scoping Plan was adopted by CARB, setting a goal to reduce GHG emissions to an additional 40 percent below 1990 levels by 2030, under SB 32's requirements. The plan details the State's strategy for achieving the State's GHG targets, and includes energy-related goals and policies. Emissions from project construction would be consistent with California's 2017 Climate Change Scoping Plan.

2.2.10.6 Executive Order B-55-18

EO B-55–18 signed by Governor Brown set a goal of statewide carbon neutrality by 2045 and net negative emissions thereafter. Energy resource-related regulations, policies, and plans at the State level require the regular analysis of energy data and developing recommendations to reduce statewide energy use and setting requirements on the use of renewable energy sources.

Construction for the proposed project would comply with EO B-55-18 by quantifying and reporting energy use to the State of California.

2.2.10.7 Executive Order S-3-05

EO S-3-05 established specific GHG targets for California, which include reducing California emission levels in 2010 to 2000 levels, 2020 to 1990 levels, and 2050 to 80 percent below 1990 levels.

2.2.11 Hazards and Hazardous Materials

2.2.11.1 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), prescribed 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. Natural gas facilities within the project area will be handled in accordance with this regulation during project implementation.

There are no known wells in the proposed project area. But, if any are encountered, the project proponent will ensure compliance with Section 1723.1 for project safety.

2.2.11.2 California Government Code Section 65962.5 (Cortese List)

California Government Code Section 65962.5 requires the California Environmental Protection Agency (CalEPA) to develop an updated Hazardous Waste and Substances Sites (Cortese) List at least once per year. The Cortese list is mostly developed by the California Department of Toxic Substances Control under CalEPA. The list is used as a planning document by agencies and developers to comply with CEQA requirements.

The Cortese list was used to determine if any hazardous waste or substances are known to occur in the proposed project area.

2.2.11.3 California Hazardous Waste Control Act

The Hazardous Waste Control Act was enacted in 2014 to establish regulations that ensure generators of hazardous waste employ technology and management practices for the safe handling, treatment, recycling, and destruction of hazardous wastes prior to disposal (Justia 2014).

The proposed project would follow regulations for the disposal of hazardous wastes as outlined in the Hazardous Waste Control Act during the construction phase.

2.2.11.4 Hazardous Substances Account Act

The Hazardous Substances Account Act was enacted in 2017 to establishes a program to provide for releases of hazardous substances, compensate persons for out-of-pocket medical expenses, lost wages, or business income resulting from injuries caused by exposure to releases of hazardous substances. The program also makes available funds to permit the State of California to assure payment of its 10 percent share of costs mandated pursuant to Section 104(c)(3) of the federal act (42 USC Section 9604[c][3]).

The proposed project would follow procedures to comply with the Hazardous Substances Account Act should the release of hazardous substances result in the need for compensation.

2.2.11.5 Public Resources Code Sections 4201–4204

PRC 4201 through 4204 direct CalFire to classify lands within State responsibility areas in accordance with the severity of fire hazard present for the purpose of identifying measures to be taken to retard the rate of spreading and to reduce the potential intensity of uncontrolled fires that threaten to destroy resources, life, or property. Fire hazard severity zones (FHSZ) indicate what type of mitigation strategies are applied to reduce wildland fire risk. The majority of the proposed project area is located in a local responsibility area (LRA) designated as a Non-Very High FHSZ. A small portion of the proposed project area is located in a State-responsibility area designated as a Moderate FHSZ. Potential exposure of people and structures to wildland fire hazards is discussed in Chapter 4.18, "Wildfires."

2.2.12 Hydrology, Hydraulics, and Flood Risk Management

2.2.12.1 2012 Central Valley Flood Protection Plan (CVFPP) and CVFPP 2017 Update

The CVFPP was developed to improve flood risk management in the Central Valley. The flood risk objectives identified in the CVFPP 2017 Update (California Department of Water Resources 2017) include improving "flood conveyance capacity and reducing flood stages in the flood management system, while improving flood system resiliency and facilitating adaptation to future climate and land use changes" (California Department of Water Resources 2017).

The 2012 CVFPP and CVFPP 2017 Update serve as the State Plan of Flood Control. The CVFPP provides a comprehensive framework for system-wide management and flood risk reduction planning for the Sacramento and San Joaquin River Basins. The CVFPP identifies the original level of flood that levees were built to, which is derived from the USACE levee design criteria.

The CVFPP applies to the project goals, objectives, design, implementation, and impact analysis, including guidance for improvements to rural-agricultural levees.

2.2.12.2 California Code of Regulations Title 23

23 CCR outlines permit applications, quarterly reports, and trade secret request requirements to regulate underground tanks.

2.2.13 Noise and Vibration

2.2.13.1 California Department of Transportation, Transportation and Construction Vibration Guidance Manual

This manual provides practical guidance to engineers, planners, and consultants who must address vibration issues with the construction, operation, and maintenance of Caltrans projects.

2.2.13.2 California Department of Transportation Guide for the Preparation of Traffic Impact Studies

This guide was published in 2002 to outline the Caltrans requirements for traffic impact studies. The guide also provides guidance for Caltrans staff who review local development and land use change proposals as well as inform local agencies of the information needed for Caltrans to analyze the traffic impacts to State highway facilities.

2.2.13.3 California Public Utilities Commission

The California Public Utilities Commission regulates privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies, in addition to authorizing video franchises.

2.2.14 Utilities and Service Systems

2.2.14.1 California Integrated Waste Management Act

The California Integrated Waste Management Act (AB 939, Sher, Chapter 1095, Statutes of 1989, as amended) made all California cities, counties, and regional solid waste management agencies responsible for planning and implementing diversion of solid waste from solid waste disposal facilities. The California Department of Resources Recycling and Recovery (CalRecycle) provides regulatory oversight of solid waste management facilities and assists local governments in developing and implementing the mandates and subsequent legislation. Also, activities involving removal and disposal of sediments within irrigation and flood control facilities or the use of inert materials in levee or flood control work by federal, State, or local governments may be excluded from solid waste permitting by CalRecycle Tiered Regulatory Placement criteria for construction and demolition waste and inert debris disposal. However, these activities would require permitting by the Regional Water Quality Control Boards in implementing CWA, Section 401, and SWRCB requirements for dredging, filling, and disposal of dredge wastes (State Water Resources Control Board 2021a).

The project will comply with this act through proper permitting and through proper disposal of construction-related waste.

2.2.14.2 CalOSHA Title 8: Section 1541

This policy requires that subsurface installations be identified and marked prior to excavation activities. The excavator must receive a response from all known owners or operators of subsurface installations and must meet with owners or operators of high-priority subsurface installations (such as high-pressure pipelines, natural gas/petroleum pipelines, electrical lines greater than 60,000 volts) within 10 feet of the proposed excavation before opening the excavation. Only qualified persons (persons who meet training and competency requirements) can perform subsurface installation locating activities. All proposed employees must be trained in excavator notification or excavation activities. Excavators must immediately notify the subsurface installation owner or operator of any damage discovered during or caused by excavation activities. Proposed construction activities would comply with this policy.

2.2.14.3 Protection of Underground Infrastructure (California Government Code, Section 4216)

Utility locator qualification requirements are published under California Government Code 4216, which require that only a qualified person shall perform subsurface locating activities (Section 4216.3) and a qualified person performing subsurface installation locating activities on behalf of a subsurface installation operator shall use a minimum of a single-frequency utility locating device and shall have access to alternative sources for verification if necessary (Section 4216.3).

The proposed project will comply with this California Government Code before construction to ensure all subsurface activities do not damage utilities.

2.2.15 Water Quality

2.2.15.1 California Fish and Game Code Section 1602

For more information on CFGC Section 1602, please see the description provided in Section 2.2.4.2.

2.2.15.2 California State Antidegradation Policy

The California State Antidegradation Policy applies to the disposal of waste to high-quality surface water and groundwater. This policy requires that the quality of existing high-quality water be maintained unless the State finds that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in policies as of the date on which such policies became effective (State Water Resources Control Board 2021b). Proposed construction activities would comply with this policy.

2.2.15.3 California Toxics Rule (40 CFR Part 131)

Implemented in April 2000, the California Toxics Rule set a water quality criteria baseline for certain toxic pollutants to protect the environment under the CWA, including inland surface waters, enclosed bays, and estuaries in California that are subject to regulation pursuant to CWA Section 303(c).

Through Section 401 Water Quality Certification and by seeking an NPDES permit, the proposed project would comply with the California Toxics Rule.

2.2.15.4 Porter-Cologne Water Quality Control Act

For more information on the Porter-Cologne Water Quality Control Act, please see the description provided in Section 2.2.4.3.

2.2.15.5 Water Quality Control Plan for the Sacramento and San Joaquin River Basins

The CVRWQCB is responsible for preparing and updating the Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins (Central Valley Regional Water Quality Control Board 2018). 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 area 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 objects are often precursors to numeric objectives. The primary methods 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 mitigation measures described in Chapter 4.10, "Geology, Soils, and Paleontological Resources," and Chapter 4.17, "Water Quality," the proposed project would comply with all CVRWQCB requirements, including those contained in the Basin Plan.

2.2.15.6 General Waste Discharge Requirements/NPDES Permit for Limited Threat Discharges to Surface Waters (Order R5-2016-0076-01)

Order R5-2016-0076-01 outlines the type of dischargers that are subject to WDR's as set forth in the General Order. Any construction-related discharges would comply by obtaining an NPDES permit.

2.2.16 Wildfires

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

2.3 Local Plans, Policies, Regulations, and Laws

It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature. Although DWR may comply with these local regulations, it is not required to comply. The following plans, policies, regulations, and laws are presented for information purposes.

2.3.1 Tehama County General Plan

The *Tehama County General Plan Update 2009-2029* (Tehama County

General Plan) includes regulations or ordinances related to the resource topics evaluated in Chapter 4, "Environmental Impact Analysis." Specific General Plan policies are described, where relevant, in the regulatory setting section for each resource topic in Chapter 4.

2.3.2 Tehama County Zoning

The project area includes parcels zoned as Agricultural, Upland District (AG-1) and Agricultural, Valley District (AG-2) according to the Tehama County Municipal Code. The purpose of the AG-1 district classification is to implement the Upland Agriculture lands designation (of the land use element of the Tehama County General Plan [2009]) by recognizing lands capable of supporting grazing activities; providing for areas of intensive and extensive agriculturally compatible uses; identifying and conserving areas of important open space, recreation, scenic, and natural value; and accommodating the use of land for compatible non-agricultural uses including commercial recreation, hunting and fishing, resource protection and management, and habitat management.

As a compatible non-agricultural use, the proposed project's land use would be consistent with uses in an AG-1 district.

The purpose of AG-2 is to implement the Valley Floor Agriculture (VFA) lands designation (of the land use element of the Tehama County General Plan [2009]) by recognizing lands that are suited for, and are appropriately retained for, the production of orchard and field crops.

The portions of the project proposed on land zoned AG-2 likely would need to be rezoned or would require the acquisition of a use permit for consistency with the Tehama County zoning ordinance.

2.3.3 Other Local Plans and Policies

2.3.3.1 Tehama County CEQA Planning and Permitting Handbook

The *Tehama County CEQA Planning and Permitting Handbook* is prepared by the TCAPCD. The handbook outlines guidelines for assessing potential air quality impacts from residential, commercial, and industrial development, as well as permits required by the TCAPCD. Consistency with *the Tehama County CEQA Planning and Permitting Handbook* is discussed in detail in the resource impact sections, in particular in Section 4.4, "Air Quality."

2.3.3.2 Northern Sacramento Valley Planning Area 2018 Triennial Air Quality Attainment Plan

The 2018 triennial update of the *Northern Sacramento Valley Planning Area Air Quality Attainment Plan* (2018 Plan) assesses the progress made in implementing the previous triennial update and proposes modifications to the strategies necessary to attain the California Ambient Air Quality Standards (CAAQS) by the earliest practicable date. The 2018 Plan includes an assessment of progress toward achieving the control measure commitments in the previous triennial plan, a summary of the last three years of ozone data, a comparison of the expected versus actual emission reductions for each measure committed to in the previous triennial plan, updated control measure commitments, and updated growth rates of population, industry, and vehicle related emissions.

2.3.3.4 Tehama County Transportation Commission

The Tehama County Transportation Commission (TCTC) is the designated Regional Transportation Planning Agency, as established by Government Code 29535. The TCTC is responsible for area-wide transportation planning in Tehama County, and is responsible for preparation of the regional transportation plan.

All project-related traffic would be consistent with the regional transportation plan.

2.3.3.5 Society of Vertebrate Paleontology Professional Paleontological Standards

The Society of Vertebrate Paleontology (1995, 1996), a national scientific organization of professional vertebrate paleontologists, established standard guidelines that outline acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, specimen preparation, analysis, and curation. Most practicing professional paleontologists in the nation adhere to the Society's assessment, mitigation, and monitoring requirements, as specifically spelled out in its standard guidelines. Consistency with the Society of Vertebrate Paleontology Professional Paleontological Standards is described in more detail in Section 4.10, "Geology, Soils, and Paleontological Resources."

Chapter 3. Descriptions of Project Alternatives

The alternatives evaluated in this draft EIR include a no project alternative and six project (i.e., build) alternatives. Each alternative is described below.

3.1 No Project Alternative

Under the no project alternative, no changes to Lower Deer Creek hydrology or surface-water management would occur. Construction activity would be limited to emergency bank stabilization needed to maintain the levees as is. No other construction activity would occur as a result of the no project alternative. Channel maintenance would continue to be hindered by regulatory constraints. The consequences of the no project alternative are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

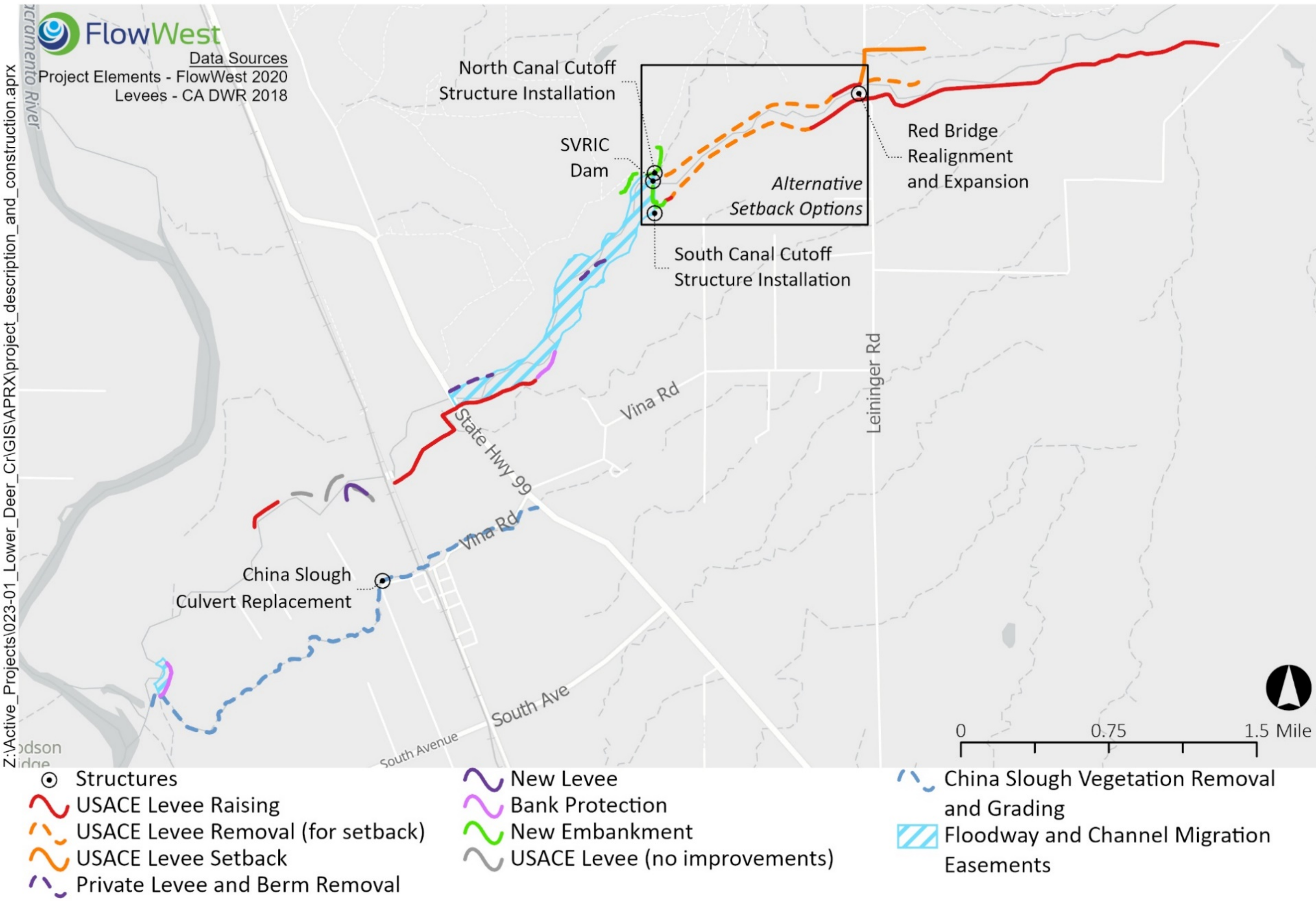
3.2 Alternatives A through F

The six project alternatives are referred to as Alternatives A through F. All six alternatives share common project elements, and each of the six includes a different levee setback option. Section 3.2.1 discusses common project elements; Section 3.2.2 discusses the six different levee setback options.

3.2.1 Common Project Elements

A number of project elements along approximately 8 miles of Lower Deer Creek are common to all project alternatives. These common project elements include levee setbacks and improvements, channel migration and floodway easements, enhanced flood protection in irrigation sloughs, and other ecosystem restoration and flood protection actions. All common elements described below are shown in Figure 3-1, unless otherwise noted.

Figure 3-1 Project Elements Common to Alternatives A through F



3.2.1.1 USACE Levee Raising

USACE levees would be raised as needed throughout the proposed project area to achieve the design criteria of 3 feet of freeboard at the 50-year flow of 21,000 cfs. Freeboard is the distance between the top of the levee and the maximum water surface elevation for the design flow event. Previous hydraulic modeling analysis shows a lack of sufficient freeboard throughout much of the project area. A more detailed discussion of the analysis and findings related to freeboard are presented in Appendix F, "Hydrodynamic Modeling Report."

The raised, fixed-in-place USACE levees would include:

- A 990-foot-long section on the north bank of Deer Creek.
- A 5,420-foot-long section south of Deer Creek which crosses SR 99.
- An 11,620-foot-long section of levee along the south bank of Deer Creek from downstream of Red Bridge to approximately 2 miles upstream of the bridge.
- A 770-foot-long section on the north bank and west of the Red Bridge.
- Height adjustments in the setback reach, described in Section 3.2.2.

The design cross-section would comply with USACE design guidance for levees with a 12-foot crest width and 3-foot-horizontal to 1-foot-vertical ratio (3H:1V) side slopes, meaning that for every 3 feet of horizontal distance along the ground, the height of the levee would increase 1 foot. 3H:1V slopes are the steepest slopes that allow for maintenance activities and walking inspections. Levee height adjustments will be made to meet freeboard requirements for a 50-year storm and will vary across project elements. Existing and anticipated levee heights are presented in Table 3-1.

Table 3-1 USACE Levee Characteristics

Project Element	Existing Length (feet)	Maximum Rise in Levee Height (feet)
USACE Levee – north bank, west of Vina	990	Approximately 1.5
USACE Levee – south bank, crossing State Route 99	5,420	Approximately 0.5
USACE Levee – south bank, crossing Leininger Road	11,620	Approximately 2.5
USACE Levee – north bank, west of Leininger Road	770	Approximately 2.0

Note: USACE = United States Army Corps of Engineers

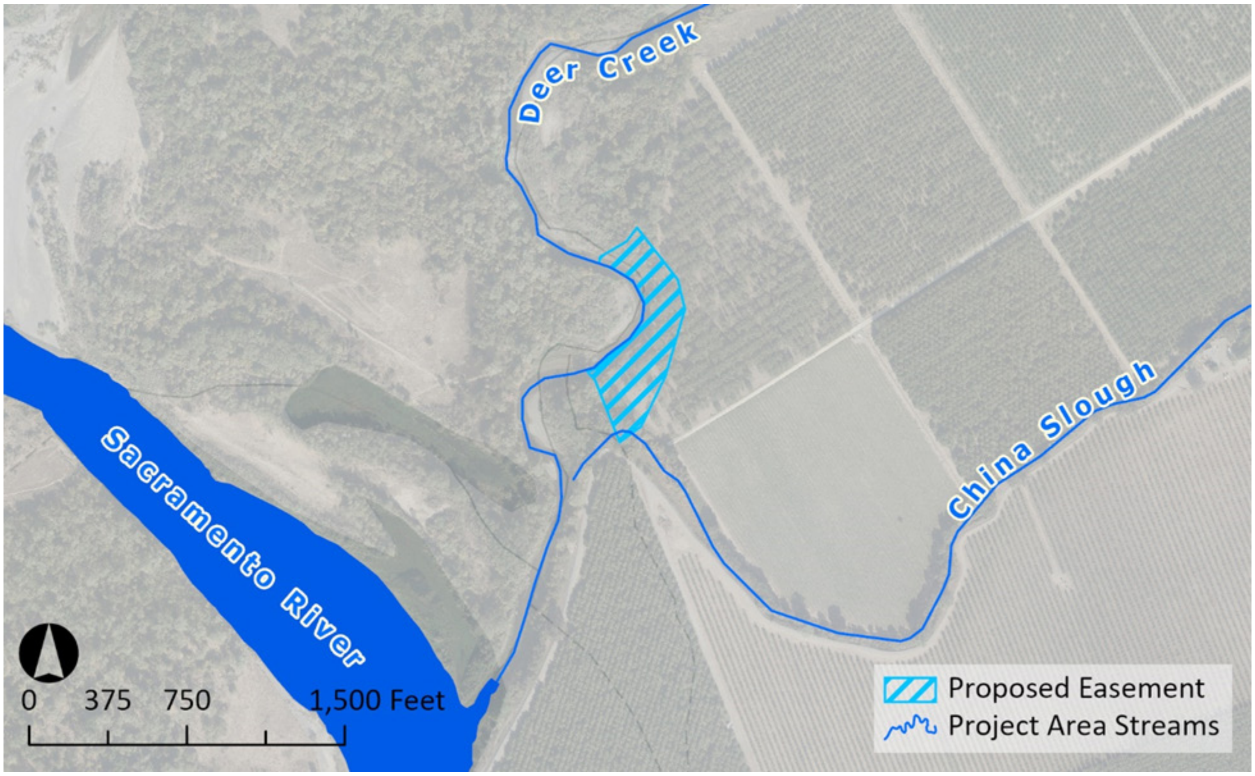
3.2.1.2 Floodway and Channel Migration Easements

Deer Creek is currently restricted from moving laterally and flooding by levees constructed immediately adjacent to the active channel. Floodway and channel migration easements are proposed in specific areas of restriction (Figure 3-2) to conserve the land for habitat purposes. Although the easements would not have direct environmental impacts, placing the land in easements would allow the land to be flooded and eroded from channel migration in these areas. The easements would be defined by legal agreements between the landowners and the easement holder and would specify land uses and maintenance requirements within the easement area. The purpose of these easements is to restore hydrologic and geomorphic function, where possible, on lower Deer Creek by creating more lateral space for the channel to migrate. The easements would also protect floodplain land exposed to regular high flows, sediment, and debris transport from upstream and compensate for increased disturbance of land during high flows. The two floodway and channel migration easements that are common to all alternatives are described below. The third easement is specific to Alternatives A through E and is discussed in Section 3.3.2, “Levee Setback Options.”

Confluence Easement

The confluence easement would cover approximately 5 acres and would be located upstream of the confluence with the Sacramento River, as shown in Figure 3-2. The terms of this easement would allow the channel to continue to naturally migrate to a defined boundary. The easement is proposed in an area that is already prone to erosion and where the bank is migrating inland towards existing orchards. The landside boundary of the easement would have bank stabilization features and native riparian vegetation. Within the easement, the channel would be free to continue migrating laterally.

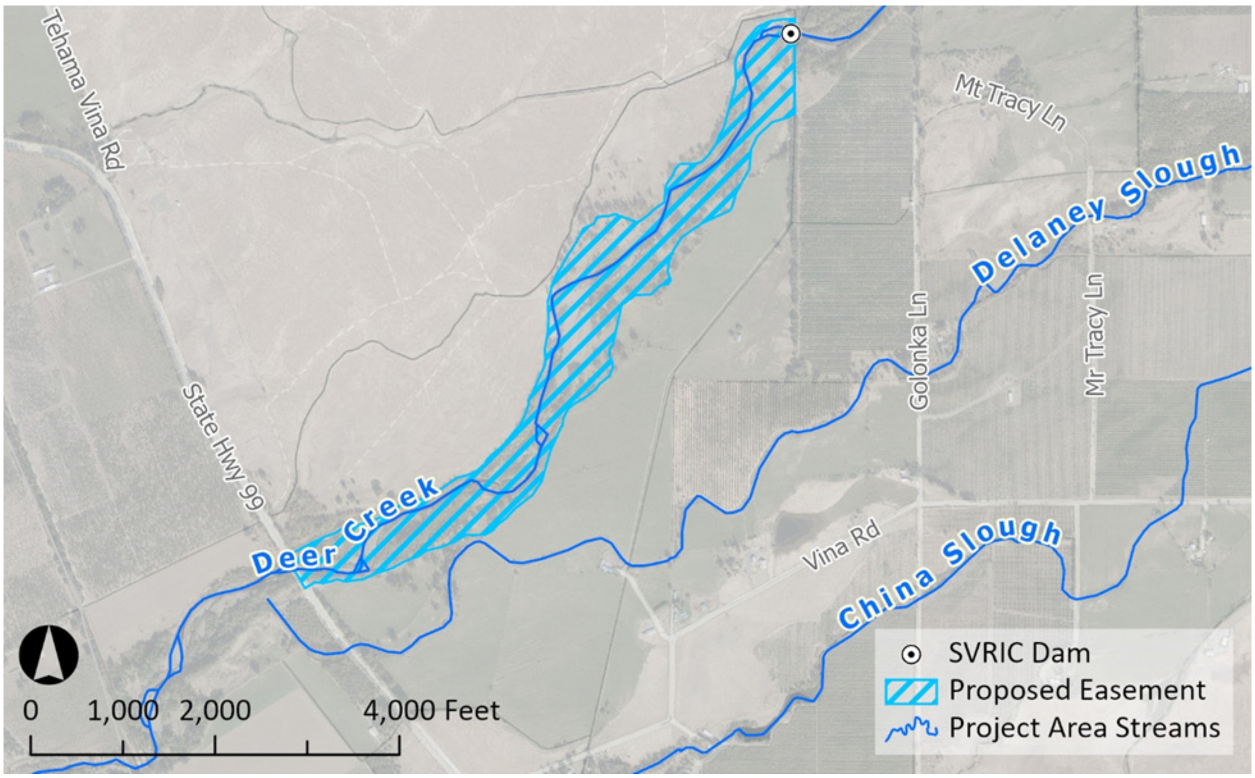
Figure 3-2 Proposed Easement near the Confluence of Deer Creek with the Sacramento River



State Route 99-to-SVRIC Dam Easement

Upstream of the confluence easement, a second easement would be located along both banks of the channel between SR 99 and the SVRIC Dam, as shown in Figure 3-3. This easement would cover 115 acres. The terms of this easement would specify maintenance requirements to preserve ecosystem integrity and flood system requirements. Within the easement, an 1,100-foot-long privately owned non-USACE levee and a 1,200-foot-long privately owned non-USACE berm would be removed, bank protection would be installed to replace existing bank protection in an area prone to erosion on the south bank, and the USACE levee on the south bank upstream of SR 99 would be raised to meet freeboard criteria. This easement, coupled with the levee removals in this reach, would allow for channel migration and establishment of native vegetation, which would reduce maintenance needs. This easement would also reestablish natural geomorphology functions of the channel, including the accommodation of more lateral movement of the channel and promotion of a more naturally graded sediment composition within the streambed though the natural processes of erosion and deposition of sediment. Balanced erosion and deposition would also help reestablish native vegetation, improve ecosystem conditions, and reduce the need for maintenance activities such as sediment removal and bank stabilization.

Figure 3-3 Proposed Easement between State Route 99 and the SVRIC Dam



3.2.1.3 New Levee

The installation of a 984-foot-long private levee would protect the Abbey laundry facility and infrastructure. This area has been identified by landowners as being prone to flooding and damage from debris carried by flood flows. This levee would be privately owned and maintained by the Abbey.

3.2.1.4 China Slough Vegetation Removal and Excavation

China Slough is a remnant distributary channel of Deer Creek (Deer Creek Watershed Conservancy 2011) and is now part of the agricultural irrigation infrastructure in the Deer Creek watershed. The slough is currently overgrown with invasive plant species, including Giant Reed (*Arundo donax*) and Himalayan Blackberry (*Rubus bifrons*)**.** The slough flows under a road near the Abbey entrance, where excessive vegetation and accumulation of sediment causes flooding along the road during high flows. Grading and vegetation removal would improve flood flow conveyance. Removing vegetation would also improve access to this area that may provide potential non-natal salmonid rearing habitat. Vegetation would be trimmed and removed along 2.6 miles of China Slough, from its confluence with Deer Creek to SR 99. Grading would remove sediment to a depth of up to 3 feet along the same 2.6 miles of China Slough. The slough would be privately maintained. Channel maintenance would be the responsibility of adjacent landowners in consultation with the TCFCWCD.

3.2.1.5 China Slough Culvert Replacement

The China Slough culvert at the Abbey access road would be replaced with a larger culvert. Flooding occurs at the culvert on the Abbey access road; increasing the culvert size would reduce the flooding risk to the road. The existing culvert consists of a 2.5-foot-diameter corrugated metal pipe and a 3-foot-diameter concrete pipe. These would be replaced with a prefabricated concrete culvert structure sized to meet the desired level of flood protection. Mostly likely, the culvert size would not exceed an 8-foot-diameter pipe or an 8-foot by 8-foot box culvert. The actual size and shape of the culvert will be determined in the final design process. This culvert would be privately owned and maintained by the Abbey.

3.2.1.6 Private Non-USACE Levee and Abandoned Non-USACE Levee Removal

An abandoned, privately built non-USACE levee on the north bank upstream of SR 99 and a non-USACE levee on the north bank downstream from the SVRIC Dam would be removed. These two levees are 1,090 and 1,232 feet long, respectively. The privately built abandoned berm deflects high flows, causing erosion on the south bank of the channel and degrading riparian habitat conditions in the area. Removal of the berm would increase the conveyance area for flood flows, create more natural sediment transport conditions, and improve the suitability of the riparian and floodplain area for salmonid habitat. The non-USACE levee further upstream is degraded and ineffective for flood protection. In its existing condition, the levee impedes and redirects flows and causes excessive erosion downstream. Removing the degraded private levee would help reestablish the natural processes that sustain river and floodplain ecosystems (Beechie 2010). Natural processes that would be improved include the hydraulic and sediment transport conditions and the suitability of channel, riparian, and floodplain areas for salmonid habitat.

3.2.1.7 Red Bridge Realignment and Expansion

The height and width of Red Bridge are insufficient to safely convey flood flows. Water overtops the bridge during high flow events and debris becomes trapped in front of the bridge structure, reducing the flow area under the bridge. The bridge structure also creates a backwater effect which increases water surface elevation in the channel upstream of the bridge. This causes levee freeboard encroachment, increased sedimentation upstream of the bridge, and channel bed scour and bank erosion downstream of the bridge. Red Bridge would be designed to pass the 50-year design flood flow, which would also increase the sediment transport through this reach. The proposed span length of the bridge will be approximately 250 feet to 450 feet and located at a new location approximately 100 feet upstream, while being high enough to pass the 50-year flood flow. Red Bridge would be maintained by the Tehama County Public Works.

3.2.1.8 USACE Levee Setback (Leininger Road Raise)

In addition to the realignment and expansion of Red Bridge, Leininger Road would be raised and serve as a USACE levee. It would connect to a new setback section of the USACE levee upstream of Red Bridge on the north bank. This action would be taken to prevent roadway encroachment by high flows and minimize risk of flooding on Leininger Road. The Tehama County Public Works would be responsible for maintenance of the section of the setback levee beneath Leininger Road and the new setback levee on the north bank east of Leininger Road would be maintained by the TCFCWCD.

3.2.1.9 Access Road Raising

To maintain flood protection along the SVRIC main diversion canal extending southward from the SVRIC Dam, the adjacent road leading to the dam would be raised. Volume calculations and impact analyses provided in this report are based on maximum potential lengths and heights. The maximum changes in geometry would be an increase of 5.5 feet in height along 900 feet of the road.

3.2.1.10 New Embankments

New embankments would also be built to maintain flood protection along the diversion canals extending north and south from the SVRIC Dam. Embankments on the north and south of SVRIC Dam would connect the cutoff structures to the existing high ground. An embankment is located on the north side of the diversion canal, downstream of the SVRIC Dam. Similar to the access road raising, the geometry of the new embankments would vary among the project alternatives because of the different levee setback options. Volume calculations and impact analyses provided in this report are based on maximum potential lengths and heights described in Section 3.2.2 "Levee Setback Options." The north embankment that extends upstream would be 1000 feet long, range in height from 2 to 7 feet tall with an average height of approximately 2 feet, at an elevation of 260 feet (North American Vertical Datum 1988 [NAVD88]). The north embankment that extends downstream would be 700 feet long, range in height from 2 to 7feet tall, and be located at an elevation of 249 feet (NAVD88). The maximum extent of the south embankment would be 916 feet long, and the height would be approximately 8.3 feet tall at an elevation of 260 feet (NAVD88). These embankments would be maintained by the TCFCWCD.

3.2.1.11 North and South Canal Cutoff Structure Installation

To maintain flood protection along the main diversion canals extending northward and southward from the SVRIC Dam, a high flow cutoff structure would be installed in each of the canals. The structures would consist of either prefabricated concrete box culverts, stop-logs, or a steel radial gate, and would redirect flood flows away from the canal and back into Deer Creek. The north and south canal cutoff structures would be owned, operated, and maintained by the SVRIC.

3.2.1.12 Bank Protection

Within the confluence and SR 99-to-SVRIC Dam floodway and channel migration easements, specific bank protection is proposed. No new bank stabilization would be placed in the active channel. Bank stabilization features would be installed underground on the landside boundary of the first easement to prevent lateral migration beyond the easement limit. Bank protection would be installed to replace existing bank protection within the second easement in an area prone to erosion on the south bank. In total, approximately 784 linear feet of bank stabilization would be installed.

The TCFCWCD would be responsible for maintenance of the bank protection.

3.2.2 Levee Setback Options

All project alternatives include the common project elements described above, as well as levee setback options that differ by how far the existing levees would be set back or moved from their existing alignment. The area between the SVRIC Dam and Red Bridge where the levee setbacks would be constructed is shown in Figure 3-1. The floodplain ground surface between the setback levees and the channel would be lowered through grading to improve geomorphic function. Floodway and channel migration easements would also be established in this reach, and private infrastructure affected by levee setbacks and floodplain lowering would be repaired or replaced.

The purpose of setting back the levees and grading in this reach is to increase the width of the meander belt, which would allow the channel to move or shift during higher flows. Setting back the levees would also improve sediment balance in the system; this would be accomplished by providing lateral space for sediment to deposit, rather than what occurs under existing conditions where sediment accumulates on the banks upstream of SVRIC Dam. Additionally, the setback areas would create floodplain rearing habitat for juvenile salmonids.

To meet USACE requirements for levees, the new levees would be built to a height that meets the USACE freeboard criteria. In some areas, the setback levees would be lower than the existing levees but would still meet the freeboard criteria (Table 3-2). Between the setback levees and the channel, easements would provide for support of floodplain habitat and use by landowners for existing farming purposes. Discussions with adjacent landowners prompted the evaluation of the multiple setback options (A through F); the options are described below and shown in plan-view on Figure 3-4 and cross-section view in Figures 3-5a through 3-5f:

- Setback Option A totals 74 acres and includes the maximum acreage of levee setbacks and floodplain lowering. The maximum levee height increase would be approximately 2.5 feet, and the maximum levee height decrease would be approximately 2 feet.
- Setback Option B totals 69.9 acres and includes the maximum acreage of levee setbacks and floodplain lowering, minus the southern bank parcel upstream of the SVRIC Dam. The maximum levee height

increase would be approximately 2.5 feet, and the maximum levee height decrease would be approximately 2 feet.

- Setback Option C totals 57.1 acres and includes the maximum acreage of levee setbacks and floodplain lowering on the north bank, and a reduced setback and floodplain lowering extent on the south bank. The maximum levee height increase would be approximately 2.5 feet, and the maximum levee height decrease would be approximately 1.5 feet.
- Setback Option D totals 39.7 acres and includes a smaller acreage of levee setbacks and floodplain lowering on the north bank compared to Setback Options A through C, and the maximum setback and floodplain lowering extent on the south bank. The maximum levee height increase would be approximately 2 feet, and the maximum levee height decrease would be approximately 1.5 feet.
- Setback Option E totals 29.3 acres of setback area and easements and includes a smaller acreage of USACE levee setbacks and floodplain lowering on both north and south banks compared to Setback Options A through D. The maximum levee height increase would be approximately 2 feet, and the maximum levee height decrease would be approximately 1.5 feet.
- Setback Option F would involve no USACE levee setbacks or floodplain lowering between the SVRIC Dam and Red Bridge, but the levees in the reach would be raised to meet the freeboard criteria. The maximum levee height increase would be approximately 5.5 feet, and the minimum levee height increase would be approximately 1 foot.

Table 3-2 Aproximate Maximum and Minimum Levee Height Adjustments by Project Alternative

Setback Option	Levee Height Adjustment Maximum (feet)	Levee Height Adjustment Minimum (feet)
A	2.5	-2.0
B	2.5	-2.0
C	2.5	-1.5
D	2.0	-1.5
E	2.0	-1.5
F	5.5	1.0

Figure 3-4 Levee Setback Options for Alternatives A through F between the SVRIC Dam and Red Bridge

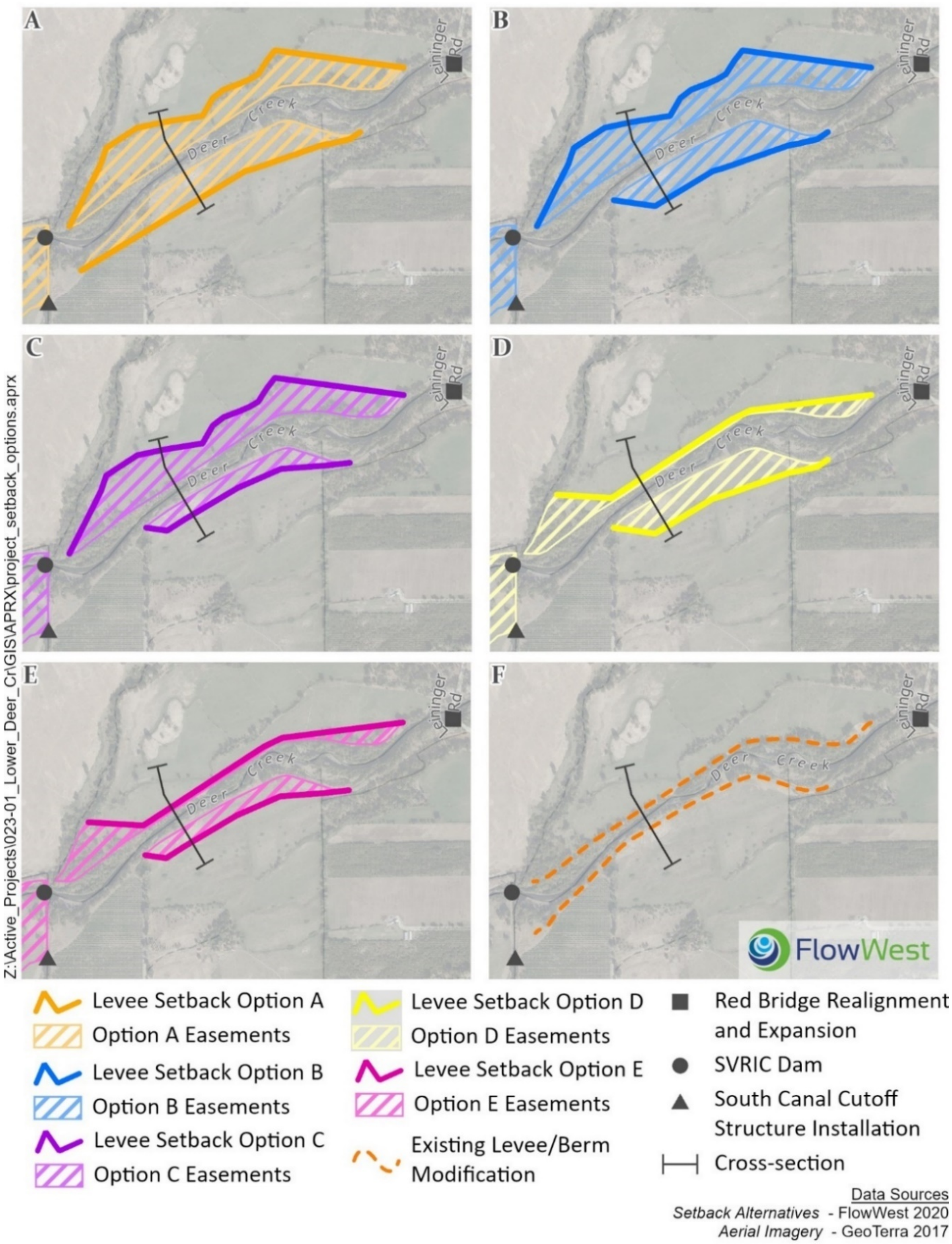


Figure 3-5a Alternative A Levee Setback Option Cross-Section

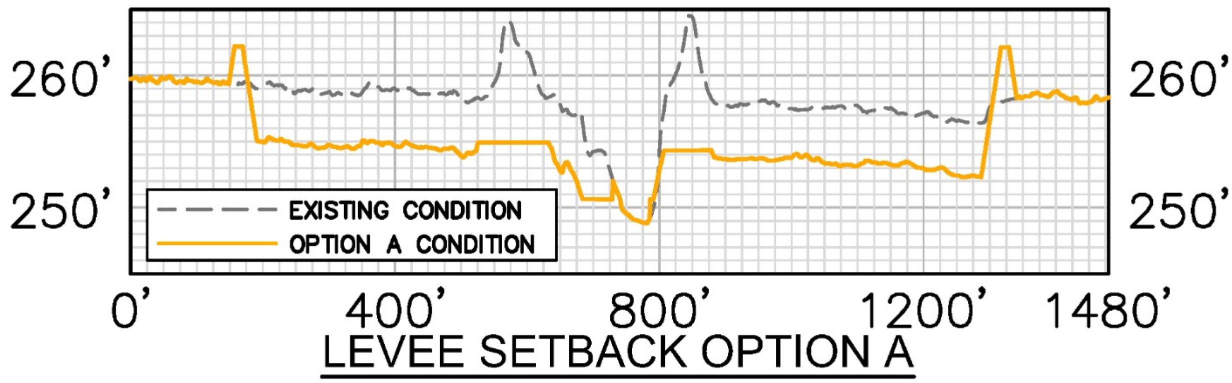


Figure 3-5b Alternative B Levee Setback Option Cross-Section

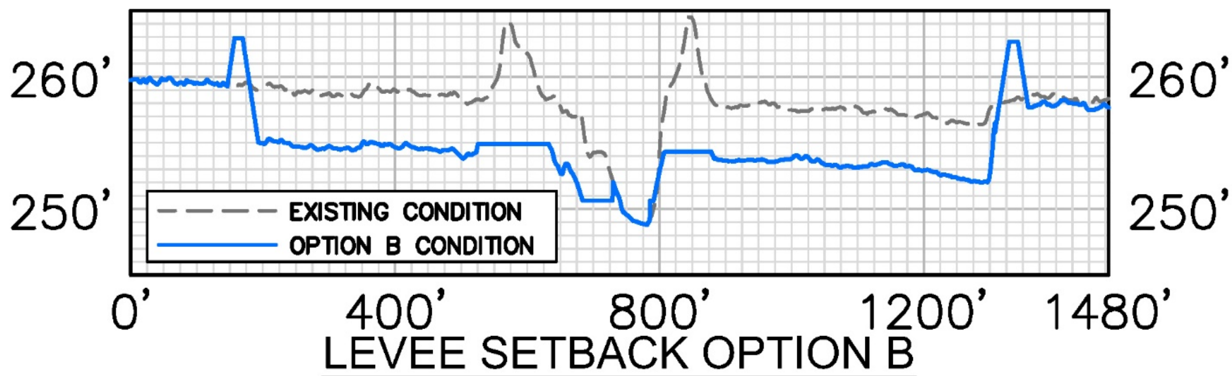


Figure 3-5c Alternative C Levee Setback Option Cross-Section

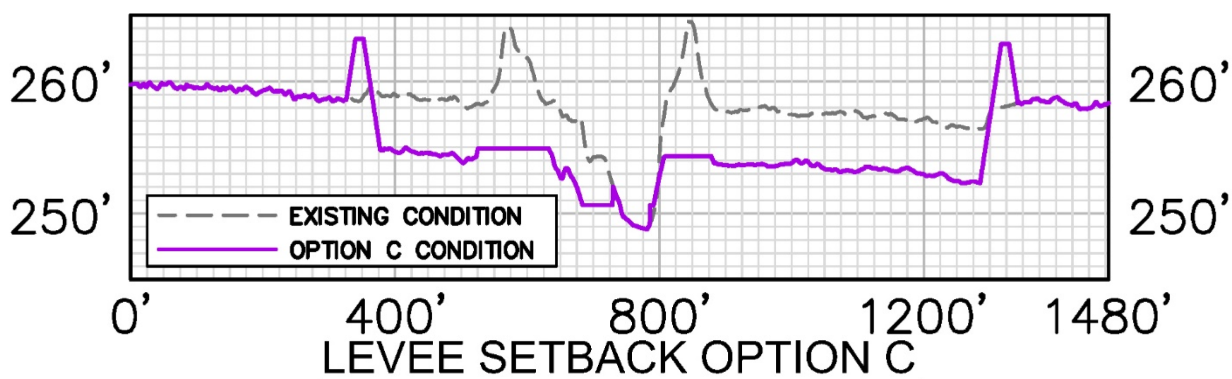


Figure 3-5d **Alternative D Levee Setback Option Cross-Section**

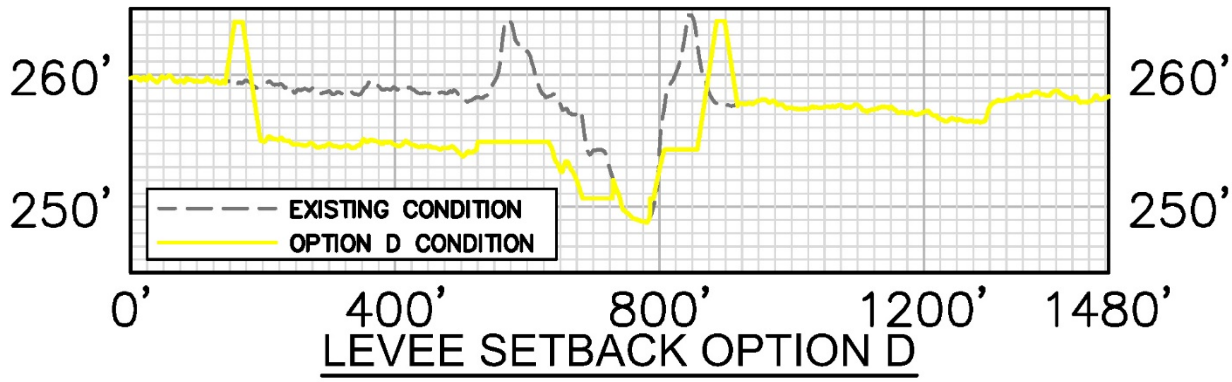


Figure 3-5e **Alternative E Levee Setback Option Cross-Section**

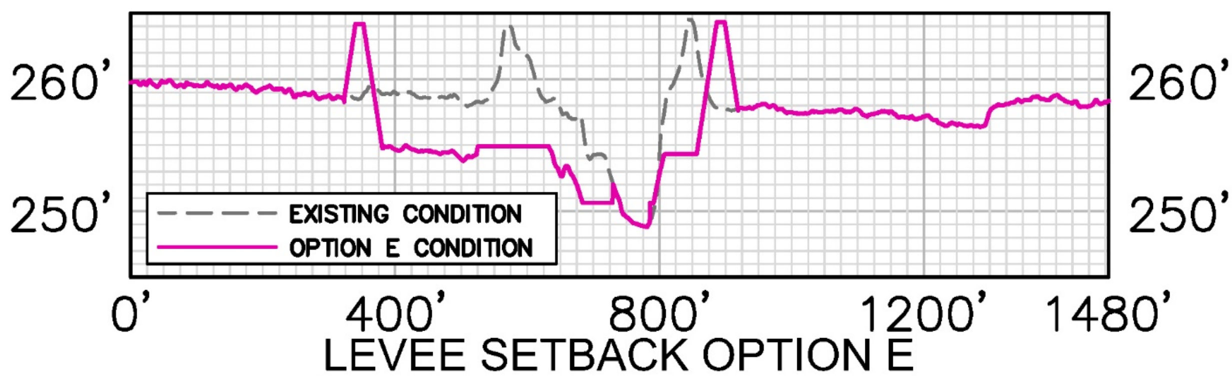
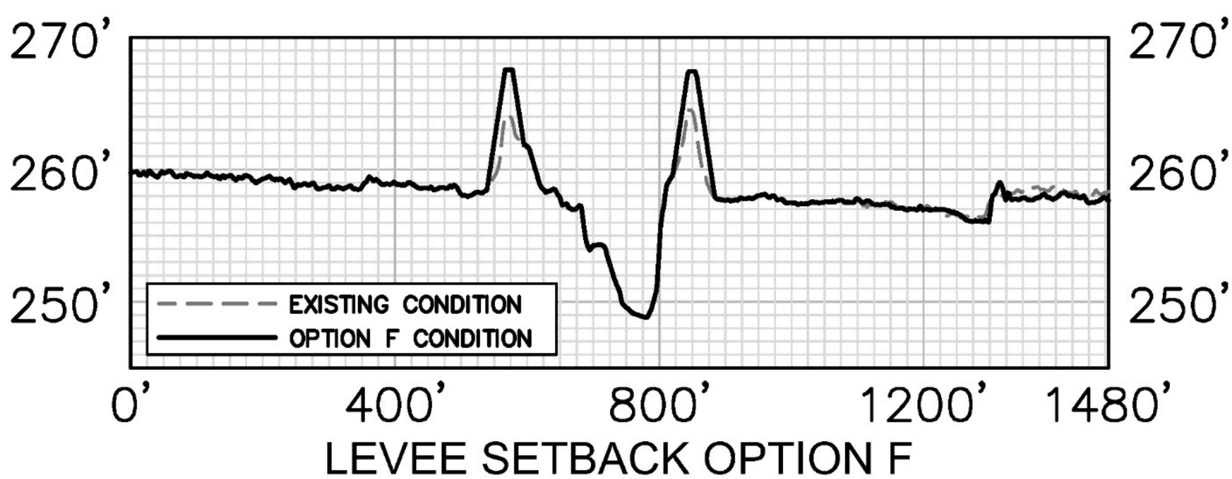


Figure 3-5f **Alternative F Levee Setback Option Cross-Section**



3.2.2.1 North and South Setback Easements

The north and south setback easements would be located on both banks of the channel between the SVRIC Dam and Red Bridge. The different configurations of the proposed easements are described and shown as levee setback options A through E in Section 3.2.2, "Levee Setback Options." No easement is proposed for Levee Setback Option F because it retains the existing levee alignment. The purpose of the north and south setback easements would be to preserve ecosystem integrity and flood system requirements. Similar to the SR 99-to-SVRIC Dam easement, these easements would also create a more graded sediment composition and reduce the amount of maintenance in this section of the channel corridor.

3.2.2.2 Deer Creek Floodplain Lowering

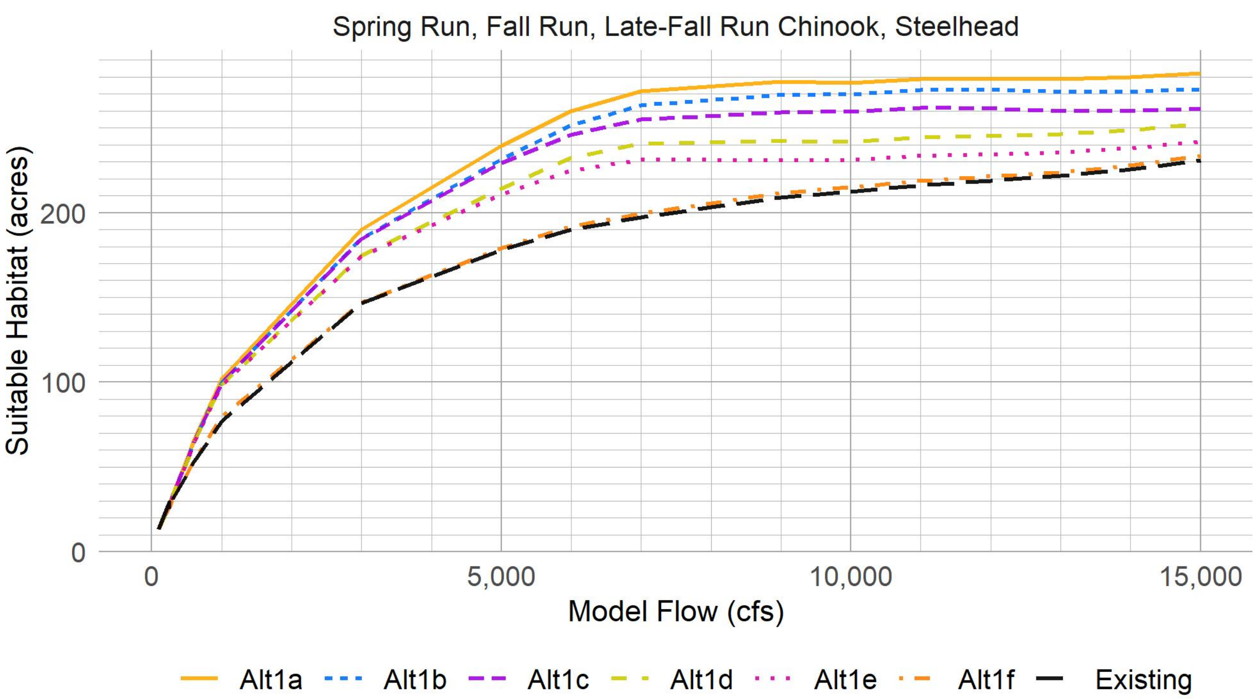
Within the north and south setback easements (Alternatives A through E), grading of the floodplain adjacent to the streambed is proposed to create lower off-channel habitat areas that would inundate more frequently and enhance juvenile salmonid rearing habitat suitability. Grading would selectively lower the ground surface elevation throughout the easement areas by up to 4 feet, except in areas of high ground or where lowering would result in ground elevations 2 feet below the bottom of the active channel. The design of floodplain lowering will be refined in later design stages of the proposed project. Graded areas within the easements would be revegetated with native riparian vegetation.

The amount of existing rearing habitat and the amount that would be created by the proposed project in the setback reach is modeled in Appendix G — "2D Hydrodynamic Model Proposed and Alternative Results Addendum." Table 3-3 and Figure 3-6, reproduced from Appendix G, show the estimated amount of rearing habitat by alternative at the two-year and five-year return interval flows (5,500 cfs and 9,900 cfs, respectively). Several of the alternatives show similar suitable habitat acres at the two-year flow, after which they start to diverge. These groups of similar floodplain habitat have been designated by group number in Table 3-3.

Table 3-3 Acres of Suitable Floodplain Habitat by Alternative

Group	Alternative	Suitable Acres			
		Chinook and Steelhead		Hardhead	
		2-Year Flow	5-Year Flow	2-Year Flow	5-Year Flow
1	A	249.6	276.8	135.6	165.3
2	B	241.6	269.7	131.7	157.6
2	C	237.7	259.4	131.5	156.3
3	D	223.2	241.9	123.3	141.1
3	E	217.9	230.9	122.6	137.6
4	F	185.5	214.5	100.0	114.7
4	Existing	183.8	212.0	99.5	115.3

Figure 3-6 Chinook and Steelhead Floodplain Rearing Suitability



3.2.2.3 Repair or Replacement of Private Infrastructure

Setting back the levees and grading in the setback areas would result in the loss of agricultural productivity and the inability of landowners to use the areas between the levees for agricultural purposes. To ensure the viability of the remaining agricultural lands in the project area, repair or replacement of private infrastructure damaged, removed, or rendered inoperable by construction activities would be necessary. Specifically, existing fencing would be repaired, and, if necessary, additional fencing would be installed to accommodate proposed project features. Similarly, existing irrigation systems would be repaired and, if necessary, realigned to accommodate proposed project features so that irrigated agriculture remains in irrigation.

3.3 Preferred Alternative — Alternative A

The preferred alternative includes the common project elements and Levee Setback Option A. Alternative A was selected as the preferred alternative because it includes the largest proposed area in the levee setback reach, which would provide the greatest environmental benefits compared to other alternatives and would meet all of the project objectives.

3.4 Construction Techniques and Equipment

The techniques and anticipated required equipment for the construction of the project alternatives are described below. Table 3-4 presents the anticipated excavation and fill amount estimates in cubic yards for the construction of all six project alternatives.

Table 3-4 Excavation and Fill Estimates in Cubic Yards for Construction of the Six Project Alternatives

	Alt A	Alt A	Alt A	Alt B	Alt B	Alt B	Alt C	Alt C	Alt C	Alt D	Alt D	Alt D	Alt E	Alt E	Alt E	Alt F	Alt F	Alt F
	Cut	Fill	Rock Fill	Cut	Fill	Rock Fill	Cut	Fill	Rock Fill	Cut	Fill	Rock Fill	Cut	Fill	Rock Fill	Cut	Fill	Rock Fill
Red Bridge Replacement and Upstream Activities	21,945	16,099	0	21,945	16,099	0	21,945	16,099	0	21,945	16,099	0	21,945	16,099	0	21,945	16,099	0
Levee Setbacks and Floodplain Lowering	760,268	88,360	0	681,829	81,196	0	616,849	88,704	0	491,725	90,478	0	424,776	101,918	0	108	68,696	0
Activities from SVRIC Dam to State Route 99	32,637	1,161	380	32,637	1,161	380	32,637	1,161	380	32,637	1,161	380	32,637	1,161	380	32,637	1,161	380
Activities Downstream of State Route 99	74,856	1,768	1,291	74,856	1,768	1,291	74,856	1,768	1,291	74,856	1,768	1,291	74,856	1,768	1,291	74,856	1,768	1,291
Total	889,706	107,388	1,670	811,267	100,224	1,670	746,287	107,732	1,670	621,163	109,506	1,670	554,214	120,946	1,670	129,546	87,724	1,670

Alt = Alternative
SVRIC = Stanford-Vina Ranch Irrigation Company

3.4.1 USACE Levee Raising

USACE levee raises would be constructed using excavated on-site material where possible, per recommendations from geotechnical evaluations of the material. Levee material would be placed in lifts by motor graders. Each lift would be moisture-conditioned using water trucks and compacted in accordance with USACE requirements for lift thickness and compaction densities. Compaction would be performed with a sheepsfoot roller or smooth-drum roller.

USACE levees would also be assessed for bank and levee toe stability. Areas with significant risk of erosion would be remediated where needed. Where appropriate, bioengineered bank stabilization methods that include native riparian vegetation and add channel margin complexity would be used to improve riparian habitat.

3.4.2 New Levee

The new levee design would adhere to USACE recommendations with a crest width of 12 feet and 3H:1V side slopes. The new private levee located near the Abbey would be constructed using excavated on-site material where possible, per recommendations from geotechnical evaluations of the material. Levee material would be placed in lifts by motor graders. Each lift would be moisture-conditioned using water trucks and compacted in accordance with geotechnical recommendations. Compaction would be performed with a sheepsfoot roller or smooth-drum roller.

3.4.3 China Slough Vegetation Removal and Grading

The proposed China Slough improvements would involve placing sandbag cofferdams, clearing and grubbing vegetation within limits of disturbance, pumping water from the slough channel out onto adjacent fields, and excavating the channel. China Slough would be cleared of existing invasive vegetation with hand tools and a small excavator, where feasible. Invasive vegetation would be disposed of in a manner that would limit the spread of seeds or other invasive species. This method could include incineration or other means to eliminate the potential for regrowth or spread. All equipment would be properly cleaned prior to and after use on site, and all seed mixtures and straw used would be site appropriate. Excess deposited sediment would be excavated with an excavator along the entirety of China Slough and spoiled at an appropriate location to be determined by the contractor. Excess sediment would be disposed of in a manner similar to other excavated sediment and would be processed if necessary. Sediment would be offered to landowners and any excess would be disposed of at the nearest landfill. The slough banks would be revegetated by hydroseeding and live stake plantings of native species to improve riparian habitat.

3.4.4 China Slough Culvert Replacement

The China Slough culvert at the Abbey access road would be replaced. Construction would start with site preparation, which would include vegetation removal. The existing asphalt would be sawcut and removed. After the asphalt is removed, the existing culvert would be excavated and removed. The trench would then be prepared for the placement of the new culvert. After the new culvert is placed in the trench, the trench would be backfilled and compacted. The road would be repaved and striped, and the exposed soil along the sides of the road would be replanted.

Because culvert replacement would require the temporary closure of the Abbey access road, a temporary one-way access road would be constructed. This road likely would be constructed to the east of the existing road (upstream) and would be approximately 12 feet wide and have an approximate footprint of 7,500 square feet. Temporary road construction would require the removal of additional vegetation, but the temporary one-way road alignment would avoid mature trees. The base of the road would be located in the slough and could include pipes overlaid with gravel.

3.4.5 Private Levee and Berm Removal

The levee and berm areas would be cleared of existing vegetation and the levee and berm material would be removed with an excavator and placed on either the south bank of the channel in an area that is prone to erosion or stockpiled for future use by the landowner. The newly graded floodplain areas would be revegetated with a combination of hydroseeding and live stake or container plantings of native species to improve riparian habitat.

3.4.6 Red Bridge Realignment and Expansion

Demolishing and rebuilding the bridge in the realignment would involve a utility search and possibly temporary relocation of existing utilities to prevent any disruption of utility services to adjacent properties. Cofferdams would be installed within 500 feet upstream and downstream of the existing bridge to temporarily divert flow in the channel. The specific cofferdam installation technique would be determined by the contractor. The cofferdam would utilize all best management practices and would minimize sediment entering Deer Creek. Diversion of the channel during construction would maintain flows in the channel upstream and downstream of the dewatered construction area for habitat and aquatic species and to ensure maintenance of water diversions for agricultural irrigation. The channel diversion would provide a dry work area for the new bridge construction. To maintain the road crossing across the channel on Leininger Road during construction, a temporary, prefabricated concrete box-culvert bridge would be installed with a crane or excavator.

Alternatively, if it is possible with the realignment design, the existing bridge would remain in place until construction of the new one is complete. The existing bridge and abutments would be demolished with an excavator and crane, and the material hauled to the nearest landfill in a dump truck. New bridge abutment sites would be cleared and grubbed, graded, and compacted. Dump trucks from borrow site(s) may be needed to import additional soil to grade abutment sites. New cast-in-place concrete bridge abutments would then be poured using a concrete pump. Bridge piers would be installed only outside of the actively meandering channel area. Piers could be installed using an excavator to prepare the pier footing location and a concrete pump to pour the pier. Piers could also be installed using a vibratory hammer on an excavator. Installation method would depend on the final bridge design. The new bridge would be similar in character and quality to the existing bridge. Asphalt road surface material would be placed on the bridge deck and tied into the existing road surface with a paver. Once the new bridge is in service, the existing or temporary bridge would be removed, stream banks along the existing or temporary road alignment would be restored with an excavator and dump truck, and the channel would be graded and protected with bioengineered bank stabilization around the bridge abutment areas. The cofferdams and diversion culverts would be removed with an excavator, and the disturbed areas revegetated with native riparian seeding.

3.4.7 USACE Levee Setback (Leininger Road Raise)

For raising Leininger Road and the setback section of the USACE levee upstream of Red Bridge on the north bank, a utility search would be conducted, and utilities relocated if necessary. Existing vegetation within the limits of disturbance would be cleared and grubbed. Temporary aggregate base rock roadway would be placed to provide access during construction. The existing roadway would be demolished by an excavator and hauled to a disposal site by a dump truck after the new bridge is in service. There may be a need to excavate and replace soil up to 5 feet deep along the road alignment, or construct a slurry cutoff wall, depending on geotechnical conditions along the new road alignment. Soil material for the connection of the roadbed to the USACE levee would be imported with dump trucks from borrow site(s), placed, and compacted in accordance with geotechnical recommendations. Aggregate base rock 4 to 12 inches thick would be placed at the top of the new road grade and levee connection. Construction of the Leininger Road raise would be coordinated to align with Red Bridge construction. The temporary roadway would then be removed with an excavator, and disturbed areas revegetated with native seeding.

3.4.8 Access Road Raising

The access road raise, embankment construction, and cutoff structures installation (Sections 3.2.1.9, 3.2.1.10, and 3.2.1.11, respectively) would be constructed concurrently. A utility search would be conducted, and utilities relocated if necessary. Existing vegetation within the limits of disturbance would be cleared and grubbed. Temporary aggregate base rock roadway would be placed, if needed, to provide access during construction. The existing roadway would be raised per the design specifications and geotechnical requirements. Soil material from other project excavation or borrow site(s) would be placed and compacted in accordance with geotechnical recommendations. Aggregate base rock 4 to 12 inches thick would be placed at the top of the new road grade.

3.4.9 New Embankments

The embankments would be constructed to design specifications and use excavated on-site material where possible, per recommendations from geotechnical evaluations of the material. (See Section 3.5.1 for a description of sources of potential additional material.) Embankment material would be placed in lifts by motor graders. Each lift would be moisture-conditioned using water trucks and compacted in accordance with geotechnical recommendations. Compaction would be performed with a sheepsfoot roller or smooth-drum roller.

3.4.10 North and South Canal Cutoff Structure Installation

The cutoff structures would be installed on the north and south canals in a dry work area and isolated with temporary cofferdams. The existing cutoff structure would be demolished with excavators with drill bits and hauled off by excavators fitted with buckets. Parts of the existing canals upstream and downstream would be demolished during construction, and a concrete truck would be used to form and pour the new cutoff structures that would be higher than the existing cutoff. The structures would be constructed through a combination of earthwork and new reinforced concrete and would be located in the canals. The adjacent canal banks would be elevated using earthwork to match the top of bank elevations with the roadway and embankment elevations on either side of the canals. After the cutoff installations are complete, the upstream and downstream canals would be repaired and the banks and roads would be hydroseeded with native vegetation cover.

3.4.11 Bank Protection

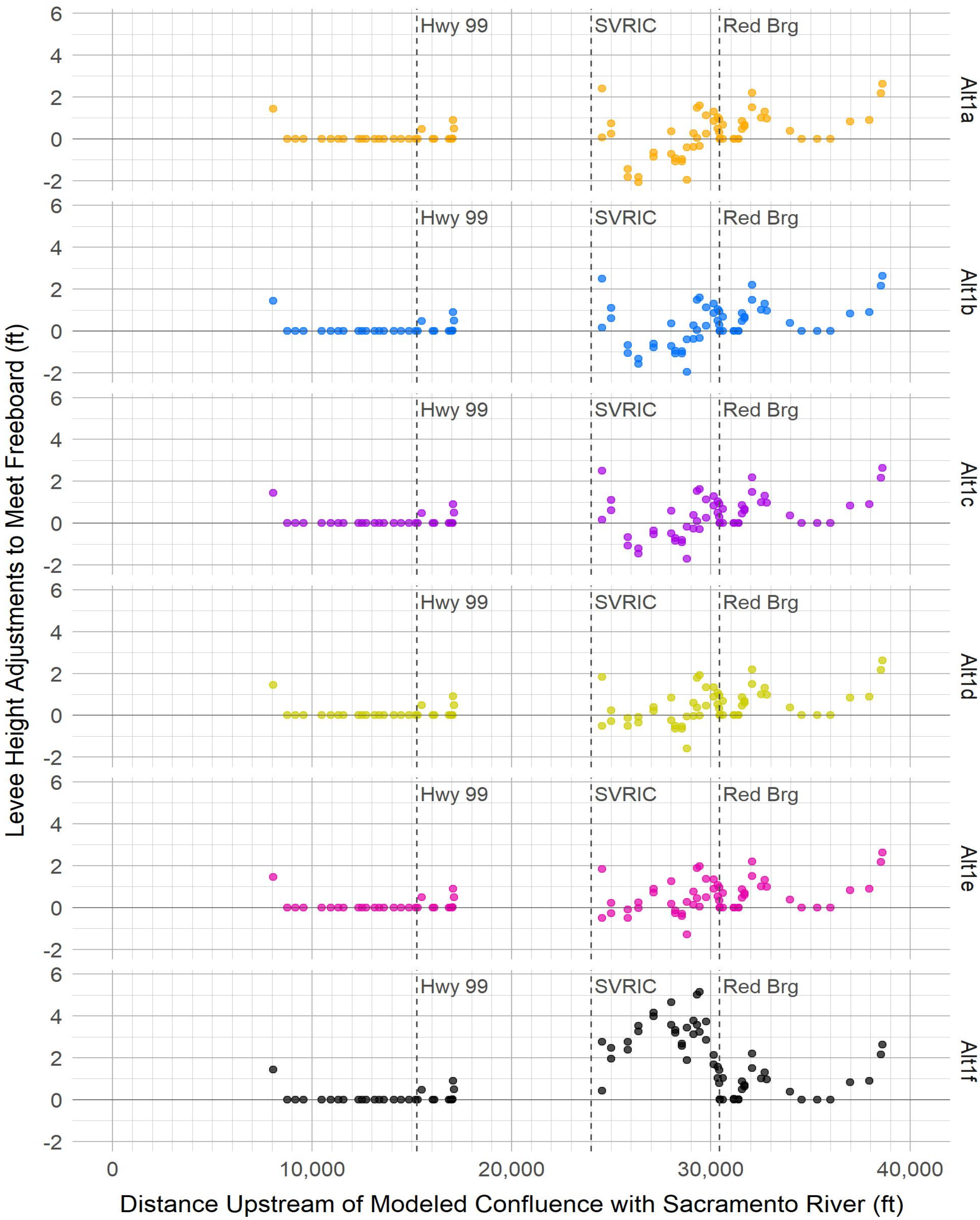
Bank protection would occur within the confluence easement and the SR 99-to-SVRIC Dam easement. No new bank stabilization would be placed within the active channel. The landside boundary of the confluence easement, approximately 100 feet from the active channel, would have bank stabilization features installed, including a combination of buried, launchable rock, and native riparian vegetation. Launchable rock is rock that is disturbed by erosion and moves down to the toe of the slope. For the SR 99-to-SVRIC Dam easement, bank protection would be installed in an area prone to erosion on the south bank where bank protection has been placed previously. The bank protection material could come from the removal of the existing levee and berm. Vegetation would be cleared and grubbed, and 854 feet of buried rock toe protection would be installed along the bank.

3.4.12 Levee Setback Options

Despite the variation in size and alignment of the levee setback options, all of the levee setbacks would be constructed in the same way. The new setback levees would be designed and constructed in accordance with the 23 CCR and USACE criteria. The levees would have a 12-foot crest width and 3H:1V slopes. The setback levee heights would be adjusted between a raise of 5.5 feet and lowering by 2 feet at various points throughout the alignment of each. Table 3-2 summarizes the levee height adjustments. Figure 3-7 shows these differences in levee heights that would be required to meet USACE freeboard requirements along the entire length of Deer Creek within the project area. Figures 3-5a to 3-5f show the cross-sections of the levee setback options.

A utility search and relocation would be conducted if necessary. Existing vegetation within limits of disturbance would be cleared and grubbed. Existing mature riparian vegetation would be preserved to the extent feasible; large native trees would be avoided. Native trees removed would be assessed for their ability to be reused as in-stream woody debris to add channel complexity and would be used to the greatest extent possible. If invasive plant species are removed, proper disposal methods would be implemented as described in Section 3.4.3, "China Slough Vegetation Removal and Grading." Temporary aggregate base rock roadway would be placed to provide access during construction. Depending on geotechnical recommendations, there may be a need to excavate down into soil, or the need for a slurry cutoff wall. Levee soil material would be placed and compacted in accordance with geotechnical recommendations. Aggregate base rock 4 to 12 inches thick would be placed at the top of the levee, the temporary roadway would be removed with an excavator, and disturbed areas would be revegetated with native seeding.

Figure 3-7 Levee Height Adjustments Required to Meet USACE Freeboard Requirements



3.4.13 Deer Creek Floodplain Lowering

Areas within the north and south setback easements requiring grading and revegetation would be cleared and grubbed. Clearing activities would be completed with hand tools where feasible, and the proposed grading would avoid mature vegetation. If needed for wide swaths of grading, grubbing would involve 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. Grading would be performed with an excavator.

Areas of grading within the easements would be revegetated with a combination of hydroseeding and installation of live stakes and container stock of native riparian vegetation species. Hydroseeding involves applying a mixture of water, seed, wood fiber, and potentially a soil stabilizer, and would be applied with a hydroseeding truck. If needed, follow-up applications of the hydroseed mixture would be completed. Live stakes and containers stock of native riparian vegetation may be planted using different approaches depending on the plant species and type, terrain, and ease of access.

After grading, an excavator and hand shovels would be used to backfill over planted vegetation. Alternatively, native riparian vegetation plantings could be installed by drilling with auger, staking, and then backfilling by hand. All plantings would be irrigated manually with a water truck or with a temporary irrigation system maintained during the three-to-five-year establishment period.

3.4.14 Repair or Replacement of Private Infrastructure

CDFW would support and aid, where possible, in the implementation of improvements needed to offset the change in land use within the setback reach and to help landowners minimize impacts to their livelihood from this project. For construction, this would include the installation and replacement of irrigation systems and fencing that are within the setback reach but would need to be rerouted and replaced outside of the setback reach. Irrigation and fencing would be replaced with similar materials and installed to avoid the setback reach and maintain their utility to support agricultural viability for agricultural operations, which previously used the setback reach.

3.5 Other Construction Considerations

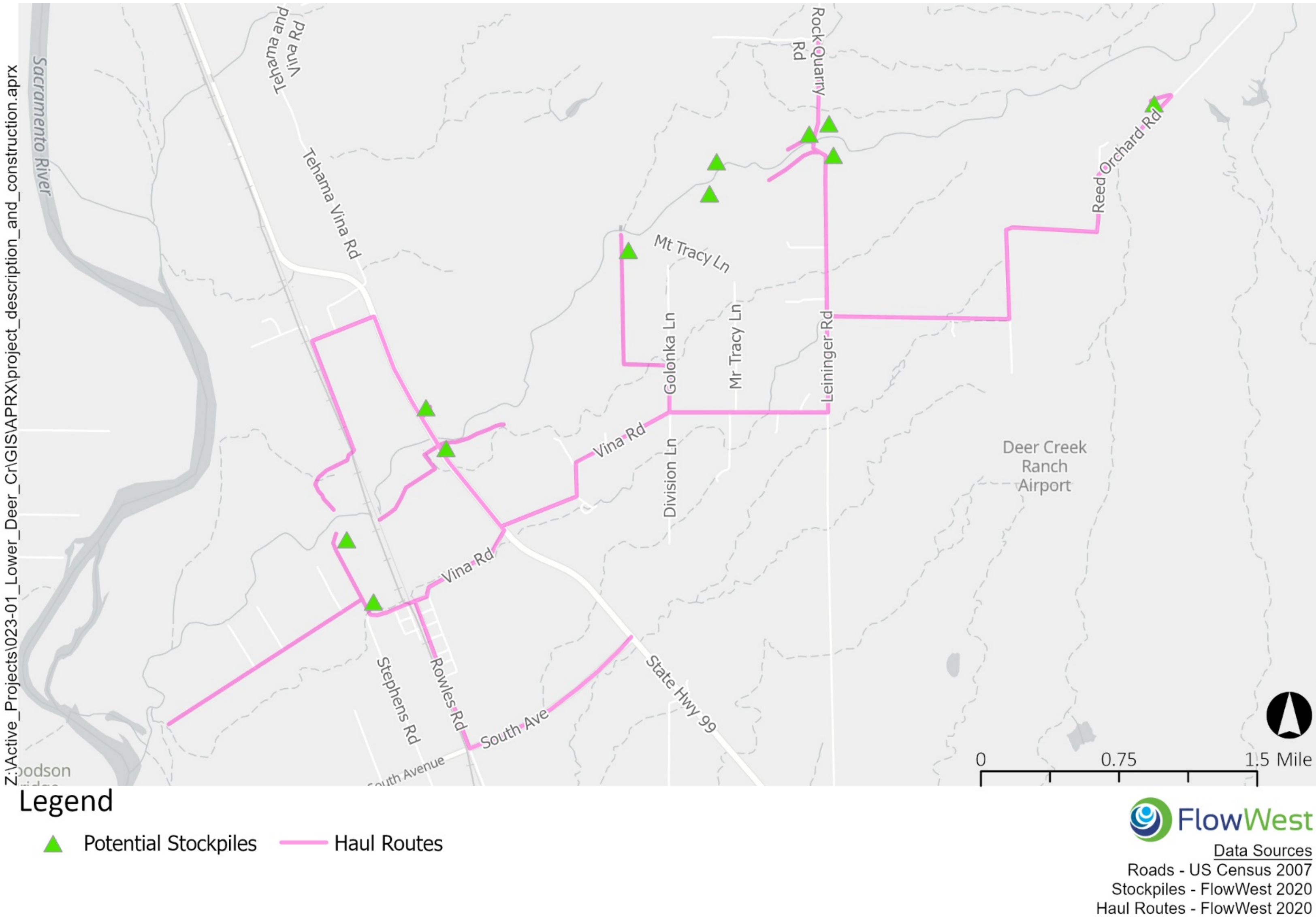
3.5.1 Borrow Areas and Materials

Levee raises, construction of the new setback levees, and the construction of the new levee would require large amounts of fill material. It is anticipated that much of the fill material would be sourced from excavation of the proposed project. The total amount of excavated material differs with the levee setback options. The largest setback option (Option A) would generate a surplus of excavated cut material that could be used in the construction of other project elements. Fill material sourced on-site would be evaluated for geotechnical suitability in levee construction. If additional material is needed, borrow sites would be identified. Necessary aggregate base rock material would be obtained from a commercial sand and gravel operation, most likely in the Red Bluff area. Riprap material would be obtained from quarries located within approximately 50 miles of the project site. The construction contractor would select the specific supplier based on suitability and pricing. On-site material would be excavated using bulldozers, scrapers, or excavators. Excavation depths would be limited to above groundwater elevations. Material would be transported to the construction area via truck along the designated haul routes. On-site borrow areas would be hydroseeded following the conclusion of excavation.

3.5.2 Haul Routes and Staging Areas

Haul routes and potential staging and stockpile areas are shown in Figure 3-8. All staging and stockpile areas would be located on private property within the project area and at an appropriate distance from private residences to mitigate noise impacts. The project team would coordinate with landowners within the project area and on whose property staging areas and haul routes are proposed to minimize disturbance. Multiple potential staging and stockpiles areas are proposed in case project construction is phased and more localized staging and stockpiling is feasible. Staging and stockpile areas would be demobilized and restored to pre-project conditions after construction is complete. Site restoration activities that may be implemented include regrading or reseeding, constructing permanent diversion ditches, using straw wattles and bales, and applying straw mulch or other measures deemed appropriate.

Figure 3-8 Haul Routes and Potential Staging and Stockpile Areas



3.5.3 Spoils Areas

Spoil locations have not yet been determined, but they would be located in previously disturbed or non-sensitive areas. Hauling spoil material to a landfill was assumed for the purposes of evaluating air quality and GHG impacts. Spoils will be reused and repurposed to the extent feasible during construction. No specific sites have been selected to date, but for the purposes of impact analysis in this EIR it is assumed that the materials hauled from the site would be transported north to the landfill near Red Bluff.

3.5.4 Labor Force

The construction labor force is estimated to average approximately 30 persons over the construction period of approximately 240 days. Peak staffing could be up to 50 persons depending on the contractor’s schedule.

3.5.5 Construction Sequencing and Schedule

Once permitting is complete and funding for project implementation is secured, construction is anticipated to take place between 7:00 a.m. and 7:00 p.m., Monday through Friday, for 240 days from mid-March to the end of October. These work times may be extended into Saturdays and Sunday from 8:00 a.m. to 5:00 p.m. and may include nighttime work during key points of the construction phase, as needed. Adjacent landowners and Tehama County officials would be notified prior to the start of construction activities. If construction needs to continue beyond these work times, it would be done for short durations during weekdays.

Work may occur over several years, depending on funding availability.

The first project elements to be constructed would be the new setback levees outside of the existing levees under the preferred alternative (Alternative A) and Alternatives B through E. Because the Leininger Road raise would serve as a USACE levee, its construction would need to be coordinated with the Red Bridge realignment and expansion to ensure all heights and connections are in alignment. All other project elements could then be constructed simultaneously. Elements that require fill concurrently or shortly after the setback levees and floodplain lowering activities are completed would be constructed first so that on-site excavated material could be used as fill material when possible.

3.6 Operations and Maintenance Activities

Once the project is completed, no operational activities would be necessary. Anticipated maintenance activities for Deer Creek can be characterized as either habitat-related or flood conveyance-related.

3.6.1 Habitat-Related Maintenance

Habitat-related maintenance would include invasive plant management and monitoring for three to five years post-project to ensure establishment of project-related plantings. A planting and monitoring plan, including oversight of activities related to habitat plantings, would be developed. Habitat planting and maintenance would be the responsibility of the future easement holder(s) or property owners. DCWC could be engaged in maintenance if funding or staffing permits. It is anticipated that the easements, which are for habitat protection and not flood conveyance, would be maintained by the easement holder and the landowners in coordination with CDFW and DWR. Habitat-related maintenance methods would be similar under each project alternative, but would differ in the size of the area of responsibility depending on the levee setback option.

3.6.2 Flood Conveyance-Related Maintenance

DWR cooperates with USACE to repair flood-damaged federal flood control projects maintained under the authority of the CVFPB, which include levees, channels, and various flood control structures. Maintenance is conducted in accordance with the USACE O&M manuals. For channel maintenance, DWR complies with the following regulations (California Department of Water Resources 2021):

- CEQA
- CESA
- Federal ESA
- Federal CWA

DWR also conducts O&M activities in accordance with the CVFPP, which states that O&M will be conducted "in ways that are compatible with natural processes" (California Department of Water Resources 2017), and consistent with DWRs Environmental Stewardship and Sustainability Policies, Climate Action Plan, and Governor's California Water Action Plan. For channel maintenance on Deer Creek, DWR also complies with Fish and Game Code Section 1600 under a Streambed Alteration Agreement with CDFW. The project design is intended to reduce or eliminate maintenance needs, particularly related to sediment management.

The active (perennially flowing) Deer Creek channel is currently unvegetated (except for small annual aquatic and emergent plants) and is expected to remain unvegetated post-project. Under existing conditions, the riparian zone is highly vegetated because no channel maintenance or extreme flood flows have occurred in more than 30 years. Floodplain vegetation is relatively sparse under existing conditions because of grazing management. But, post-project, the floodplain is expected to develop vegetation coverage similar to existing riparian areas. Hydraulic modeling of the proposed project alternatives, which assumed this growth of mature riparian vegetation in the floodplain, indicates that flood conveyance-related channel maintenance would not be required to maintain flood system performance and freeboard under normal cycles of geomorphic and vegetation change. But, based on DWR’s flood management experience, it is still possible that maintenance could be required to address local and acute issues caused by sediment, vegetation, or debris transported during extreme high-water events (e.g., the 10- to 25-year flood event). For this reason, flood maintenance is assumed to include annual inspection of the project elements, and, if annual inspection identifies conditions not considered in the hydraulic model, additional maintenance actions.

The threshold for channel or floodplain maintenance would be when channel and floodplain conditions have more roughness than what was considered in the hydraulic modeling (e.g., a blockage caused by some combination of sediment, uprooted vegetation, or other debris). This threshold would likely only be reached after extreme high-water events. Maintenance activities required after such an event could include clearing a path to a debris jam (including vegetation removal); cutting, excavating, and hauling away sediment, uprooted vegetation, and debris; and restoration of vegetation that may need to be removed for access, the details of which would be specified in any required permits for the activity. Channel maintenance for flood conveyance would not include general sediment removal in the channel. However, if flow is directed toward a levee that could threaten it, channel grading or sediment removal could be required to reduce that threat. If required, these activities would be conducted under permit conditions to maintain habitat functions and values post-maintenance. Channel and floodplain maintenance methods would be similar under each alternative but may take place in different areas depending on the levee setback option.

Maintenance requirements after an extreme high-water event could also include maintenance and repair of USACE and non-USACE levees. The closer the levees are to the Deer Creek channel, the higher the velocities will be at the toes and water sides of the levees. Higher velocities can erode levee toes and increase the likelihood of levee failure. Because it is difficult to predict if, where, or when this would happen, levee maintenance is assumed to include annual inspection of the project elements, and, if annual inspection identifies issues with the levees, additional maintenance actions would be taken. Levee maintenance responsibilities would differ between the project alternatives. The frequency of required levee maintenance would decrease from existing conditions under Alternatives A through E, but the amount of decrease likely would depend on the levee setback widths. The greatest decrease in maintenance frequency would be associated with the largest levee setback (Alternative A) and the smallest decrease in frequency would be associated with the smallest levee setback (Alternative E). The frequency of levee maintenance is anticipated to be the same as existing conditions under Alternative F because no levee setbacks are proposed under that alternative.

China Slough maintenance is expected to include invasive plant species maintenance and removal. These maintenance activities would be conducted by private landowners in coordination with the TCFCWCD. China Slough vegetation maintenance would be the same under each project alternative.

If needed, sediment removal activities would be accomplished with an excavator. Backhoes would be used for erosion control and repair activities, such as filling eroded areas. Levee banks would be assessed, and any bank erosion addressed through the installation of bank protection.

The potential flood conveyance-related maintenance activities and the respective responsible parties are summarized in Table 3-5.

Table 3-5 Anticipated Flood Conveyance-Related Maintenance Activities and Responsible Parties by Project Element

Project Element	Responsible Parties	Maintenance Activities
USACE Levees	TCFCWCD	Inspection and repair.
Floodplain Lowering (portion of the setback reach within 2,500 feet upstream of the SVRIC Dam)	SVRIC and CDFW	Vegetation, debris, and sediment removal.
Floodplain Lowering (portion of the setback reach more than 2,500 feet upstream of the SVRIC Dam)	DWR	Possible vegetation, debris, and sediment removal following extreme high-water events.
New Levee (ring levee)	Abbey of New Clairvaux	Inspection and repair.
China Slough	Adjacent landowners	Vegetation, debris, and sediment removal.
China Slough Culvert	Abbey of New Clairvaux	Inspection, debris clearing, and repair.
Red Bridge	Tehama County Public Works	Inspection and repair.
USACE Levee Setback (Leininger Road raise)	Tehama County Public Works	Vegetation, debris, and sediment removal.
New Embankment	TCFCWCD	Inspection and repair.
North and South Canal Cutoff Structures	SVRIC	Inspection and repair.
Bank Protection	TCFCWCD	Inspection and repair.

Notes:

CDFW = California Department of Fish and Wildlife
DWR = California Department of Water Resources
SVRIC = Stanford-Vina Ranch Irrigation Company
TCFCWCD = Tehama County Flood Control and Water Conservation District
USACE = United States Army Corps of Engineers

Chapter 4. Environmental Impact Analysis

4.1 Overview of the Environmental Impact Analysis

CEQA Guidelines require an EIR to include an evaluation of potentially significant effects on the physical environment associated with a proposed project and to identify feasible mitigation for any significant adverse effects. As stated in 14 CCR 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 15125[d]). An EIR must describe potentially feasible measures that could avoid or minimize significant adverse impacts (14 CCR 15126.4[a][1]) and feasible and practicable measures that are fully enforceable through permit conditions, agreements, or other legally binding processes (14 CCR 15126.4[a][2]). Under CEQA, mitigation measures are not required for effects that are found to be less than significant.

4.1.1 Chapter Contents

This chapter evaluates the potential effects of the proposed project by resource topic. Each resource topic section includes the discussions summarized below.

4.1.1.1 Environmental Setting

This section provides an overview of the baseline physical environmental conditions (i.e., the environmental baseline) in the project area and vicinity, as appropriate, in accordance with CEQA existing conditions. Under CEQA, the environmental conditions that exist at the time that the NOP is published is the baseline against which the effects of the alternatives are measured. Information presented in this chapter is the most current available at the time of the NOP publication, from both a local and regional perspective, and this information used as the CEQA baseline for analysis for all resources that are qualitatively analyzed. An NOP was circulated from December 4, 2020, to January 15, 2021, and a virtual public scoping meeting was held on December 15, 2020. Because the concept of a significant effect on the environment focuses on changes within the environment, the environmental setting (or baseline relevant environmental conditions) of each resource topic is described to support the analysis of environmental impacts. The purpose of this requirement is to give the public and decision-makers the most accurate and understandable picture practically possible of the project's likely near-term and long-term impacts (14 CCR 15125[a]).

4.1.1.2 Regulatory Setting

This section provides a bulleted list of the adopted plans, policies, laws, regulations, and ordinances that are relevant to each resource topic. Summary descriptions of each applicable plan, policy, law, regulation, or ordinance are provided in Chapter 2, “Consistency with Applicable Plans and Policies.” The environmental analysis addresses possible conflicts between the proposed project 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 CEQA Guidelines CCR 15125[d]). Although the draft 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, they are addressed as specific impacts within each applicable resource topic section.

4.1.1.3 Impacts and Mitigation

This section identifies the anticipated impacts of project construction, operation, and maintenance within the context of each alternative. Those impacts that are deemed to be potentially significant prior to mitigation are identified as such in the text. The following sections are also presented under Impacts and Mitigation:

- Methodology — Identifies the method used to analyze impacts, as well as the key assumptions used in the analysis process.
- Significance Criteria — Presents the criteria and thresholds used to identify potentially significant effects on the environment in accordance with PRC Section 21082.2, and CEQA Guidelines Sections 15064 and 15065. Thresholds include guidance provided by Appendix G of the CEQA Guidelines, as well as agency standards or legislative or regulatory requirements as applicable, in addition to professional judgement. All impacts that do not exceed the stated significance criteria described for each section are assumed to be less than significant and therefore are not discussed in detail in the document (PRC Section 21100 and CEQA Guidelines Section 15128).
- Impact Analysis — Assesses 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 measure implementation.

4.1.1.4 Terminology to Describe Impacts

The following terminology is used throughout the impact analyses:

- "Construction" applies to activities associated with any form of ground-disturbance.
- "Operations" or "operations and maintenance" apply to activities 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).

- "Project Alternative" refers to all Lower Deer Creek project elements, as described in Chapter 3, and is used generally to refer to any of the project alternatives evaluated in this EIR.

4.1.1.5 Levels of Significance

The following terminology is used to denote the level of significance of project-related environmental impacts.

- "No impact" indicates that the construction, operation, or maintenance of the project would not have any direct or indirect impact on the environment and there would be no change from baseline conditions. This impact level does not require mitigation.
- A "less-than-significant impact" is one that would not result in a substantial or potentially substantial adverse change in the physical environment.
- 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 are provided, where feasible, to reduce the magnitude of significant effects to less-than-significant levels.
- 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 measures. 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 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.

4.1.1.6 Geographic Scope of Impact Analyses

CEQA Guidelines indicate that lead agencies "should define the geographic scope of the area affected by the cumulative effect" (CCR 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 three geographic areas, as described below.

1. Project Area — Lower Deer Creek areas where all new and modified project levees and other elements would be located, constructed, and operated. "Project site" is not used because of the many locations of the project.
2. Project Vicinity and Region — Generally, the project vicinity and region shown in Figure 1-1, "Lower Deer Creek Flood and Ecosystem Improvement Project Location."
3. Regional Transportation Network — Linear transportation corridors used for truck haul routes during construction.

4.1.2 Resource Topics Evaluated

The resource topics addressed in this EIR are listed below.

- Aesthetics (Section 4.2)
- Agricultural Resources and Land Use (Section 4.3)
- Air Quality (Section 4.4)
- Biological Resources — Fish and Aquatic Habitat (Section 4.5)
- Biological Resources — Wetlands and Other Waters (Section 4.6)
- Biological Resources — Vegetation (Section 4.7)
- Biological Resources — Wildlife (Section 4.8)
- Cultural and Tribal Cultural Resources (Section 4.9)
- Geology, Soils, and Paleontological Resources (Section 4.10)
- Greenhouse Gas Emissions and Climate Change (Section 4.11)
- Hazards and Hazardous Materials (Section 4.12)
- Hydrology, Hydraulics, and Flood Risk Management (Section 4.13)
- Noise and Vibration (Section 4.14)
- Transportation (Section 4.15)

- Utilities and Service Systems (Section 4.16)
- Water Quality (Section 4.17)
- Wildfires (Section 4.18)

4.1.3 Resource Topics Eliminated from Further Discussion

During the environmental analysis conducted for the proposed project, several resources were eliminated from detailed analysis because no significant impacts from project implementation are anticipated. A description of the resources and an explanation for eliminating them from further analysis are provided below. Relevant checklist questions from CEQA Guidelines Appendix G are also provided to show the significance criteria considered for the analysis.

4.1.4 Energy

i. Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.

ii. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

The proposed project would result in a short-term increase in energy use during construction. Any such increase would not be unnecessary, wasteful, or inefficient, as measures to minimize the need for material transportation and consequently, fuel use, are built into the proposed project design. Construction timing would be scheduled and would not cause significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation. The relevant State plan related to renewable energy is the Renewable Portfolio Standard (RPS) program (California Public Utilities Commission 2021). Although the Tehama County General Plan (2009) includes policies related to energy conservation (e.g., Policy OS-2.6), these policies are mostly related to buildings. The RPS requires 50 percent renewable resources by the end of 2026, 60 percent by the end of 2030, and 100 percent renewable energy and zero carbon resources by 2045. EO B-55–18 signed by Governor Brown in 2018 set a goal of statewide carbon neutrality by 2045 and net negative emissions thereafter.

The proposed project would not conflict with any of the goals, policies, or implementation actions identified in the applicable energy plans, such as the 2018 Integrated Energy Policy Report Update, because the proposed project would be completed as efficiently as possible. Although no mitigation measures are necessary to reduce this impact to a less-than-significant level, implementation of Mitigation Measures AQ-2 would reduce the proposed project's effect by requiring minimization of idling times, requiring that all equipment be maintained and tuned properly, and reducing the potential fossil fuel use by requiring the use of low-emission diesel products, or alternative fuels. The proposed project would not conflict with any plans relating to renewable energy or energy efficiency. For these reasons, energy impacts were eliminated from further discussion.

4.1.5 Forestry Resources

i. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g)).

ii. Result in the loss of forest land or conversion of forest land to non-forest use.

iii. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of forest land to non-forest use.

Forestland, as defined in PRC Section 1220(g), is land that can support 10 percent of 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. Because the project area does not contain 10 percent native tree cover (Atlas of Global Conservation 2021), it is not classified as forestland under PRC Section 12220(g). For this reason, impacts to forestry resources were eliminated from further discussion.

4.1.6 Mineral Resources

i. 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.

ii. 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.

Mineral resources in the vicinity of the project area include two gravel and sand quarries: the Carmichael Rock Quarry, located approximately 8 miles to the northeast in Vina, Calif., and the Paynes Creek Quarry, located approximately 27 miles to the north in Red Bluff, Calif. Although material will be necessary to raise levees and to construct the setback levees, the amount of material needed for the project would not lead to the loss of availability of gravel or sand in any of the quarries in the project vicinity. The proposed project would excavate gravel and sand, which are considered mineral resources by Tehama County's General Plan, to lower the floodplain and construct the levees. But, the excavated gravel and sand would not be lost because it would be put to use. Additional adequate supplies of gravel and sand are available to the region and residents of the state.

According to the Tehama County General Plan (2009), there are no mineral resource recovery sites located in the vicinity of the proposed project. The DOC Geologic Energy Management Division's wells mapper also shows that there are no oil or gas wells located in the proposed project area (California Department of Conservation 2020). For these reasons, impacts to mineral resources were eliminated from further discussion.

4.1.7 Population and Housing

i. Direct and indirect inducement of substantial unplanned population growth.

ii. Displacement of substantial numbers of people or existing housing, necessitating the construction of replacement housing elsewhere.

The proposed project does not propose new housing, roads, or other growth-inducing infrastructure. The proposed project would provide increased flood protection in comparison to existing conditions, but would not provide greater flood protection than the levee system's design flood protection. This improvement would not induce more population growth than that identified in the Tehama County General Plan (2009). Approximately 30 employees would be needed over the course of project construction, but these employees likely would be drawn from the existing pool of construction workers within the region rather than from outside the region, resulting in no population growth.

The proposed project would occur in an unincorporated area that consists of large tracts of agricultural land. A few residences are located in the project area. But, the proposed project would not displace these existing houses or residents and would not necessitate construction of replacement housing. For these reasons, impacts to population and housing were eliminated from further discussion.

4.1.8 Public Services

i. Substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities related to any public services.

The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities related to any public services. The proposed project would require approximately 30 construction workers on average with a peak of 50 workers during combined construction events, but these employees likely would be drawn from the existing pool of construction workers within the region rather than from outside the region. The growth planning processes for Tehama County public services (i.e., fire and police services) anticipated additional growth in the region. Because of this, these construction workers would be accommodated by the region for the duration of construction without the need for new or physically altered government facilities. Construction activities associated with the proposed project would not be expected to substantially affect the service ratios, response times, or other performance objectives of any public services such that new or physically altered facilities would be required. The proposed project may result in some demand for public services, but would not result in substantial adverse physical impacts or the need for new or physically altered governmental facilities. For these reasons, impacts to public services were eliminated from further discussion.

4.1.9 Recreation

i. 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.

ii. Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

The proposed project would not increase the use of existing neighborhood and regional parks or any other recreational facilities. Recreational opportunities on Deer Creek are minimal now because both the north and south banks are privately owned properties with very little access to the creek channel. Recreational opportunities along the Sacramento River would not be impacted because construction would not occur in the river channel. But, it is possible that construction equipment may deter people from recreational use. This deterrence may increase the use of other recreational facilities in the area, such as the Woodson Bridge State Recreation Area. Because of the area's small population size and the ability for nearby recreation facilities, including the Woodson Bridge State Recreation Area, to accommodate this potential negligible increase in visitors, substantial physical deterioration of recreational facilities would not occur.

The proposed project does not include recreational facilities and would not require the construction or expansion of existing recreational facilities. For these reasons, recreation impacts were eliminated from further discussion.

4.2 Aesthetics

4.2.1 Environmental Setting

Aesthetic resources include the visual setting and character of an area, including natural resources, landforms, vegetation, and human-made structures in a regional or local environment, that generate pleasant sensory reactions and evaluations by viewers. The location and setting provide context for determining the existing visual environment. Factors considered when characterizing the aesthetics of the project area include the overall visual quality or attractiveness of the area, the types and number of viewers within the area, the viewing conditions, and the visual sensitivity of the area.

The project area is located within the alluvial plain of the Sacramento Valley, east of the Sacramento River. The Sacramento River itself is a scenic resource. Recreationists boating or floating along the river near the mouth of Deer Creek have limited views of the channel because of the angle of its confluence with the Sacramento River within a bend of the river.

Deer Creek is bounded by private land on the north and south banks. The built environment consists of rural residences and farm equipment, agricultural storage facilities, irrigation ditches, and farm roads associated with agricultural operations.

4.2.1.1 Public Views

Vina Road provides public views of China Slough and its surrounding vegetation for roadway users. The slough is surrounded by agricultural land, orchards, and rural residences. Travelers along SR 99 and Leininger Road have limited views of Deer Creek while crossing over the channel. Travelers along Leininger Road also have views of Red Bridge while crossing the channel. Figures 4.2-1 through 4.2-10 are photos of these common views.

4.2.1.2 Scenic Resources

No scenic resources have been identified within the project area. The County’s designated scenic highways include State Routes 89, 172, 36, and 32. The project area is not located within the viewshed of, or adjacent to, these designated state scenic highways (California Department of Transportation 2019).

The Bureau of Land Management (BLM) developed the Redding Resource Management Plan to guide strategy on where and how BLM would administer public lands within the Redding Resource Area. This included classifying the waterways based on their eligibility for inclusion in the National Wild and Scenic Rivers System (Bureau of Land Management 1993). The classification for Deer Creek is “wild” between the boundary of the Ishi Wilderness and the Deer Creek Irrigation District, which is upstream of the project area and therefore not applicable. No other part of Deer Creek was designated as part of this process.

4.2.1.3 Visual Quality and Sensitivity

Deer Creek, China Slough, and their associated riparian vegetation, as well as Red Bridge and the surrounding agricultural lands, all have high visual quality. However, the public views are all from roadways, creating views which are often limited by vegetation and short in duration. Overall, visual sensitivity is considered moderate for the project area.

Figure 4.2-1 View of China Slough looking northwest from Corner of 7th Street and C Street

Figure 4.2-2 View of China Slough looking northwest from Vina Road

Figure 4.2-3 View of the Deer Creek Channel looking east (upstream) from the State Route 99 Bridge

Figure 4.2-4 View of the Deer Creek Channel looking west (downstream) from the State Route 99 Bridge

Figure 4.2-5 View of the Southern Levee looking west from Leininger Road

Figure 4.2-6 View of the Northern Levee looking west from Leininger Road

Figure 4.2-7 View of the Northern Levee looking east from Leininger Road

Figure 4.2-8 View of Deer Creek looking downstream from Red Bridge

Figure 4.2-9 View of Deer Creek from Private Land

Figure 4.2-10 View of Deer Creek looking upstream from Red Bridge

4.2.2 Regulatory Setting

The following plans, policies, regulations, or laws related to water quality apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

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

State Regulations

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

Regional and Local Regulations

The Tehama County General Plan (2009) includes policies to protect and preserve aesthetic values of the County's lands, including natural resource, habitat, historic, and agricultural lands. Relevant Goals and Policies include:

- GOAL OS-10 (To preserve the historic and archaeological resources of the County for their scientific, educational, aesthetic, recreational, and cultural values.) — Applies to impact analysis.
- GOAL OS-11 (To protect the scenic views and aesthetic qualities of Tehama County.) — Applies to impact analysis.
    - Policy OS-11.2 (The County shall strive to protect the aesthetic and scenic beauty of its regional locations.) — Applies to impact analysis.
        - Implementation Measure OS-11.2b (To the extent feasible, new development will be required to retain existing trees and vegetation and ensure that these resources are incorporated into project design wherever feasible.) — Applies to planning and design.
    - Policy OS-11.4 (New development should be designed to be compatible with surrounding development in ways that contribute to the desired character of the surrounding area.) — Applies to planning and design.

4.2.3 Impacts and Mitigation

4.2.3.1 Methodology

Analysis of the visual effects of potential changes expected to occur from implementation of the proposed project alternatives was based on field observations and review of the Tehama County General Plan (2009), project maps and drawings, and photographs of the project area. Site reconnaissance was conducted in February 2018 and April 2021 to view the project area and to take representative photographs of existing visual conditions.

4.2.3.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Impacts to aesthetics would be significant if they would:

- Have a substantial adverse effect on a scenic vista.
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway.
- Substantially degrade the existing visual character or quality of public views of the site and its surroundings (public views are those that are experienced from a publicly accessible vantage point).
- Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

4.2.3.3 Topics Not Evaluated Further

During environmental analysis, the following topic was eliminated from detailed analysis because no impacts from project implementation are anticipated:

- Have a substantial adverse effect on a scenic vista.
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway.

No scenic vistas exist within the project area and no scenic resources or State scenic highways are designated within the project area. No impact would occur.

4.2.4 Impact Analysis

Impact AES-1: *Substantially degrade the existing visual character or quality of public views of the site and its surroundings.*

No Project Alternative

No Impact. Under the no project alternative, no construction-related impacts to aesthetics would occur. Maintenance activity would be limited to any emergency bank stabilization needed to maintain the levees, which could require minimal removal of riparian vegetation but would result in negligible visual changes. The consequences and environmental effects of continued O&M are further discussed in Chapter 6, under “No Project Alternative,” in Section 6.3.2.1, “Consequences of No Action.”

Alternatives A through F

Construction-related Impacts

Less than significant. As described in the environmental setting, some of the common project elements are publicly viewable from Vina Road, SR 99, and Leininger Road.

Vina Road Views

Proposed construction activities include removal of vegetation along China Slough and grading along the channel. Project construction activities and removal of vegetation would temporarily degrade the visual character of views of China Slough. However, when viewed in the visual context of the rural and agricultural setting, this degradation would be minor. The visual character along Vina Road includes row crops, orchards, open fields, and ruderal land, which are located between the road and China Slough or on the other side of China Slough. The areas of China Slough proposed for vegetation removal and grading would be visually similar to the altered open fields and ruderal lands. In addition, much of the vegetation that would be removed is invasive and overgrown, which adversely affects the visual quality of portions of the slough. These changes would be noticeable and could be considered degradation of the existing views, but the changes would be in keeping with the visual character of the project site and its surroundings. Additionally, these changes would be temporary because vegetation would grow back after project construction, making these impacts **less than significant**.

State Route 99 Views

Proposed construction activities in the vicinity of SR 99 include USACE levee raising and private levee and berm removal, although the private levee and berm are not currently visible from SR 99. The USACE levees would be raised approximately 1 foot above the existing levee crests; this higher levee crest would not degrade or obstruct public views. Construction and demolition could temporarily degrade the visual character and quality of views of the site, as agricultural land and riparian vegetation may be affected. But these activities would not substantially degrade the existing rural visual character or visual quality of the project area, and riparian vegetation would be replanted or naturally recruited post-project, so the change in visual character would be temporary. In addition, the presence of dense vegetation along the roadway would screen most views of these construction activities, and vehicles passing by on SR 99 would have fleeting views of the Deer Creek channel. Thus, impacts would be **less than significant**.

Leininger Road and Red Bridge Views

Proposed construction activities include realignment and expansion of Red Bridge levee setbacks and levee raising. These construction activities could degrade the existing visual character or quality of public views of the site and its surroundings during the construction period.

Red Bridge is not a designated scenic or historic resource, but it does contribute to the visual quality of public views along Leininger Road. The realignment and expansion of Red Bridge would be completed such that it would be similar in character and quality to the original bridge and impacts would be **less than significant**.

Leininger Road affords views to the west of the proposed raised levees and setback levees. The setback reach begins approximately 500 feet downstream from Leininger Road. Although Alternatives A through E differ in the extent of proposed levee alignments and levee heights in the setback reach, the distance from public views at which construction activities would occur would make the differences between the alternatives negligible. Levees would be raised along the southern bank of Deer Creek on both sides of Leininger Road. Though these levees would be raised, they would be below the elevation of Red Bridge and would not obstruct public views. Levees on the northeast side of Deer Creek would be removed and set back such that a new levee would run beneath Leininger Road, following the road north for approximately 1,000 feet before turning east and extending for several hundred feet. The levees would be similar in visual character and quality to the existing levees and would not substantially degrade the existing visual character or quality of public views of the project site and impacts would be **less than significant**. Construction of the setback levees, levee improvements, and Red Bridge realignment would involve earthmoving equipment, dirt stockpiles, and levee construction, all partially visible from Leininger Road. These activities would reduce the amount of agricultural land and riparian vegetation in some areas, but would not substantially degrade the existing rural visual character or visual quality of the project area. Riparian vegetation would be replanted and naturally recruited post-project, so the change in visual character would be temporary, would not change the overall visual character, and would not be considered a substantial degradation of the existing visual character or quality of public views of the project site.

In addition, the distance from Leininger Road, the short duration of views for passing drivers, and the existing vegetation that partially blocks views would make these construction-related impacts **less than significant.**

<u>O&M-related Impacts</u>

Less than significant. Post-construction, publicly viewed areas would be visually similar to and consistent with the existing visual character of the project site and vicinity. Continued maintenance activities, including levee repair and vegetation management, would be short-term in nature, would result in limited disturbance, and would not substantially degrade the existing visual character or quality of public views. In addition, these activities may occur in areas that are not publicly viewable. Therefore, impacts would be **less than significant**.

Impact AES-2: *Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.*

No Project Alternative

No Impact. Under the no project alternative, no construction would occur. Maintenance activity would be limited to any emergency bank stabilization needed to maintain the levees, which would not create a new source of light or glare. Therefore, **no impact** would occur. The consequences and environmental effects of continued O&M are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternative A through F

<u>Construction-related Impacts</u>

Less than significant. No nighttime construction is proposed. If lighting is needed, the use of lights would be minimal and temporary during construction and would not adversely affect day or nighttime views. The materials use for the newly constructed Red Bridge may create glare immediately after construction, but it would not be substantial, would not affect daytime views, and would be minimized by the weathering of materials. Therefore, impacts would be **less than significant**.

Operations- and Maintenance-related Impacts

Less than significant. No lighting is proposed as part of the project. The use of lights would be minimal and temporary during maintenance activities and would not adversely affect day or nighttime views. Therefore, the impact would be **less than significant.**

4.3 Agricultural Resources and Land Use

4.3.1 Environmental Setting

This section describes existing agricultural resources and land use in the project area.

4.3.1.1 Project Area Overview

The Lower Deer Creek watershed, which includes the project area, is predominantly rural with large areas used for agricultural or livestock production. Riparian vegetation surrounds much of the Deer Creek channel. Within the project area and vicinity, pasture generally occurs to the north of Deer Creek and agricultural production generally occurs to the south of Deer Creek. Most agricultural crops are irrigated orchards, including walnuts, almonds, olives, and prunes. Other crops may include grapes or row crops, but at a lower density than orchards.

4.3.1.2 Agricultural Resources

Important Farmland

The DOC Important Farmland classifications define land suitability for agricultural production based on 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. There are eight categories mapped by the DOC under the Farmland Mapping and Monitoring Program (FMMP), described below (California Department of Conservation 2019a).

- 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 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 a 1.5-acre parcel (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 California Important Farmland Map, produced by the DOC Division of Land Resource Protection (California Department of Conservation 2018), was used to evaluate the agricultural significance of the lands in the project area. Figure 4.3-1 shows the farmland classifications in relation to the common project elements. Figure 4.3-2 shows the farmland classifications in relation to the levee setback options for each of the project alternatives.

Figure 4.3-1 Farmland Mapping Classifications in Relation to the Common Project Elements

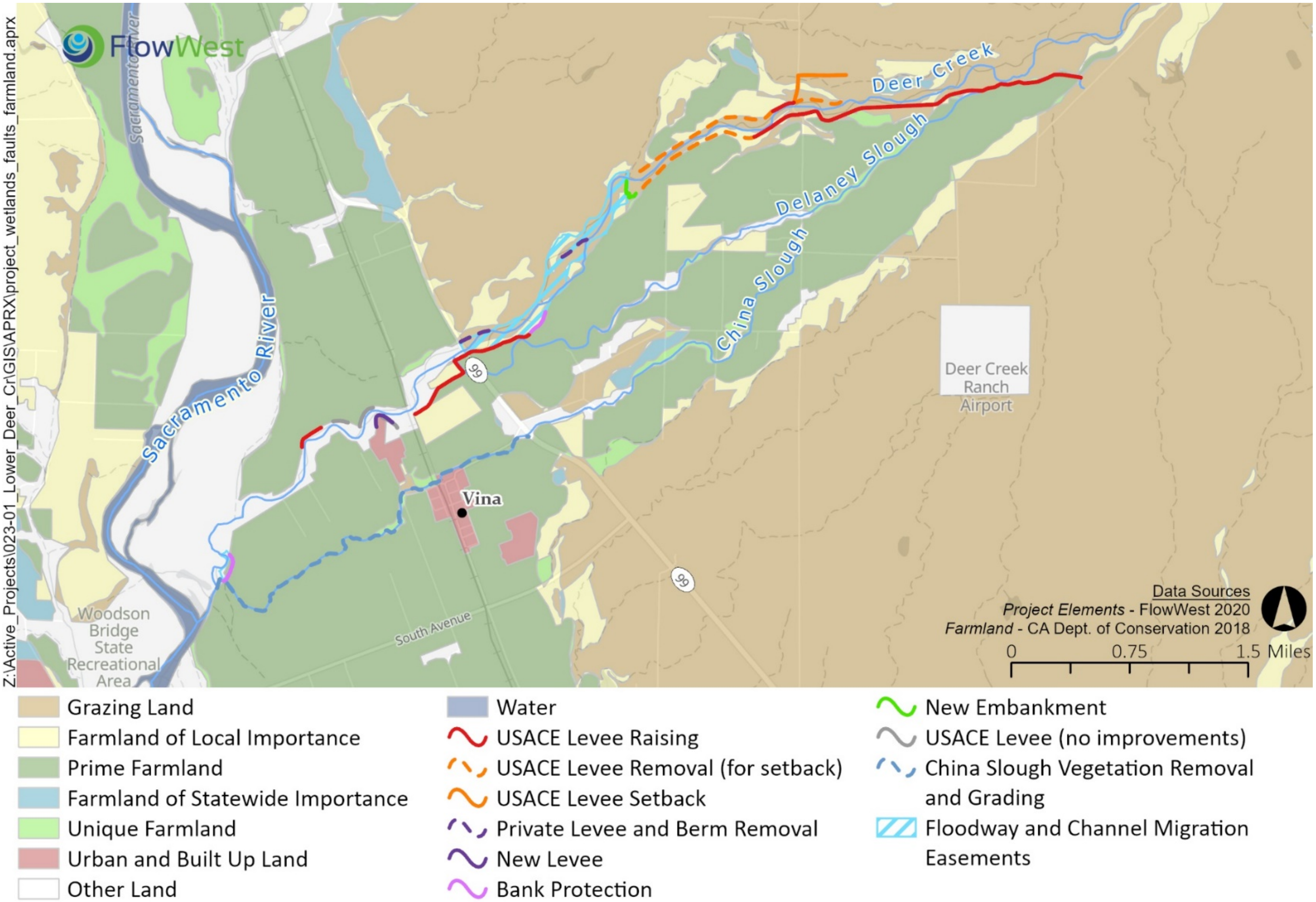
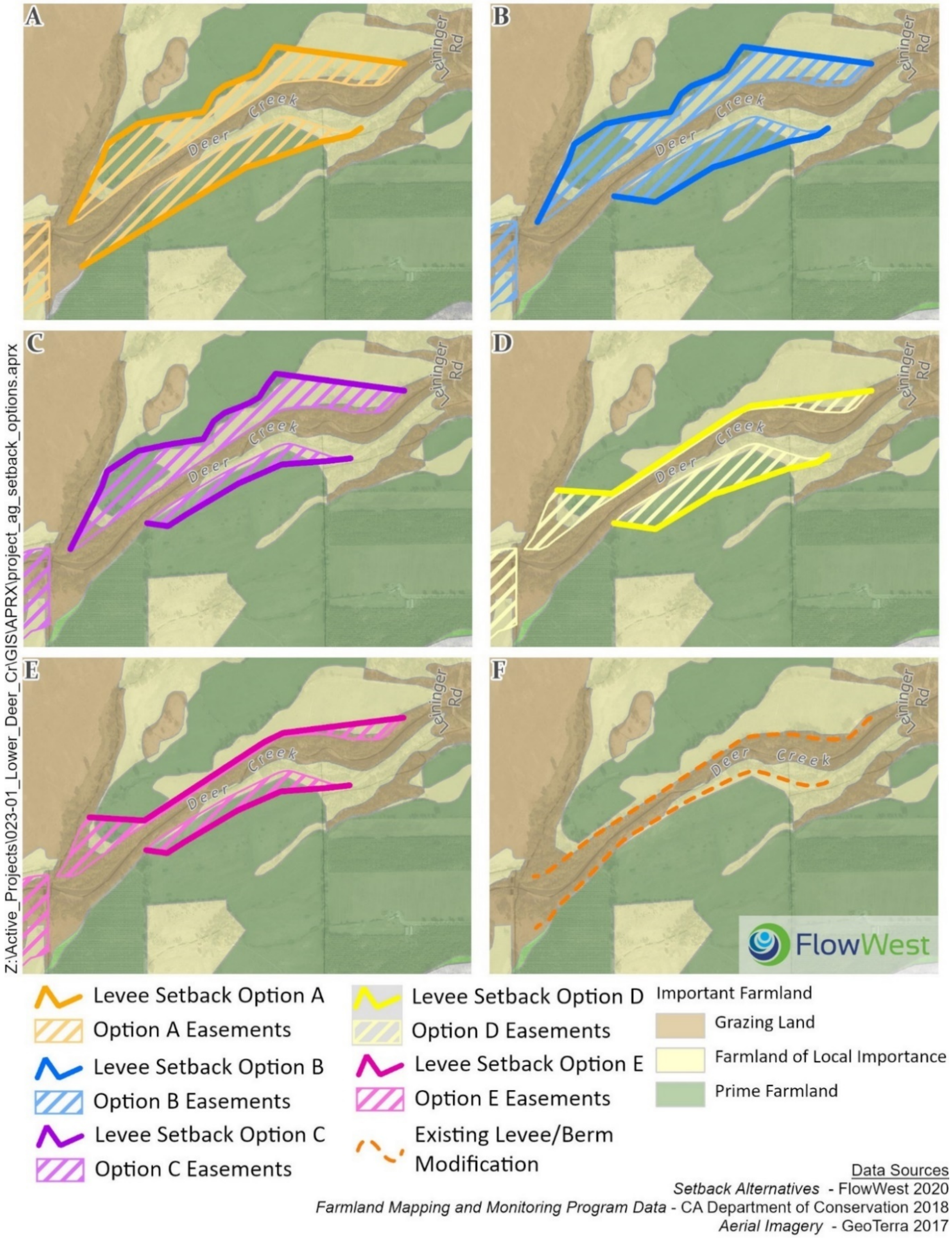


Figure 4.3-2 Farmland Mapping Classifications in Relation to the Levee Setback Elements



Prime Farmland

As shown on Figure 4.3-1, Prime Farmland in the project area is mapped:

- Along both sides of China Slough where vegetation removal and excavation are proposed.
- Adjacent to the USACE levee that would be raised on the north bank of Deer Creek downstream from SR 99.
- Adjacent to both USACE levees that would be raised on the south bank of Deer Creek. Adjacent to both of the proposed bank protection locations.
- Within and outside of the proposed setback levee area.

This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields.

Farmland of Statewide Importance

As shown on Figure 4.3-1, Farmland of Statewide Importance is not mapped immediately adjacent to or within the project area. The nearest farmland of statewide importance is mapped along China Slough approximately 1 mile east of the project area.

Unique Farmland

As shown on Figure 4.3-1, Unique Farmland is mapped along the north bank of China Slough just downstream from the railroad, in a small section near the levee setback options, and adjacent to the USACE levee that would be raised on the south bank of Deer Creek (east of Leininger Road).

Farmland of Local Importance

As shown on Figure 4.3-1, Farmland of Local Importance is mapped along both sides of the USACE levee that would be raised that crosses SR 99 on the south bank of Deer Creek. Farmland of Local Importance is also mapped adjacent to the proposed non-USACE levee and berm removal site near SR 99, adjacent to the proposed new embankment, adjacent to and within the footprint of the levee setback areas, and within the SR 99-to-SVRIC Dam floodway easement.

Grazing Land

As shown on Figure 4.3-1, Grazing Land is mapped adjacent to the proposed non-USACE levee and berm removal site near SR 99, adjacent to the proposed new embankment, and adjacent to and within the footprint of the levee setback areas.

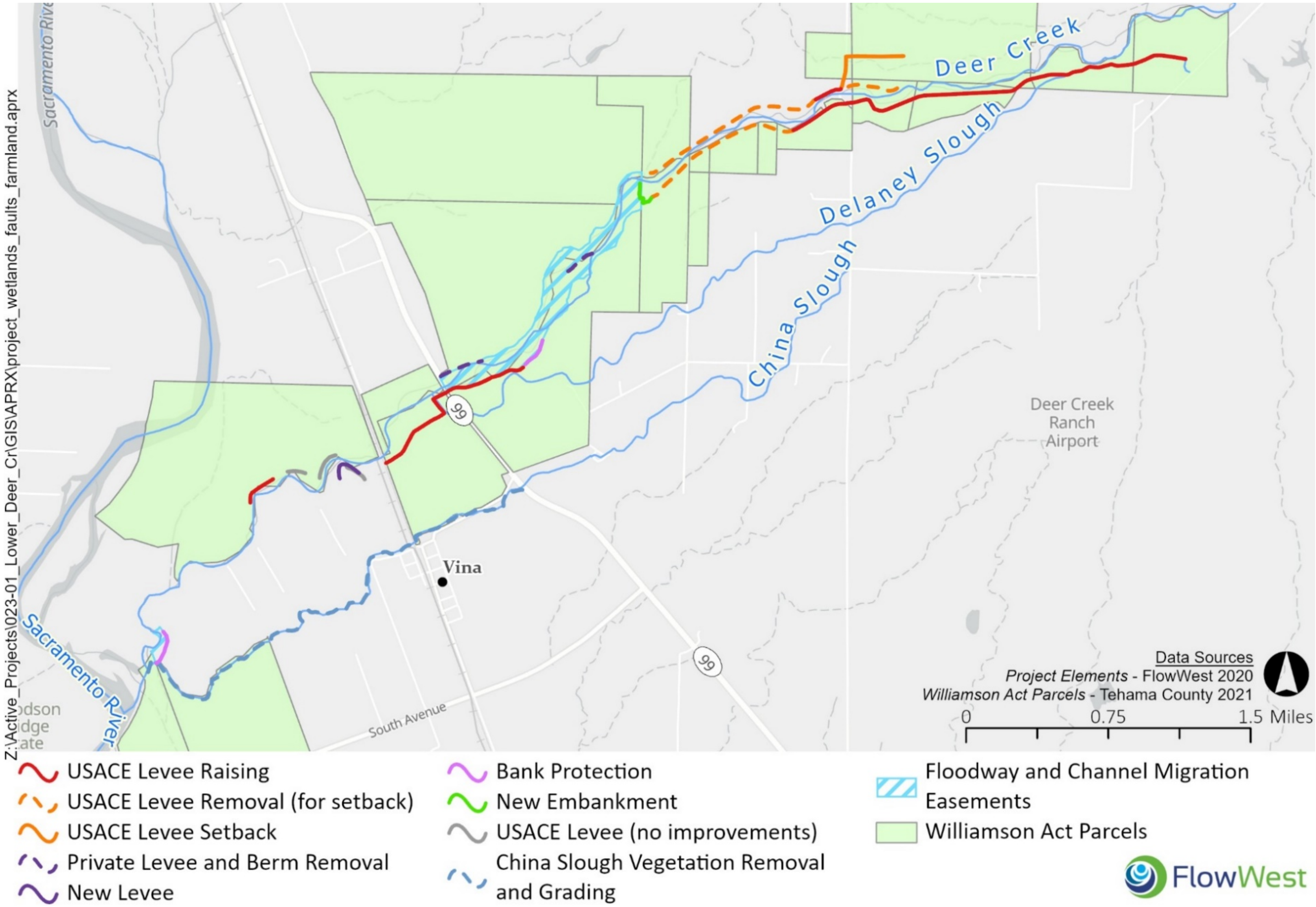
Urban and Built-Up Land

As shown on Figure 4.3-1, Urban and Built-Up Land is mapped adjacent to China Slough in the town of Vina and adjacent to the proposed new levee at the Abbey.

4.2.1.3 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 conversion to urban uses (California Department of Conservation 2019b). The act provides for local governments to enter into contracts with private landowners to restrict land use to agricultural or related open space purposes. In return, landowners receive property tax assessments that are lower than market value. The lands in the project area and vicinity that have entered into a California Land Conservation Act contract are shown in Figure 4.3-3. The majority of proposed construction activities would occur on lands that have Williamson Act contracts. The upper reach of China Slough that would be excavated and the north bank of the levee setback reach are exceptions. Other proposed project elements that would not occur on lands under Williamson Act contracts are the bank protection at the China Slough confluence with Deer Creek and the new levee at the Abbey.

Figure 4.3-3 **Williamson Act Parcels in the Project Vicinity**



4.2.1.4 Land Use

The project area comprises three land use designations (Tehama County 2009):

- Habitat Resources — The Habitat Resources designation is intended for the protection and preservation of Tehama County's wildlife resources, to prevent their wasteful destruction, and to recognize their ecological, recreational, and aesthetic values. Lands in this designation shall remain in their natural states, yet allow low-intensity recreational activities such as hiking or nature study, if these activities do not threaten the integrity of the habitat. Small areas of Habitat Resources land are mapped downstream of SR 99 along the south bank of Deer Creek and at the Sacramento River confluence.
- Upland Agricultural (UA) — The UA designation is used to preserve lands capable of supporting grazing activities; provide for areas of intensive and extensive agriculturally compatible uses; identify and conserve areas of important open space, recreation, scenic, and natural value; and accommodate the use of land for compatible nonagricultural uses such as commercial recreation, hunting and fishing, resource protection and management, and habitat management. The primary use of land in this designation is livestock grazing. Secondary uses include tree, row, and field crops; farming; animal husbandry; dairies; nurseries and greenhouses; commercial recreation, including hunting and fishing; mineral exploration; and residential uses supporting agricultural and commercial recreation operation. Land mapped as UA surrounds the project area, but is not located immediately adjacent to Deer Creek or China Slough.
- Valley Floor Agriculture (VFA) — The VFA designation is applied to lands which are suited for, and are appropriately retained for, the production of orchard and field crops. The designation includes lands with present or future potential for significant agricultural production, availability of water, and on which contiguous or intermixed smaller parcels having noncompatible uses could jeopardize the agricultural use of agricultural lands. Permitted nonagricultural uses, to the greatest extent possible, should not occur on lands that otherwise might be devoted to agricultural production. The primary use of land in this designation is for grazing; production of tree, row, and field crops; animal husbandry; dairies; nurseries and greenhouses and uses

integrally related to the processing and sales of agricultural products. Secondary uses include mineral exploration; processing and development of natural resources; residential uses accessory to and supporting an agricultural use; conservation; and outdoor recreation uses. The project area consists predominantly of VFA lands.

4.2.1.5 Zoning

Zoning classification are based on the Tehama County land use designations (Tehama County 2009). Most of the project area is zoned as Agricultural, Valley District (AG-2). Some areas upstream of SR 99 are zoned as a combination of AG-2 and Agricultural, Upland District (AG-1), and some areas downstream of SR 99 are zoned as a combination of AG-2 and Natural Resource (NR).

4.3.2 Regulatory Setting

The following plans, policies, regulations, or laws related to land use and agricultural resources apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

No federal plans, policies, regulations, or laws related to land use or agricultural resources apply to the alternatives under consideration.

State Regulations

- California Land Conservation Act of 1965 (Williamson Act) (restricts land use on contracted parcels to farmland or related open space use.) — Applies to impact analysis, planning.
- California Department of Conservation, Office of Land Conservation – Important Farmland Inventory System and California FMMP — Applies to impact analysis and planning.

Regional and Local Regulations

- Tehama County General Plan (2009) Goals and Policies Relevant to Agricultural Resources
    - Policy AG-1.1 (The County shall provide for the protection of agricultural lands from nonagricultural development pressures and uses that will adversely impact or hinder existing or foreseeable agricultural operations through a separation utilizing natural buffers and land use transition areas that mitigate or prevent land use conflicts with the development interest providing the buffers.) — Applies to impact analysis, planning, and design.
    - Policy AG-1.2 (The County shall establish criteria for demonstrating appropriateness of conversion of agricultural land to other uses.) — Applies to impact analysis and planning.

- Tehama County General Plan (2009) Goals and Policies Relevant to Land Use
    - GOAL OS-12 (To protect and maximize the present and future productive, economic, and environmental values of the County's soil resources.) — Applies to impact analysis.
    - Policy OS-12.1 (The County shall recognize the need to protect and conserve areas where soils have high resource values, especially in terms of potential agricultural productivity.) — Applies to impact analysis.
    - Policy LU-5.3 (The County shall accommodate growth and other nonagricultural development by directing new growth to lands that do not exhibit characteristics that would support agricultural uses and areas for which services and infrastructure have been planned to support new growth.) — Applies to impact analysis.

4.3.3 Impacts and Mitigation

4.3.3.1 Methodology

For the purposes of this analysis, agricultural 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 (PRC Section 21060.1).

- Williamson Act lands that are under continuing-term and nonrenewal contracts.

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 PRC Section 21060.1 and the State CEQA Guidelines Appendix G. GIS data were used to assist in identifying areas of existing agricultural lands that could be affected by project implementation.

Because land use conflicts are related to land use inconsistency with agricultural land, the agricultural and land use impact discussions are combined.

4.3.3.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Impacts on agricultural resources and land use would be considered significant if they would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use.
- Conflict with existing zoning for agricultural use, or a Williamson Act contract.
- Physically divide an established community.
- Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

4.3.3.3 Topics Not Evaluated Further

During environmental analysis, the following topics were eliminated from detailed analysis because no impacts from project implementation are anticipated:

- Physically divide an established community. The proposed project is located in an unincorporated agricultural area of Tehama County with very limited housing. Most of the rural residences in the project vicinity are located west of SR 99 in the main part of the town center of Vina.

The new setback levees and other related project components would be constructed in the same location or immediately adjacent to existing infrastructure, which is located east and north of these residences and would not physically divide them. Therefore, no impact would occur.

4.3.4 Impact Analysis

Impact AG-1: *Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural use, or cause a significant environmental impact due to a conflict with a land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.*

No Project Alternative

No Impact. Under the no project alternative, there would be no impact to farmland because no construction would occur. Similarly, no changes to hydrology or maintenance activity would occur, resulting in no impact. However, the operational impacts on agricultural resources that would continue to occur under the no project alternative are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

Less than Significant with Mitigation Incorporated. The proposed project construction and O&M activities would have no impact on farmland of statewide importance because it is not located within the project area. Temporary impacts to prime or unique farmland could occur during construction of the raised levees, installation of bank protection, and excavation of China Slough. Impacts would be minor, temporary, and would not conflict with a land use plan, and disturbed areas would be restored to pre-project conditions, resulting in a **less-than-significant impact**.

Under Alternative A, proposed construction activities within the proposed levee setback area would result in the permanent conversion of approximately 0.23 acre of unique farmland to non-agricultural uses. This acreage would represent a small fraction of the total acreage of unique farmland in the project vicinity and Tehama County and would not result in the fragmentation of the surrounding agricultural land. This loss of unique farmland would not be substantial, and impacts would be **less than significant**.

Although the project footprint was designed to minimize impacts to agricultural lands, staging areas were sited on already disturbed lands, and access was limited to existing roads to the extent feasible, construction of Alternatives A through F would result in the permanent conversion of prime farmland to nonagricultural uses. The majority of prime farmland that would be converted is comprised of irrigated and nonirrigated pasture. The acreage of loss would vary by alternative and is summarized in Table 4.3-1.

Table 4.3-1 Estimated Conversion of Farmland Acreage to Nonagricultural Uses by Project Alternative

Project Alternative	Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance?	Acreage of Prime Farmland Converted to Nonagricultural Uses	Acreage of Unique Farmland Converted to Nonagricultural Uses	Acreage of Farmland of Statewide Importance Converted to Nonagricultural Uses
No Project	No	NA	0	0
A	Yes	42.4	0.23	0
B	Yes	36.1	0	0
C	Yes	27.2	0	0
D	Yes	24.2	0	0
E	Yes	14.9	0	0
F	Yes	3.9	0	0

The two floodway easement areas included as common project elements would convert approximately 3.9 acres of prime farmland to nonagricultural uses . Under Alternatives A through E, additional prime farmland would be converted in the levee setback reach, which would be held under an easement to allow for frequent inundation by Deer Creek and establish habitat for salmonids, precluding the area from being actively farmed. This conversion would also conflict with the County land use designations because the majority of the project area is designated as VFA lands on which the conversion to Habitat Resources is not permitted. The permanent loss of prime farmland would, therefore, result in a **potentially significant impact**.

Improvements to regional flood risk reduction provided by the project elements could, in some areas, reduce the frequency and severity of flood events that adversely affect agricultural lands within the project area. This could reduce the potential for conversion of agricultural land to other uses by reducing catastrophic losses that might lead to the abandonment of agricultural operations and conversion of the land to another purpose. Because of this, project implementation could have a beneficial effect in terms of creating more sustainable conditions for agricultural activities to persist in Lower Deer Creek and may compensate for the loss of prime farmland, which would range from 3.9 to 42.4 acres depending on the project alternative implemented. But, 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 future flood events. Such potential benefits may not completely compensate for project-related losses of prime farmland under all project alternatives.

Because the proposed conversion of prime farmland to nonagricultural use may constitute an irretrievable and permanent loss of the use of this land for agricultural purposes despite the potential project benefits described above, impacts would remain **potentially significant**. If determined by Tehama County to be required, implementation of the compensatory measures included in Mitigation Measure AG-1 would reduce these potential impacts to **less than significant**. Implementation of the measures included in Mitigation Measure GEO-2 to store and reuse excavated topsoil and make it available to agricultural land users in the project vicinity would enhance soil productivity and further reduce impacts.

Mitigation Measure AG-1: *If Determined to be Necessary, Establish Conservation Easements for the Loss of Prime Farmland.*

If project-related benefits to agricultural lands are determined insufficient to compensate for the loss of prime farmland, agricultural conservation easements will be considered in consultation with Tehama County. If easements are applicable, the factors listed below will be considered.

- Methods for compensation may include establishing agricultural conservation easements, paying in-lieu fees toward agricultural conservation easements, and supporting agricultural land trusts.

- The appropriate ratio of purchase or establishment of agricultural conservation easements relative to conversion of Prime Farmland will be established following consultation with Tehama County. The mitigation ratio shall not exceed 1-to-1. 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.
- Where conservation easements are established, 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.

Mitigation Measure GEO-2: *Store and Reuse Topsoil.*

Refer to Impact GEO-2 in Section 4.10, "Geology, Soils, and Paleontological Resources," for the full text of this mitigation measure.

Impact AG-2: *Conflict with existing zoning for agricultural use, or a Williamson Act contract.*

No Project Alternative

No Impact. There would be no conflicts with existing zoning or Williamson Act contracts under the no project alternative because no construction would occur. Similarly, no changes to hydrology or maintenance activity would occur, resulting in no impact. The operational impacts on agricultural and Williamson Act lands that would continue to occur under the no project alternative are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternative A through F

Potentially Significant and Unavoidable. The majority of lands within the project area are zoned for agricultural uses. As shown in Figure 4.3-3, with the exception of the proposed new levee around the Abbey laundry facilities and the upstream portion of the proposed China Slough vegetation removal and excavation, construction of the common project elements would be implemented on agricultural lands held under Williamson Act contracts. Temporary impacts to Williamson Act lands could occur during construction of the raised levees, removal of the private levee and berm, installation of bank protection, and excavation of China Slough. These impacts would be minor and temporary, and disturbed areas would be restored to pre-project conditions, resulting in a **less-than-significant impact**.

Construction of Alternatives A through F would result in permanent impacts to Williamson Act lands, even though the project footprint was designed to minimize impacts to agricultural lands, staging areas were sited on already-disturbed lands, and access was limited to existing roads to the extent feasible. Table 4.3-2 shows the total acreages of active and nonrenewal Williamson Act contracts that would be converted under each project alternative.

Table 4.3-2 Estimated Conversion of Williamson Act Lands to Nonagricultural Uses by Project Alternative

Project Alternative	Acreage of Williamson Act Lands Converted to Non-Agricultural Uses
A	97
B	90
C	80
D	70
E	66.5
F	55

Agricultural land in the floodway and channel migration easements would be subject to periodic inundation during high flows and flood events; the land in the SR 99-to-SVRIC Dam easement and confluence easement could not be used for agriculture after project construction. Overall, construction of the common project elements would result in the conversion of approximately 55 acres of Williamson Act lands to nonagricultural uses. Within the levee setback reach, Alternatives A through E would convert additional agricultural lands along the south bank of Deer Creek and in some areas of the north bank to nonagricultural uses and likely would be inconsistent with allowable land uses under existing Williamson Act contracts, resulting in a **potentially significant impact**. If warranted to compensate for the loss of prime farmland, the compensatory measures included in Mitigation Measure AG-1 may reduce the level of significance of this impact. But, because the acreage of conversion of Williamson Act land would be greater than the loss of prime farmland, the compensatory measures may not be sufficient and impacts could remain **significant and unavoidable**.

4.4 Air Quality

4.4.1 Environmental Setting

This section describes existing air quality conditions in the proposed project area. This section also provides a brief summary of applicable regulations to add context for the air quality summary and analysis.

4.4.1.1 Background

The CAA is implemented by the EPA and sets ambient air limits, referred to as the NAAQS, for six criteria pollutants: PM_{10}, $PM_{2.5}$, CO, NO_2, ground-level ozone, and lead. Of these criteria pollutants, PM and ground-level ozone pose the greatest threats to human health. Ground-level ozone is caused by emissions of the ozone precursors nitrous oxides (NO_x) and reactive organic gases (ROG).

CARB sets the CAAQS for criteria pollutants that are more stringent than the NAAQS and include the following additional contaminants: visibility-reducing particles, hydrogen sulfide, sulfates, and vinyl chloride. These national and State criteria pollutants are further described in this section and, as applicable, evaluated in the impact discussion.

4.4.1.2 Regional Setting

California is divided into 15 air basins by geography and meteorological features to better manage air pollution. The proposed project is located in the Sacramento Valley Air Basin (SVAB), which comprises nine air districts and includes the counties of Shasta, Tehama, Glenn, Butte, Colusa, Yuba, Sutter, Yolo, Sacramento, and portions of Placer and Solano. The SVAB is divided into two planning areas: the Northern Sacramento Valley Air Basin (NSVAB) and the Greater Sacramento Air Region (Tehama County 2008). Tehama County is part of the NSVAB, which includes the counties of Butte, Colusa, Glenn, Shasta, Sutter, Tehama, and Yuba. The NSVAB is also known as the Northern Sacramento Valley Planning Area (NSVPA). The TCAPCD manages attainment of air quality standards and permitting within the Tehama County portion of the NSVAB.

4.4.1.3 Northern Sacramento Valley Air Basin

The NSVAB is generally shaped as an elongated bowl ranging from low valley elevations to mountains above 6,000 feet elevation (Sacramento Valley Air

Quality Engineering and Enforcement Professionals 2015). The NSVAB is bounded on the north and west by the Coast Ranges, on the north by the Sierra Nevada, and on the east by the southern portion of the Cascade Mountain Range (Sacramento Valley Air Quality Engineering and Enforcement Professionals 2015). Winds from the south can transport pollutants to the NSVAB from the more populated, southern SVAB areas (Sacramento metropolitan area; Yolo, Solano, and portions of El Dorado, Placer, and Sutter counties). The mountain ranges surrounding the NSVAB, particularly during temperature inversions, can trap transported and local air pollutant emissions (Sacramento Valley Air Quality Engineering and Enforcement Professionals 2015). The majority of the population is within the valley areas of the NSVPA (less than 1,000 feet elevation), although a substantial portion of the NSVPA is at elevations higher than 1,000 feet (Sacramento Valley Air Quality Engineering and Enforcement Professionals 2015).

4.4.1.4 Climate and Topography

Tehama County has a Mediterranean climate characterized by cool, wet winters and hot, dry summers. Average temperatures range from a low of 36 degrees Fahrenheit (°F) in January to a high of 96°F in July (Western Regional Climate Center 2019). Average annual precipitation is approximately 26 inches, with most precipitation occurring from October through May (Western Regional Climate Center 2019). The predominant wind direction varies throughout the year but is generally from the south or north (Weather Spark 2019). Average wind speeds vary from approximately 4.8 to 6.2 miles per hour (Weather Spark 2019).

The project area gradually slopes downward to the southwest away from the Sierra Nevada. Elevations in the project area range from approximately 190 to 310 feet.

4.4.2 Air Pollutants

Except where noted, the information below is taken from the California Air Pollution Control Officers Association Health Effects webpage, which provides general information on the effects of air pollution on human health (California Air Pollution Control Officers Association 2019).

4.4.2.1 Carbon Monoxide

CO is an odorless, colorless gas that is highly toxic. CO is formed by the incomplete combustion of fuels and is emitted directly into the air. Ambient CO concentrations normally are considered a localized effect and typically correspond closely to the spatial and temporal distributions of vehicular traffic, forming pollutant "hot spots." CO concentrations are also influenced by wind speed and atmospheric mixing. Under inversion conditions, CO concentrations may be distributed more uniformly over an area to some distance from vehicular sources. CO binds with hemoglobin, the oxygen-carrying protein in blood, and reduces the blood's capacity for carrying oxygen to the heart, brain, and other parts of the body. At high concentrations, CO can cause heart difficulties in people with chronic diseases. CO can also impair mental abilities and, in extreme cases, cause death.

4.4.2.2 Nitrogen Oxides

NO_x is a family of gaseous nitrogen compounds and are precursors to the formation of ozone and PM. The major component of NO_X is NO_2, which is a reddish-brown gas that is toxic at high concentrations. NO_X results primarily from the combustion of fossil fuels under high temperature and pressure. Fuel combustion, primarily from on-road and off-road motor vehicles and industrial sources, is the major source of this air pollutant.

4.4.2.3 Volatile Organic Compounds

Volatile organic compounds (VOCs) are hydrocarbon compounds that exist in the ambient air. VOCs contribute to the formation of smog and may themselves be toxic. VOC emissions are a major precursor to the formation of ozone.

4.4.2.4 Ozone

Ozone is a reactive gas consisting of three oxygen atoms. In the troposphere (the lowest region of the atmosphere), it is produced by a photochemical process involving the sun's energy. It is a secondary pollutant that is formed when NO_x and VOCs (known as ozone precursors) react in the presence of sunlight. Ozone at the earth's surface causes numerous adverse health effects and is a pollutant regulated by State and federal air quality agencies. It is a major component of smog. But, in the stratosphere, ozone exists naturally and shields the Earth from harmful incoming ultraviolet radiation. High concentrations of ground-level ozone can adversely affect the human respiratory system and aggravate cardiovascular disease and many respiratory ailments. Ozone also damages natural ecosystems, agricultural crops, and human-made materials such as rubber and plastics.

4.4.2.5 Particulate Matter

PM is a complex mixture of extremely small particles and liquid droplets. PM is made up of multiple components, including acids, organic chemicals, metals, and soil or dust particles. The size of particles in PM is directly linked to the particles' potential for causing health problems. PM_{10} is of concern because these particles pass through the throat and nose and are deposited in the thoracic region of the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. $PM_{2.5}$ penetrates even more deeply into the thoracic and alveolar regions of the lungs.

4.4.2.6 Sulfur Dioxide

SO_2 is a colorless, toxic gas formed primarily by the combustion of sulfur-containing fossil fuels. It has a pungent odor similar to the smell of a rotten egg. Suspended SO_2 particles can contribute to poor visibility within air basins and are a component of PM_{10}.

4.4.2.7 Lead

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. The health effects of lead poisoning include loss of appetite, weakness, apathy, and miscarriage. Lead poisoning can also cause lesions of the neuromuscular system, circulatory system, brain, and gastrointestinal tract.

Historically, gasoline-powered automobile engines were a major source of airborne lead through the use of leaded fuels. Since the use of leaded fuel has been mostly phased out, ambient concentrations of lead have decreased dramatically.

4.4.2.8 Hydrogen Sulfide

Hydrogen sulfide (H_2S) is associated with geothermal activity, oil and gas production and refining, sewage treatment plants, and confined animal feeding operations. H_2S is extremely hazardous in high concentrations and can cause death (California Office of Environmental Health Hazard Assessment 2000).

4.4.2.9 Sulfates

Sulfates are the fully oxidized, ionic form of sulfur. Sulfates occur in combination with metal or hydrogen ions. In California, emissions of sulfur compounds result primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates is comparatively rapid and complete in urban areas of California because of its regional meteorological features (California Air Resources Board 2021).

CARB's sulfate standard is designed to prevent aggravation of respiratory symptoms. Effects of sulfate exposure at levels that exceed the standard include decreased ventilatory function, aggravation of asthmatic symptoms, and increased risk of cardiopulmonary disease. Sulfates are particularly effective in degrading visibility and because they are usually acidic and can harm ecosystems and damage materials and property.

4.4.2.10 Vinyl Chloride

Vinyl chloride is a colorless gas that does not occur naturally; it is formed when substances such as trichloroethane, trichloroethylene, and tetrachloroethylene are broken down. Vinyl chloride is used to make polymer of vinyl chloride (PVC), which is used in plastic products such as pipes, wire and cable coatings, and packaging materials (Agency for Toxic Substances and Disease Registry 2006).

4.4.2.11 Toxic Air Contaminants

TACs are air pollutants that may lead to serious illness or increased mortality, even when present in relatively low concentrations. Hundreds of different types of TACs exist, with varying degrees of toxicity. Many TACs are confirmed or suspected carcinogens or are known or suspected to cause birth defects or neurological damage. For some chemicals, such as carcinogens, no thresholds exist below which exposure can be considered risk free.

Sources of TACs include stationary sources, area-wide sources, and mobile sources. The EPA maintains a list of 187 TACs, also known as hazardous air pollutants (HAPs). These HAPS are included on CARB's list of TACs along with additional chemicals identified as TACs in California (California Air Resources Board 2011). According to the California Almanac of Emissions and Air Quality (California Air Resources Board 2013), many researchers consider diesel particulate matter (DPM) to be a primary contributor to health risk from TACs because particles in the exhaust carry many harmful organics and metals, rather than being a single substance, as are other TACs. Using the CARB emission inventory's PM_{10} database, ambient PM_{10} monitoring data, and results from several studies, CARB has made preliminary estimates of DPM concentrations throughout the state (California Office of Environmental Health Hazard Assessment 2001). According to estimates by CARB, outdoor (ambient) DPM concentrations in 2012 have decreased by 68 percent from 1990 levels (from approximately 1.8 micrograms per cubic meter [$\mu g/m^3$] to less than 0.6 $\mu g/m^3$) (California Air Resources Board 2019a).

4.4.3 Local Air Quality Conditions

4.4.3.1 Project Vicinity and Existing Land Uses

The project area is located along Deer Creek and a portion of China Slough and the adjacent Sacramento River, in the vicinity of the Town of Vina (a census-designated place) in southern Tehama County, California. The project area is located on land designated by the Tehama County General Plan (2009) as "valley floor ag" (agricultural uses) or "habitat resource." In Vina, land uses include valley floor agriculture, suburban, and public facility (Tehama County 2009).

4.4.3.2 Air Monitoring Data

The EPA, CARB, and local air districts operate an extensive air monitoring network to measure progress toward attainment of the NAAQS and CAAQS. The closest air monitoring station to the project area with available data for recent years is the Red Bluff Walnut Street station, approximately 23 miles from the project area. Table 4.4-1 shows the most recent three years (2015–2017) of available data from that station.

Table 4.4-1 Red Bluff Walnut Street Station Air Monitoring Data for 2015–2017

Pollutant Standard	Unit of Measure	Exceedances in 2015*	2015 Maximum Concentration	Exceedances in 2016*	2016 Maximum Concentration	Exceedances in 2017*	2017 Maximum Concentration
Ozone	1 hour	0/0	0.073 ppm	0/0	0.084 ppm	0/0	0.108 ppm
Ozone	8 hours	0	0.066 ppm	3	0.073 ppm	4/5	0.082 ppm
PM_{10}	Annual	NA	20.5 µg/m^3	NA	17.1 µg/m^3	NA	20.0 µg/m^3
PM_{10}	24 hours	NA/0	77.5 µg/m^3	0/0	49.6 µg/m^3	12/0	100.9 µg/m^3
$PM_{2.5}$	Annual	NA	NA	NA	NA	NA	7.2 µg/m^3
$PM_{2.5}$	24 hours	NA	59.2 µg/m^3	NA	32 µg/m^3	NA/5	85.9 µg/m^3

Notes:

PM_{10} = particulate matter with diameters 10 micrometers and smaller; $PM_{2.5}$ = particulate matter with diameters 2.5 micrometers and smaller; hr = hour; NA = not available (insufficient or no data available); ppb = parts per billion; ppm = parts per million; µg/m^3 = micrograms per cubic meter

* Indicates the number of exceedance days recorded annually at this monitoring station for a particular constituent compared to that constituent's California Ambient Air Quality Standards and National Ambient Air Quality Standards. The first number is the State value, and the second number is the federal value if they are different. The highest maximum (State or national) is used.

During 2015-2017, no data were available in Tehama County for nitrogen dioxide, carbon monoxide, sulfur dioxide, and hydrogen sulfide.

Source: California Air Resources Board 2019a

Estimated annual emissions of criteria air pollutants for the most recent years available for Tehama County are provided in Table 4.4-2.

Table 4.4-2 Estimated Annual Average Emissions in Tehama County

Year	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
2012	6.71	11.28	24.4	0.10	8.26	2.22
2015	7.8	12.2	35.8	0.1	15.6	4.4
2020	7.4	9.4	32.4	0.1	15.9	4.4

Notes: All measurements are in tons per day.

ROG = reactive organic gasses; NO_x = nitrogen oxide; CO = carbon monoxide; SO_X = sulfur oxide; PM_{10} = particulate matter with diameters 10 micrometers and smaller; $PM_{2.5}$ = particulate matter with diameters 2.5 micrometers and smaller.

Source: California Air Resources Board 2019b

4.4.3.3 Existing Sources of Air Pollution and Odors

Existing sources of air pollution or odors in Tehama County include motor vehicles (particularly on Interstate 5 [I-5] and SR 99), dust from unpaved roads, woodburning from stoves and fireplaces, agricultural operations, timber operations, industrial processes, and construction activities (Tehama County 2008). Combustion of fossil fuels by motor vehicles within the county is the largest contributor of ozone, and dust from unpaved roads is the largest source of PM_{10} (Tehama County 2008). Transport of pollutants from the Greater Sacramento Air Region, south of the NSVAB, has a substantial effect on the air quality, particularly ozone concentrations, within the NSVAB and Tehama County (California Air Resources Board 2001; Tehama County 2008).

4.4.3.4 TACs in the Project Vicinity

According to the Air Toxics "Hot Spots" Program data (California Air Resources Board 2019b), in 2016, there were approximately 60 stationary sources of TAC emissions in Tehama County, with the majority occurring in Red Bluff and Corning. Two facilities were located within the project vicinity (Vina area). Emissions from those sources are provided in Table 4.4-3. But, the primary source of TACs in the project vicinity is combustion of fossil fuels, in particular gasoline and diesel fuel, from on-road and off-road vehicles along SR 99.

Table 4.4-3 Summary of Stationary Facility Sources of TAC Emissions in the Project Vicinity, 2016

Contaminant	ROG	CO	NO_x	SO_x	Total PM	PM_{10}
Carl Woods Construction	NA	NA	NA	NA	5.02	2.51
Deer Creek Rock	0.28	2.33	6.34	3.56	6.59	3.67

Notes:

ROG = reactive organic gases; CO = carbon monoxide; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM = particulate matter; PM_{10} = particulate matter with diameters 10 micrometers and smaller; NA = data not available.

All measurements are in tons per day.

Data are from 2016. Emission inventory updates are required every four years. Both sources are located in Vina on Leininger Road.

Source: California Air Resources Board 2019b

4.4.3.5 Attainment Status

Table 4.4-4 shows the current attainment status in Tehama County for the State and federal ambient air quality standards. Tehama County is designated as nonattainment for the State ozone and PM_{10} standards. All areas of Tehama County that include the project area are in attainment or unclassified for the federal ozone standard, as well as the other NAAQS.

Table 4.4-4 Attainment Status of the State and Federal Ambient Air Quality Standards in the Tehama County Portion of the Sacramento Valley Air Basin

Contaminant	Averaging Time	Concentration[1,2]	State Standards Attainment Status[3]	Federal Standards Attainment Status[4]
Ozone[5]	1 hour	0.09 ppm	N	NA
Ozone[5]	8 hours	0.070 ppm[5]	N	A[6]
Carbon monoxide	1 hour	20 ppm	U	NA
Carbon monoxide	1 hour	35 ppm	NA	A
Carbon monoxide	8 hours	9.0 ppm	U	A
Nitrogen dioxide[7]	1 hour	0.18 ppm	A	NA
Nitrogen dioxide[7]	1 hour	0.100 ppm[2]	NA	A
Nitrogen dioxide[7]	Annual	0.030 ppm	A	NA

Contaminant	Averaging Time	Concentration[1,2]	State Standards Attainment Status[3]	Federal Standards Attainment Status[4]
	arithmetic mean			
Nitrogen dioxide[7]	Annual arithmetic mean	0.053 ppm	NA	A
Sulfur dioxide [8, 9]	1 hour	0.25 ppm	A	NA
Sulfur dioxide [8, 9]	1 hour	0.075 ppm[9]	NA	A
Sulfur dioxide [8, 9]	24 hours	0.04 ppm	A	NA
Sulfur dioxide [8, 9]	24 hours	0.14 ppm	NA	A
Sulfur dioxide [8, 9]	Annual arithmetic mean	0.030 ppm	NA	A
Particulate matter (PM_{10})	24 hours	50 μg/m^3	N	NA
Particulate matter (PM_{10})	24 hours	150 μg/m^3	NA	A
Particulate matter (PM_{10})	Annual arithmetic mean	20 μg/m^3	N	NA
Fine particulate matter ($PM_{2.5}$)[10]	24 hours	35 μg/m^3	NA	U
Fine particulate matter ($PM_{2.5}$)[10]	Annual arithmetic mean	12 μg/m^3	U	U
Sulfates	24 hours	25 μg/m^3	A	NA
Lead[11,12]	30-day average	1.5 μg/m^3	A	NA
Lead[11,12]	3-month rolling average	0.15 μg/m^3	NA	U/A
Hydrogen sulfide	1 hour	0.03 ppm	U	NA
Vinyl chloride (chloroethene) [11]	24 hours	0.010 ppm	U	NA
Visibility Reducing particles[13]	8 hours (10:00 to 18:00 PST)	See footnote 13	U	NA

Notes:

A = attainment; N = non-attainment; U = unclassified; NA = threshold not applicable; ppm = parts per million; PST = Pacific Standard Time; µg/m^3 = micrograms per cubic meter; $PM_{2.5}$ = particulate matter with diameters 10 micrometers and smaller; PM_{10} = particulate matter with diameters 10 micrometers and smaller: PST = Pacific Standard Time; °C = degrees Celsius; ppm = parts per million; ppb = parts per billion.

1. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 °C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this stable refers to ppm by volume, or micromoles of pollutant per mole of gas.
2. National Primary Standards. The levels of air quality necessary, with an adequate margin of safety to protect the public health.
3. California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, and visibility-reducing particles) are values that are not to be exceeded. All others are not to be equaled or exceeded. CAAQAs are listed in the Table of Standards in the California Code of Regulations, Title 17, Section 70200.
4. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations averaged over three years, are equal to or less than the standard.
5. On October 1, 2015, the national eight-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
6. The project area is in attainment of the standard. The Tuscan Buttes (outside of the project area) is not in attainment for ozone.
7. To attain the one-hour national standard, the three-year average of the annual 98th percentile of the one-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national one-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national one-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

8. On June 2, 2010, a new one-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the one-hour national standard, the three-year average of the annual 99th percentile of the one-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
9. Note that the one-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the one-hour national standard to the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
10. On December 14, 2012, the national annual $PM_{2.5}$ primary standard was lowered from 15 µg/m^3 to 12.0 µg/m^3. The existing national 24-hour $PM_{2.5}$ standards (primary and secondary) were retained at 35 µg/m^3, as was the annual secondary standard of 15 µg/m^3. The existing 24-hour PM_{10} standards (primary and secondary) of 150 µg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over three years.
11. The California Air Resources Board has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
12. The national standard for lead was revised on October 15, 2008, to a rolling three-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
13. In 1989, the CARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Source: California Air Resources Board 2019b; United States Environmental Protection Agency 2019; Tehama County Air Pollution Control District 2015.

4.4.3.6 Sensitive Receptors

Sensitive receptors are those segments of the population most susceptible to poor air quality — children, the elderly, and individuals with serious pre-existing health problems affected by air quality (e.g., asthma) (California Air

Resources Board 2005). Examples of locations that contain sensitive receptors are residences, schools and school yards, parks and playgrounds, daycare centers, nursing homes, and medical facilities. Residences include houses, apartments, and senior living complexes. Medical facilities can include hospitals, convalescent homes, and health clinics. Playgrounds include play areas associated with parks or community centers. The proposed project is located in an area with agricultural land uses, scattered rural residences, and recreational areas centered around the local water ways (including the Sacramento River). The nearest community to the project area is Vina, which is a census-designated place with a population of roughly 240. SR 99 intersects the project area as it travels in a northwest-southeast direction. Otherwise, most land uses surrounding the project area are agricultural, as described above in Section 4.4.3.1, "Project Vicinity and Existing Land Uses."

Sensitive receptors near the project area, including in the vicinity of all six setback alternatives and the hauling routes, are indicated on Figures 4.4-1 and 4.4-2, which are also included in Appendix A. Nearest receptors include residences in Vina, residences along Leininger Road, two recreational areas (Woodson Bridge State Recreation Area, Tehama County River Park), a religious facility (Abbey of New Clairvaux), and Vina Elementary School. For the purposes of air quality calculations, the edge of these properties would be located approximately 15 (residence in Vina), 90 (residence on Leininger Road), 185 (Woodson Bridge State Recreation Area), 690 (Vina elementary), 760 (Abbey), and 4,640 feet (Tehama County River Park), respectively, from the edge of the project area. Distances from the proposed project's stockpile and hauling areas are provided in Table 4.4-5. Additional sensitive receptors (middle and high schools, dependent care, medical care facilities [hospital], and preschools) are located a minimum of 1.5 miles from the project area in and near the cities of Red Bluff and Corning.

Figure 4.4-1 **Sensitive Receptors in the Vicinity of Proposed Project Construction Areas**

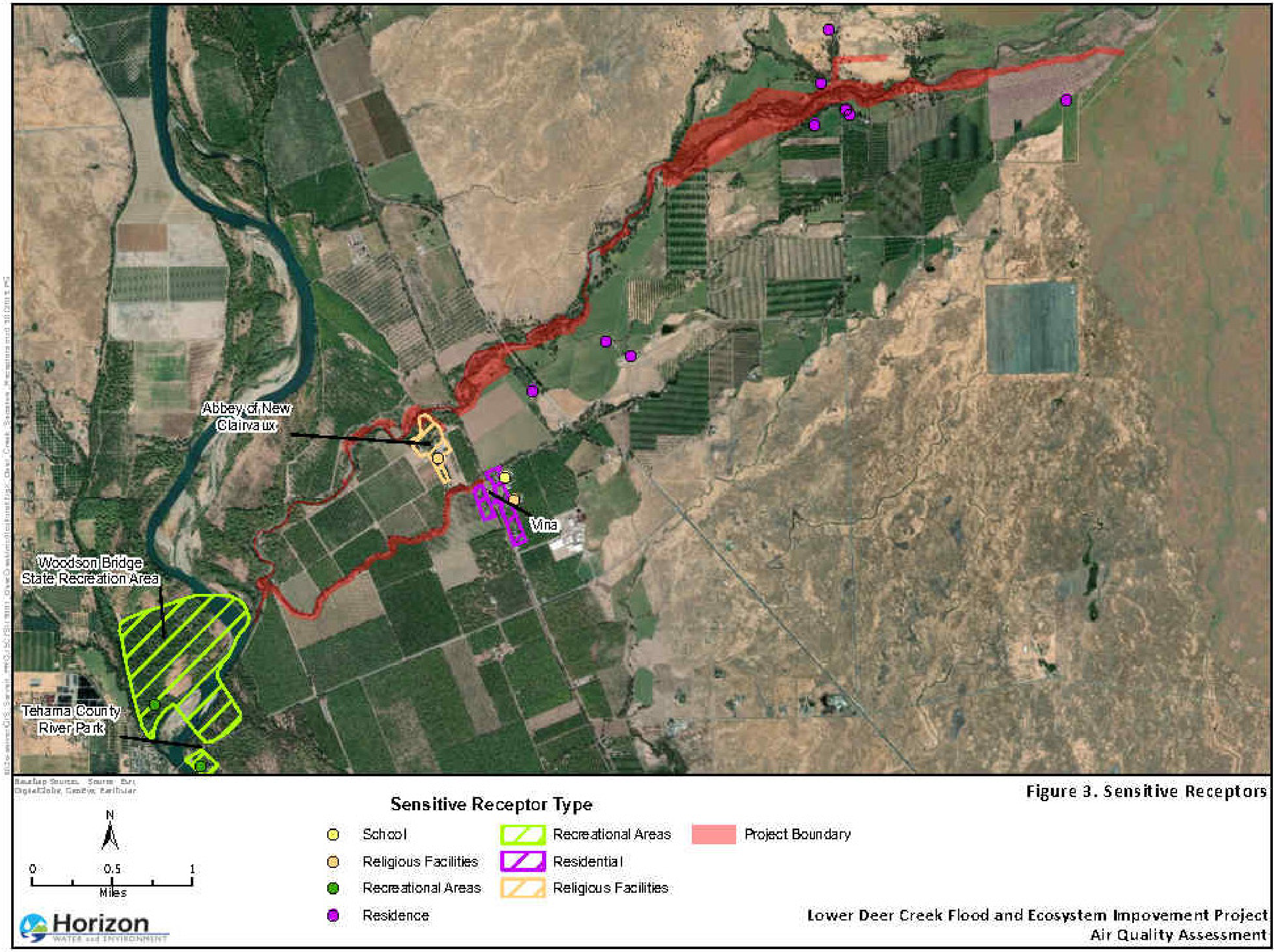


Figure 4.4-2 Proposed Access Roads, Hauling Routes, and Stockpile Locations in Relation to Sensitive Receptors

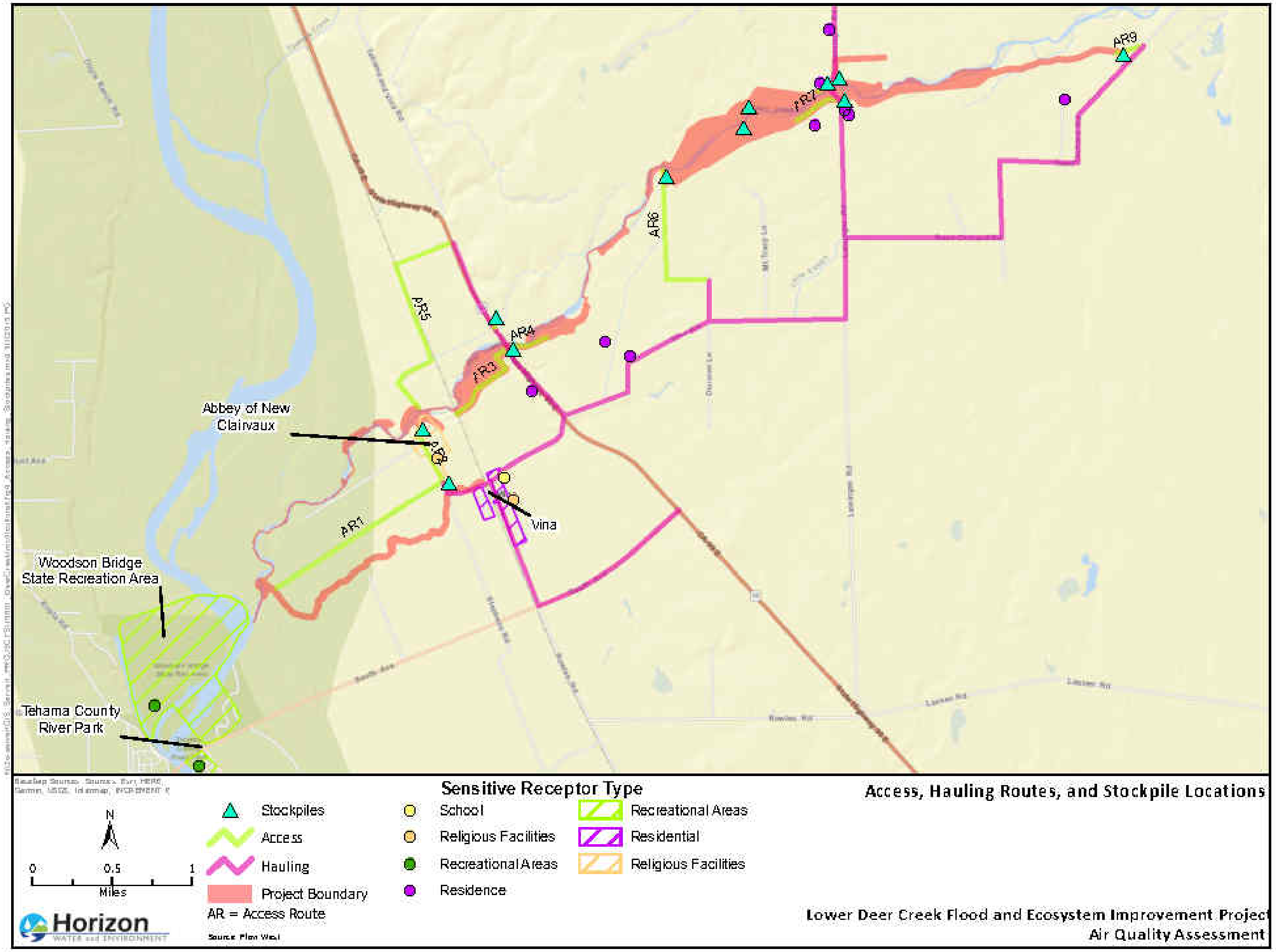


Table 4.4-5 Sensitive Receptors in the Vicinity of the Proposed Project

Sensitive Receptor Type	Sensitive Receptor Name	Approx. Distance (feet) from Project Boundary	Approx. Distance (feet) from Nearest Project Stockpile Area	Approx. Distance (feet) from Nearest Project Hauling Routes
Residence	7th Street, Vina	15	830	830
Residence	Leininger Road	90	255	175
Recreation Area	Woodson Bridge State Recreation Area	185	7,940 (1.5 miles)	1,230
Elementary School	Vina Elementary School	690	1,810	1,810
Religious Facilities	Abbey of New Clairvaux	760	0	0
Recreation Area	Tehama County River Park	4,639 (0.9 mile)	12,083 (2.3 miles)	5,926 (1.1 miles)
Dependent Care Home	Serenity House	8,800 (1.7 miles)	16,160 (3.1 miles)	9,240 (1.7 miles)
High School	Centennial High School	23,340 (4.4 miles)	29,940 (5.7 miles)	23,500 (4.5 miles)
Daycare / Preschool	Busy Bees Preschool	23,870 (4.5 miles)	28,510 (5.4 miles)	24,025 (4.5 miles)
Middle School	Maywood Middle School	39,390 (7.5 miles)	31,205 (5.9 miles)	24,815 (4.7 miles)
Elementary School	Lassen View Elementary School	59,136 (11.2 miles)	58,080 (11.0 miles)	300
Elementary School	Antelope Elementary School	95,040 (18 miles)	94,512 (17.9 miles)	70

4.4.4 Regulatory Setting

The following plans, policies, regulations, or laws related to air quality apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature.

Although DWR may comply with these local regulations, it is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below. It should be noted that although the proposed project would be required to comply with both State and federal air quality-related regulations, it would not be subject to a federal general conformity analysis because it is located in an attainment area and not in maintenance or nonattainment areas for federal ambient air quality standards (United States Environmental Protection Agency 2017).

Federal Regulations

- CAA — Applies to this impact analysis and construction.

State Regulations

- CARB, Airborne Toxic Control Measures — Applies to this impact analysis and construction.
- California CAA — Applies to this impact analysis and construction.

Regional and Local Regulations

- Northern Sacramento Valley Planning Area 2018 Triennial Air Quality Attainment Plan — Applies to planning and impact analysis.

4.4.5 Impacts and Mitigation

4.4.5.1 Methodology

Construction-related air quality impacts from the proposed project were evaluated quantitatively and qualitatively by considering the proposed project's sources and duration of criteria pollutant, TAC, and odor emissions; proximity to sensitive receptors; and frequency and duration of emissions. In addition, the NSVAB's existing air quality attainment status and applicable air quality plans were reviewed and considered in the impact analysis. Where specific construction-related details were lacking, impacts were conservatively judged to be significant, and prescriptive mitigation measures were developed to ensure significant impacts would be minimized.

As detailed in the project description, the six alternatives for the proposed project have differing material export/import quantities, hauling truck trip quantities, and areas of impact. Potential criteria pollutant emissions for all alternatives were estimated for the proposed project using the California Emissions Estimator Model (CalEEMod), version 2016.3.2, based on assumptions detailed below and in Appendix A. "Mitigated" emission levels were assumed to include equipment exhaust emission reduction measures, but did not include dust control measures.

For TACs and odors associated with the proposed project, impacts were evaluated qualitatively using the TCAPCD *Air Quality Planning & Permitting Handbook* (2015). This qualitative analysis was conducted based on pertinent information regarding TAC and odor sources (i.e., frequency and duration of emissions, type of sources, location of stockpile and construction areas, equipment and vehicle usage) and the proximity to sensitive receptors. Using this information, the proposed project was evaluated for the potential to create objectionable odors affecting a substantial number of people.

TCAPCD established screening criteria that specify an acceptable distance (1 mile) between sensitive receptors and common sources of odors, such as landfills and wastewater treatment plants. The TCAPCD acknowledges that a lead agency has discretion under CEQA to use established odor detection thresholds or other significance thresholds for CEQA review. Because the proposed project does not involve any odor sources included in the TCAPCD screening criteria, this analysis uses a qualitative assessment of potential odor sources and their impact.

4.4.5.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. The following criteria are based on Appendix G of the CEQA Guidelines (Association of Environmental Professionals 2020). Impacts on air quality would be significant if they would:

- Conflict with or obstruct implementation of the applicable air quality plan.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or State ambient air quality standard.
- Expose sensitive receptors to substantial pollutant concentrations.

- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

4.4.5.3 Tehama County APCD Significance Thresholds

The TCAPCD recommended CEQA thresholds of significance are outlined in its *Air Quality Planning and Permitting Handbook – Guidelines for Assessing Air Quality Impacts* (Tehama County Air Pollution Control District 2015) and summarized in Table 4.4-6. The TCAPCD analysis and recommended mitigation measures follow a tiered approach based on the overall project-generated emissions. The TCAPCD thresholds for ROG and NO_X, which are ozone precursors, are 25 pounds per day (lbs/day) for each pollutant. The PM_{10} threshold of significance is 80 lbs/day. In addition to these significance thresholds, the TCAPCD has determined that projects with emissions greater than the thresholds described below in Table 4.4-6 would be potentially significant and may require implementation of recommended mitigation measures to ensure a less than significant impact. Further, according to TCAPCD guidance, projects generating more than 137 lbs/day for ROG, NO_X, or PM_{10} would have significant impacts and would require implementation of mitigation measures. Proposed projects generating between 25 and 137 lbs/day would be potentially significant unless mitigation measures could reduce emissions below 25 lbs/day for ROG and NO_x and 80 lbs/day for PM_{10}.

Table 4.4-6 Applicable Tehama County Air Pollution Control District CEQA Thresholds of Significance (pounds per day)

Pollutant	Level A Emissions Threshold	Level B Emissions Thresholds	Level C Emissions Thresholds
Oxides of nitrogen (NO_x; ozone precursor)	<25	>25	>137
Reactive organic gases (ROG; ozone precursor)	<25	>25	>137
Particulate matter (PM_{10})	<80	>80	>137
Level of significance	Less than Significant	Potentially Significant	Significant
Mitigation recommendations	Standard	Standard and Best Available	Standard, Best Available, and potentially Off-site measures

Notes:

NO_x = nitrogen oxides

ROG = reactive organic gases

PM_{10} = particulate matter with diameters 10 micrometers and smaller

Source: Tehama County Air Pollution Control District 2015

4.4.6 Impact Analysis

Impact AIR-1: *Conflict with or obstruct implementation of the applicable air quality plan.*

No Project Alternative

Less than Significant. Under the no project alternative, no construction would occur. Maintenance of Deer Creek for flood management would still take place in a similar manner to existing conditions. Existing activities include channel grading and sediment removal, levee inspection, and maintenance for USACE and non-USACE levees and, vegetation removal and maintenance. These activities would have temporary impacts on air quality, but would comply with all relevant federal, State, and local laws and regulations and obtain all relevant permits and approvals. Therefore, maintenance activities under the no project alternative would not obstruct or conflict with the applicable air quality plan and would be **less than significant**.

Alternatives A through F

<u>Construction-related impacts</u>

Less than Significant. A project is deemed inconsistent with air quality plans if it would result in population or employment growth that exceeds growth estimates included in the applicable air quality plan and which, in turn, would generate emissions not accounted for in the applicable air quality plan emissions budget. Therefore, projects need to be evaluated to determine whether they would generate population and employment growth and, if so, whether that growth would exceed the growth rates included in the relevant air quality plans.

As discussed previously, the proposed project is within the planning area of the NSVAB Attainment Plan, which was prepared to address ozone nonattainment. There are no air quality plans that address PM in Tehama County (personal communication, L. Mann).

The proposed project would involve construction activities over an approximate 240-day construction period for Alternatives A through E and an approximate 150-day construction period for Alternative F. Construction workers are anticipated to come from surrounding areas, would be within the project area for a temporary period of time, and would not require permanent residences. The proposed project would not increase the total number of employees in the area or contribute to population growth. In addition, proposed project construction would follow all federal, State, and local regulations related to sources of air pollutants. Because the proposed project would not contribute to employment or population growth and would comply with all applicable regulations for sources of air pollutants, construction of the proposed project would not obstruct or conflict with applicable air quality plans and would have a **less-than-significant** impact.

<u>O&M-related Impacts</u>

Less than Significant. Maintenance activities would be temporary and short-term in nature, would not contribute to employment or population growth, and would also follow all federal, State, and local regulations related to sources of air pollutants. Maintenance of the proposed project would not obstruct or conflict with applicable air quality plans and would have a **less-than-significant** impact.

Impact AIR-2: *Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or State ambient air quality standard.*

No Project Alternative

Less than Significant. Under the no project alternative, no construction would occur. Maintenance activities, including potential vegetation management and levee repair, would be short-term in nature, would require a minimal amount of construction equipment, and would not result in a cumulatively considerable net increase in criteria pollutants. Impacts would be **less than significant**.

Alternatives A through F

<u>Construction-related impacts</u>

Potentially Significant and Unavoidable. During construction of the proposed project, the combustion of fossil fuels for operation of construction equipment, material hauling, and worker trips would result in construction-related criteria air pollutant emissions. The proposed project’s emissions were estimated using the CalEEMod, version 2016.3.2. All potential emissions from the proposed project’s multiple construction phases were combined to illustrate the total estimated emissions for construction of each of the proposed project’s alternatives. The proposed project’s estimated construction-related emissions before and after implementation of mitigation measures in comparison to the TCAPCDs thresholds of significance are provided in Table 4.4-7.

Table 4.4-7 Proposed Project's Estimated Construction-Related Emissions (pounds per day) Compared to Tehama County APCD Thresholds for Alternatives A through F

	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Alternative A						
Proposed Project Construction (Alternative A Unmitigated Emissions – All Construction Phases Combined)	15.3	197.9	125.6	0.8	37.3	18.2
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	NA	NA	80/137	NA
Exceeds Threshold (Unmitigated Alternative A)?	No	**Yes**	NA	NA	**No**	NA
Alternative A Emissions with Mitigation	6.5	**107.6**	155.8	0.8	33.2	14.4
Exceeds Threshold (Mitigated Alternative A)?	No	**Yes/No**	NA	NA	**No**	NA
Alternative B						
Proposed Project Construction (Alternative B Unmitigated Emissions – All Construction Phases Combined)	15	190	124	0.7	36.3	17.9
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	NA	NA	80/137	NA
Exceeds Threshold (Unmitigated Alternative B)?	No	**Yes**	NA	NA	**No**	NA
Alternative B Emissions with Mitigation	6.2	**100**	154.4	0.7	32.2	14.1
Exceeds Threshold (Mitigated Alternative B)?	No	**Yes/No**	NA	NA	**No**	NA
Alternative C						
Proposed Project Construction (Alternative C – All Construction Phases Combined)	14.8	184.6	123.2	0.7	35.4	17.7

	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	NA	NA	80/137	NA
Exceeds Threshold (Unmitigated Alternative C)?	No	**Yes**	NA	NA	No	NA
Alternative C Emissions with Mitigation	6.1	**94.3**	153.3	0.7	31.3	13.9
Exceeds Threshold (Mitigated Alternative C)?	No	**Yes*/No**	NA	NA	No	NA
Alternative D						
Proposed Project Construction (Alternative D Unmitigated Emissions – Combined All Construction Phases)	14.4	172.9	121	0.6	33.8	17.2
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	NA	NA	80/137	NA
Exceeds Threshold (Unmitigated Alternative D)?	No	**Yes**	NA	NA	No	NA
Mitigated Alternative D Emissions	5.7	82.7	151.1	0.6	29.7	13.4
Exceeds Threshold (Mitigated Alternative D)?	No	**Yes/No**	NA	NA	**No**	NA
Alternative E						
Proposed Project Construction (Alternative E Unmitigated Emissions – All Construction Phases Combined)	14.2	167.2	119.9	0.6	32.9	17
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	NA	NA	80/137	NA
Exceeds Threshold (Unmitigated Alternative E)?	No	**Yes**	NA	NA	No	NA
Alternative E Emissions with Mitigation	5.5	76.9	150	0.6	28.7	13.2
Exceeds Threshold (Mitigated Alternative E)?	No	**Yes/No**	NA	NA	**No**	NA

	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
Alternative F						
Proposed Project Construction (Alternative F – All Construction Phases Combined)	14	155	114	0.45	41	22
Tehama County APCD Threshold (Level B/Level C)	25/137	25/137	NA	NA	80/137	NA
Exceeds Threshold (Unmitigated Alternative F)?	No	**Yes**	NA	NA	No	NA
Alternative F Emissions with Mitigation	4.7	**47**	149	0.45	36	18
Exceeds Threshold (Mitigated Alternative F)?	N	**Yes*/No**	NA	NA	No	NA

Note: All measurements are in pounds per day. NA = not applicable. ROG = reactive organic gases; NOx = nitrogen oxide; CO = carbon monoxide; SO_X = sulfur oxide; PM_{10} = particulate matter with diameters 10 micrometers and smaller;
PM_{10} = particulate matter with diameters 10 micrometers and smaller;
$PM_{2.5}$ = particulate matter with diameters 2.5 micrometers and smaller.

* The mitigated emissions for Alternatives A and F exceed the Level B significance threshold for NO_x of 25 pounds per day. Therefore, impacts are assumed to remain potentially significant.

** Estimated mitigated emissions for PM_{10} are only based on reductions in exhaust-related emissions. Use of watering equipment was not fully quantified in this analysis and would be likely to further minimize fugitive dust-related emissions.

Source: California Emissions Estimator Model results provided in Appendix A

As described previously, the Tehama County portion of the NSVAB is designated as a State non-attainment area for ozone and PM_{10}, and is in attainment or unclassified for all other federal and State criteria air pollutants. As shown in Table 4.4-7, estimated unmitigated construction emissions of ROG, CO, SOx, PM_{10}, and $PM_{2.5}$ would be less than the TCAPCD significance thresholds, resulting in a **less than significant** impact. Emissions would be further reduced to the mitigated levels shown in Table 4.4-7 with implementation of equipment exhaust reduction measures included in Mitigation Measure AQ-1.

Although PM_{10} emissions would be well below established significance thresholds, the TCAPCD recommends implementation of fugitive dust control measures and requires a fugitive dust permit be obtained for construction activities meeting certain requirements. To ensure that the proposed project minimizes its potential contribution to the existing PM_{10} nonattainment status and minimizes potential fugitive dust emissions, it would implement the best management practices for dust control described in Mitigation Measure AQ-1 and obtain a fugitive dust permit from the TCAPCD. Implementation of the fugitive dust emission reduction measures included in Mitigation Measure AQ-1 would further reduce the mitigated PM_{10} emissions shown in Table 4.4-7.

Total estimated unmitigated NO_x emissions from construction of all project alternatives would exceed the Level C significance thresholds established by TCAPCD under all project alternatives, resulting in a **significant impact**. As shown in Table 4.4-7, implementation of the equipment emission reduction measures included in Mitigation Measure AQ-1 would reduce these estimated emissions to a level in between the TCAPCD significance thresholds of 25 and 137 lbs/day for NO_x, indicating that mitigated emissions of NO_x would still exceed the Level B threshold. Implementation of additional NO_X control measures included in Mitigation Measure AQ-2 would further reduce NO_x emissions, but it is unknown to what level they would be reduced. Because it is unknown at this time if NO_x emissions could be reduced below the TCAPCD Level B threshold, construction-related NO_x emissions may violate air quality standards by making a cumulatively considerable contribution to the existing ozone nonattainment status. This impact would remain **potentially significant** and may be **significant and unavoidable**.

<u>O&M-related Impacts</u>

Less than Significant. Maintenance activities, including levee repair, sediment removal, and vegetation management activities would continue to occur. Under existing conditions, these activities do not result in cumulatively considerable increases in criteria pollutants. Following implementation of the proposed project, modeling results show that the need for these activities would be greatly reduced or eliminated. Therefore, maintenance activities would have **less than significant** on pollutant emissions.

4.4.6.3 Mitigation Measure AQ-1

Mitigation Measure AQ-1: Implement Fugitive Dust and Equipment Exhaust Control Measures.

The contractor shall implement basic dust and equipment exhaust control measures in compliance with the TCAPCD recommendations. Current measures include the following:

- Water shall be applied by means of truck(s), hoses or sprinklers as needed prior to any land clearing or earth movement to minimize dust emission.
- All visibly dry disturbed areas shall be watered at least two times per day, and more often during periods of high wind, to minimize dust emission.
- All haul trucks transporting soil, sand, or other loose material on site or off site shall be covered.
- All visibly dry disturbed unpaved road surface areas of operation shall be watered to minimize dust emission.
- Unpaved roads may be graveled to reduce dust emissions.
- All visible mud or dirt track-out onto adjacent paved public roads shall be removed using wet power vacuum street sweepers at least once per day unless conditions warrant a greater frequency. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads and those entering and exiting the construction areas shall be limited to a speed which minimizes dust emissions (15 miles per hour [mph or less]).
- Unpaved, disturbed haul roads shall be sprayed down at the end of the work shift to form a thin crust. This application of water shall be in addition to the minimum rate of application.
- Construction workers shall park in designated parking area(s) to help reduce dust emissions.
- Soil pile surfaces shall be moistened if dust is being emitted from the pile(s). Adequately secured tarps, plastic, or other material may be required to further reduce dust emissions.
- Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications.
- Maximize, to the extent feasible, the use of diesel construction equipment meeting current CARB certification standards for off-road heavy-duty diesel engines.

- Registration in the CARB DOORS program and meeting all applicable standards for replacement and/or retrofit.
- All portable equipment, including generators and air compressors rated over 50 brake horsepower, registered in the Portable Equipment Registration Program, or permitted through the TCAPCD as a stationary source. Post a publicly visible sign with the telephone number and person to contact regarding dust complaints. Following the review of any dust complaints, this person shall respond and take corrective action within 24 hours. The telephone number of the TCAPCD shall also be visible to ensure compliance with TCAPCD Rule 4:1 and 4:24 (Nuisance and Fugitive Dust Emissions).

Mitigation Measure AQ-2: *Implement Material Hauling NO_X Control Measures.*

The contractor shall implement any combination of the following measures to reduce NO_x emissions to the equivalent of the CARB fleet average and 2008 model year on-road vehicle standard or demonstrate equivalency from these options:

- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to five minutes as a maximum (as required by the California airborne toxics control measure 13 CCR 2485).
- Reduce quantity or duration of construction equipment use on a daily basis.
- Develop a plan demonstrating that off-road equipment (greater than 50 horsepower) and material hauling vehicles used during project construction (i.e., owned, leased, and subcontracted vehicles) achieve emission reductions to the maximum extent feasible. Equipment and material hauling vehicles shall achieve at least a project-wide fleet average equal to the recent CARB fleet average or up to a Tier IV final-equivalent engine.

  Acceptable options for reducing emissions include the low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as such become available. The project proponent shall demonstrate that project-wide fleet average reductions are achieved by presenting equivalent emission calculation or other methodologies using appropriate models. Annual and final project reports shall be prepared and reviewed by the project representative.

- Limit the number of daily one-way material hauling trips.
- Use newer model year material hauling vehicles that emit less NO_x emissions per trip.

Impact AIR-3: *Expose sensitive receptors to substantial pollutant concentrations.*

No Project Alternative

Less than Significant. Under the no project alternative, no construction would occur. Maintenance activities would be short term in nature, would require a minimal amount of construction equipment, and would not expose sensitive receptors to substantial pollutant concentrations. These activities would comply with all relevant federal, State, and local laws and regulations and all relevant permits and approvals would be obtained. Impacts would be **less than significant**.

Alternatives A through F

<u>Construction-related impacts</u>

Potentially Significant and Unavoidable. The closest sensitive receptors to the proposed project's construction areas, stockpile areas, and hauling routes are the occupants of the Abbey of New Clairvaux and residences located approximately 0 to 800 feet from the various project areas (refer to Table 4.4-5 and Figures 4.4-1 and 4.4-2). Lassen View and Antelope elementary schools are located farther away from the project area along SR 99 (refer to Table 4.4-5), but SR 99 serves as the hauling route to the Tehama County-Red Bluff Landfill. The pollutants of concern and TACs that could affect these sensitive receptors are particulates (specifically PM_{10} and $PM_{2.5}$ contained in fugitive dust) and DPM from construction equipment. In addition, gasoline fuel combustion emissions that are classified as TACs could be emitted by construction equipment.

As discussed above, estimated unmitigated construction emissions of PM_{10} and $PM_{2.5}$ would be less than the TCAPCD significance thresholds and emissions would be further reduced with implementation of the best management practices for dust control described in Mitigation Measure AQ-1. Proposed project construction, therefore, would not expose sensitive receptors to substantial particulate concentrations and impacts would be **less than significant**.

Construction activities would occur only over a period of up to 240 days during the summer dry season. But, construction would require vehicle hauling trips ranging from approximately 22,800 to more than 100,000 total trips for Alternatives F and A, respectively. The number of hauling trips for Alternatives B through E would also fall within this range.

Because of the variable nature of construction activity, the generation of TAC emissions in most cases would be temporary, especially considering the short amount of time such equipment is typically operating within an influential distance that would result in the exposure of sensitive receptors to substantial concentrations. Chronic and cancer-related health effects estimated over short time periods are uncertain. Cancer potency factors are based on animal lifetime studies or worker studies with long-term exposure to the carcinogenic agent. There is considerable uncertainty when evaluating the cancer risk from exposure that would last only a small fraction of a lifetime. Some studies indicate that the dose rate may change the potency of a given dose of a carcinogenic chemical. In other words, a dose delivered over a short time period may have a different potency than the same dose delivered over a lifetime (California Office of Environmental Health Hazard Assessment 2015). In addition, construction impacts are most severe adjacent to the construction area and decrease rapidly with increasing distance. Concentrations of mobile-source DPM emissions are typically reduced by 70 percent at a distance of approximately 500 feet (California Air Resources Board 2005).

Because some sensitive receptors are located within 500 feet of the hauling routes, proposed project construction activities would potentially emit substantial quantities of DPM and result in a **potentially significant impact**. Implementation of the equipment exhaust control measures included in Mitigation Measures AQ-1 and AQ-2 would reduce these emissions. Although construction activities would only occur over a limited timeframe, and implementation of Mitigation Measures AQ-1 and AQ-2 would reduce the potential DPM emissions, it is conservatively assumed that proposed project construction may still expose sensitive receptors to substantial temporary quantities of DPM, resulting in impacts that would remain **potentially significant** and may be **significant and unavoidable.**

O&M-related Impacts

Less than Significant. Modeling results indicated that maintenance requirements would be greatly reduced, or potentially eliminated, post-project. Maintenance activities, such as vegetation and channel maintenance or levee repair, would be short-term in nature and would not result in the emission of substantial pollutant concentrations. Potential maintenance impacts would be **less than significant**.

Impact AIR-4: *Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?*

No Project Alternative

No impact. Under the no project alternative, no construction would occur. Continued maintenance activities would not result in emissions that would adversely affect a substantial number of people. Therefore, there would be **no impact**.

Alternatives A through F

Construction-related impacts

Less than Significant. Construction activities associated with the proposed project would not generate permanent or long-term objectionable odors but could generate odors related to excavated material and the operation of gasoline- or diesel-powered equipment. Odors may also be associated with decaying organic material contained in excavated or dredged material. The proposed project does not involve activities or facilities identified by TCAPCD (2015) as common odor-causing sources. Because the proposed project is located in a rural area, there are limited sensitive receptors near the project area that could be impacted by objectionable odors. Although construction activities could generate odors as described above, the odors would not adversely affect a substantial number of people and impacts would be **less than significant**. But, to minimize potential odors from stockpiles during construction, Mitigation Measure AQ-3 would be implemented.

O&M-related impacts

Less than Significant. Maintenance activities would be greatly reduced, or potentially no longer needed, post-project. Maintenance activities would be temporary and would not generate objectionable odors that would affect a substantial number of people. Impacts would be **less than significant**.

Mitigation Measure AQ-3: *Cover Odorous Stockpiles When Not in Use.*

The contractor will handle stockpiles of potentially odorous excavated or dredged material, or other potentially odorous materials, in a manner that avoids affecting residential areas or other sensitive receptors to the extent feasible. Specifically, the contractor will cover the stockpiles of these materials when they are not actively being used.

4.5 Biological Resources — Fish and Aquatic Habitat

4.5.1 Environmental Setting

Deer Creek provides important habitat for native anadromous and resident Central Valley fish species. Information presented on existing conditions within and adjacent to the project area is based primarily on scientific publications and management plans that address aquatic resources in the Deer Creek Watershed, as well as recent biological resource surveys in the project area.

The project area includes the lower 8 miles of Deer Creek in Tehama County, Calif., from 2 miles upstream of Red Bridge to the confluence with the Sacramento River. The project area also includes the lower 2.6 miles of China Slough to its confluence with Deer Creek (see Figure 1 in Chapter 1, ”Introduction”).

4.5.1.1 Lower Deer Creek

Lower Deer Creek is bounded by agricultural lands (orchards, row crops, and grazing pastures), by a limited number of residences on the north and south banks upstream of SR 99, and by the town of Vina on the south bank downstream of SR 99. Much of the project area and adjacent lands are within the Deer Creek floodplain and include intermittent and ephemeral channels, constructed canals, and a variety of wetlands (Horizon Water and Environment 2019).

Deer Creek is considered an important stronghold for State and federally listed anadromous fish and other sensitive native fish species because the watershed is still relatively natural compared to other Northern California watersheds. The Deer Creek watershed has maintained historical ecosystem integrity because of its relatively undisturbed habitat, distance from large population centers, and absence of any major dams to obstruct fish passage (United States Fish and Wildlife Service 1999). Deer Creek is one of only three California streams that support self-sustaining populations of the non-hybridized Central Valley spring-run Chinook salmon (*Onchorhyncus tshawytscha*) evolutionarily significant unit (ESU) (California Department of Fish and Game 1998). The spring-run Chinook salmon population is relatively small, shows declining trends in adult abundance (with some recent returns in the last decade showing an upward trend for the diversity group) (National Marine Fisheries Service 2016), and is considered to be at moderate to high risk from catastrophic disturbances because of small population size (Lindley et al. 2007). With the implementation of key recovery actions (National Marine Fisheries Service 2014), the watershed has a high potential for sustaining a spring-run Chinook salmon population at a low risk of extinction (Lindley 2007).

The California Central Valley steelhead (*O. mykiss*) distinct population segment (DPS), which is federally listed as a threatened anadromous fish species, also relies on Deer Creek. Deer Creek supports all life history stages of steelhead, although not much is known about the long-term viability of this DPS, including the contribution of Deer Creek to the overall viability of the DPS (Lindley et. al. 2007). The carrying capacity of steelhead in Deer Creek is also unknown. The watershed historically supported strong populations that likely were abundant prior to human development on the valley floor.

Deer Creek steelhead have not been well studied. Monitoring efforts increased following installation of a video monitoring station at the SVRIC Dam in February 2014. Observations from the video monitoring station indicate that Deer Creek steelhead population sizes are in the low hundreds. A total of 201 steelhead were counted during the 2014–2015 run (Killam et al. 2015, 2016). Deer Creek is considered essential to the recovery and perpetuation of the wild stocks of winter-run steelhead in the Central Valley (Reynolds et. al. 1993; McEwan and Jackson 1996).

The Lower Deer Creek floodplain is an ecologically important component of Deer Creek habitat conditions. During periods when flood waters inundate the floodplain adjacent to Lower Deer Creek, they carry vital nutrients to new areas. These conditions support high levels of primary and secondary production. These areas are a source of abundant food resources and shallow, low-velocity water conditions that provide especially high-quality foraging habitats for larval and juvenile fish that feed heavily on invertebrates present in floodwaters. But, floodplain connectivity has changed, partly because of historical USACE levees built in 1949. Now, the Lower Deer Creek floodplain no longer regularly conveys flood flows, and the lower 8 miles of Deer Creek are characterized by little or no connection to the historical floodplain.

Lower Deer Creek serves as a migration route for adult and juvenile salmonids and is used for juvenile rearing during out-migration. The upper 25 miles of Deer Creek provide adult salmonid holding, spawning, and rearing habitat. Deer Creek does not have major water storage facilities that inundate or block miles of historical anadromous holding and spawning habitat, thus stream habitat conditions are still relatively healthy and accessible for anadromous fish for all life history stages (Armentrout et al. 1998). Although intact and relatively healthy upstream, disturbance of riparian vegetation and alteration of the channel that has occurred, in part, as a result of historical USACE levees has degraded habitat diversity and complexity in the Lower Deer Creek corridor, including migration and rearing habitat. In addition, evaluations of the Deer Creek anadromous fishery habitats and resources have consistently identified insufficient instream flows and elevated water temperatures as factors limiting anadromous fish production in the Deer Creek watershed (Reynolds 1993; McEwan and Jackson 1996; Harvey-Arrison 2008). Improvement and enhancement of Lower Deer Creek and its floodplain habitat is essential to the recovery of these listed salmonid species (National Marine Fisheries Service 2014).

4.5.1.2 China Slough

China Slough is located south of Lower Deer Creek within the Lower Deer Creek floodplain and is a remnant distributary channel from Deer Creek. Within the project area, a portion of China Slough is bounded by Vina Road and 7th Street in the town of Vina. The slough is also bordered by orchards, field crop agriculture, vineyards, and a few residences. The slough is an intermittent stream and serves as a conduit for water on the floodplain from Deer Creek during high flow events (MacWilliams Jr. 2004) when Sacramento River backwater and flow from Deer Creek flood China Slough. These flows pass under a road near the Abbey entrance, where excessive vegetation and accumulation of sediment cause it to flood the road during high flows. China Slough is overgrown with emergent vegetation and invasive plant species including giant reed (*Arundo donax*) and Himalaya blackberry (*Rubus armeniacus*). Outside of the flood season, thick vegetation in the slough contributes to areas of stagnant water. Because China Slough's intermittent flow connects to Deer Creek only during flood events, and because of extensive emergent vegetation and degraded water quality conditions present in ponded areas, the slough is unlikely to support any special-status fish species (Johnson 2021).

4.5.1.3 Lower Deer Creek Fish Species

Fish species that utilize Lower Deer Creek are influenced by variations in habitat factors such as the seasonal inundation of floodplains. Habitat fluctuations, life history requirements, and seasonal movements in relation to these fluctuations affect the presence, abundance, and behavior of the fish species in Lower Deer Creek. The aquatic habitat in the project area has been affected, as described above, by altered flow patterns, excessive flooding and sedimentation, and leveed areas that have reduced available fish habitat. Despite these challenges, resident fish species in Lower Deer Creek have a "fairly intact native fish assemblage for most of their length," which is "unusual for most inland California streams of their size" (Sato and Moyle 1988).

A diversity of common native and non-native fish species are known to occur in Lower Deer Creek. Common native fish species include the California roach (*Hesperoleucus symmetricus*), tule perch (*Hysterocarpus traski*), speckled dace (*Rhinichthys osculus*), Sacramento pikeminnow (*Ptychocheilus grandis*), and Sacramento sucker (*Catostomus occidentalis*). Common non-native fish species include the brown trout (*Salmo trutta*), bluegill (*Lepomis macrochirus*), green sunfish (*Lepomis cyanellus*), common carp (*Cyprinus carpio*), white catfish (*Ameiurus catus*), smallmouth bass (*Micropterus dolomieu*), and largemouth bass (*Micropterus salmoides*).

A diversity of special-status fish species also occurs in Lower Deer Creek. Special-status fish species that occur in Lower Deer Creek were determined based upon a biological resources assessment (BRA) conducted during April 3–5, 2018, by WRA, Inc. (Appendix B) and available information from the USFWS, NMFS, and CDFW describing each species distribution and habitat use (United States Fish and Wildlife Service 2018; National Marine Fisheries Service 2014; California Department of Fish and Wildlife 2018a, 2018b). The assessment area, which was centered on the mainstem of lower Deer Creek from Red Bridge to the SVRIC Dam and included surrounding areas, was evaluated for its potential to support special-status fish species.

Special-status species include species that are:

- Listed as endangered or threatened under the ESA or CESA.
- Designated by NMFS or USFWS as a federal species of concern.
- Designated by the CDFW as a Species of Special Concern.
- Proposed as a candidate species eligible for listing under the ESA or CESA.

Special-status fish species with the potential to occur in Lower Deer Creek are listed in Table 4.5-1.

Table 4.5-1 Special-status Fish Species with the Potential to Occur in Lower Deer Creek

Common Name	Scientific Name	Federal Listing Status	State Listing Status	Potential to Occur
California Central Valley steelhead	*Oncorhynchus mykiss*	Threatened	None	The winter-run life history type of this species occurs in Deer Creek.
Central Valley spring-run Chinook salmon ESU	*Oncorhynchus tshawytscha*	Threatened	Threatened	Deer Creek supports 1 of only 3 extant independent populations of this species.
Central Valley winter-run Chinook Salmon	*Oncorhynchus tshawytscha*	Endangered	Endangered	A recent study indicates that juveniles of this species could utilize lower Deer Creek for non-natal rearing habitat in late summer (Phillis et al. 2017).

Common Name	Scientific Name	Federal Listing Status	State Listing Status	Potential to Occur
Hardhead	*Mylopharodon conocephalus*	None	Species of Special Concern	Adults and juveniles of this species are known to occur in Lower Deer Creek.
Pacific lamprey	*Lampetra tridentate*	Species of Concern	None	Adults migrating to upstream holding and spawning areas could occur seasonally in Lower Deer Creek.
Riffle sculpin	*Cottus gulosus*	None	Species of Special Concern	This species is known to occur in the Deer Creek watershed.
Sacramento River fall/late fall-run Chinook salmon	*Oncorhynchus tshawytscha*	Species of Concern	Species of Special Concern	Lower Deer Creek supports this specie during migration, rearing, and spawning.

Descriptions of the special-status fish species listed in Table 4.5-1 are provided below. More detail is provided for spring-run Chinook salmon and Central Valley steelhead because of their respective listing status.

California Central Valley steelhead DPS (*Oncorhyncus mykiss*)

The California Central Valley steelhead DPS, which is federally listed as threatened (71 Federal Register [FR] 834, January 5, 2006), occurs in the project area. The expected occurrence and abundance of steelhead in the Northern Central Valley, including Deer Creek, is presented in Table 4.5-2.

Table 4.5-2 Temporal Occurrence and Relative Abundance of Adult and Juvenile Central Valley Steelhead in the Northern Central Valley

Adult Migration/Holding

Location	January		February		March		April		May		June		July		August		September		October		November		December	
Sac River[1,3]	L	L	L	L	L	L	NA	NA	NA	NA	NA	L	L	L	L	M	M	H	H	M	L	L	L	L
Sac River at Red Bluff[2,3]	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	M	M	H	M	L	L	L	L
Mill, Deer creeks[4]	M	M	M	M	M	M	H	H	H	H	M	L	NA	NA	NA	NA	NA	NA	H	H	H	H	H	H
Sac River at Fremont Weir[5]	L	L	L	L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	M	M	H	H	M	M	L	L	L	L

Juvenile Migration

Location	January		February		March		April		May		June		July		August		September		October		November		December	
Sac River[1,2]	L	L	L	L	M	M	M	M	M	M	M	M	L	L	L	L	L	L	M	M	M	M	L	L
Sac River at KL[2]	L	L	L	L	H	H	L	L	L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	L
Sac River at KL[6]	M	M	M	M	H	H	H	H	M	M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	L	L	L	L
Mill, Deer, Butte creeks[4]	H	H	H	H	M	M	M	M	M	M	L	L	NA	NA	NA	NA	NA	NA	L	L	L	L	L	L
Chipps Island[7] (wild)	L	L	L	L	H	H	H	H	M	M	M	M	L	L	NA	NA	NA	NA	L	L	L	L	L	L
Sac River at Hood[8]	L	L	H	H	H	H	H	H	H	H	H	NA	NA	NA	NA	NA	NA	NA	NA	NA	L	L	L	L

Notes: Relative Abundance: L = Low, M = Medium, H = High, NA = Not Applicable.
Sac = Sacramento; KL = Knights Landing

Sources: [1]Hallock 1961; [2]McEwan 2001; [3]United States Fish and Wildlife Service unpublished data; [4]California Department of Fish and Game 1995; [5]Bailey 1954; [6]Snider and Titus 2000; [7]Nobriga and Cadrett 2003; [8]Schaffter 1980.

This table originally appeared in *Recovery Plan for The Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the DPS of California Central Valley Steelhead* (National Marine Fisheries Service 2014).

The run timing for Central Valley steelhead shows that this species generally leaves the ocean from August through April (Busby 1996) and spawns in upper Deer Creek from December through April, with peaks from January through March where cool, well-oxygenated water is available (Hallock 1961; McEwan and Jackson 1996). Timing of upstream migration is correlated with higher flow events, such as freshets or sand bar breaches at river mouths and associated lower water temperatures. Unlike other Pacific salmonids, steelhead are iteroparous, or capable of spawning more than once before death (Barnhart et al. 1986; Busby et al. 1996). But, it is rare for steelhead to spawn more than twice before dying; most that do so are females (Busby 1996).

Steelhead can be divided into two life history types, summer-run steelhead and winter-run steelhead, based on their state of sexual maturity at the time of river entry and the duration of their spawning migration, stream-maturing, and ocean-maturing. Only winter-run steelhead currently are found in the Lower Deer Creek project area (and all Central Valley rivers and streams) (McEwan and Jackson 1996).

<u>Central Valley Spring-run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)</u>

The Central Valley spring-run Chinook ESU, which is federally and state-listed as threatened (70 FR 37160, June 28, 2005), occurs in the project area. Deer Creek is home to one of three remaining Central Valley spring-run Chinook salmon populations in the Sacramento River Basin. Deer Creek spring-run Chinook salmon are considered the most substantial and consistent self-sustaining wild populations in the Sacramento drainage (Vogel 1987; Sato and Moyle 1988). Historically, this ESU was the most abundant run of spring-run 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.

The expected occurrence and abundance of spring-run Chinook salmon in the Sacramento River Upper Basin, including Deer Creek, is listed in Table 4.5-3.

Table 4.5-3 Temporal Occurrence and Relative Abundance of Adult and Juvenile Central Valley Spring-run Chinook Salmon in the Sacramento River Upper Basin

Adult Migration

Location	January		February		March		April		May		June		July		August		September		October		November		December	
Sac River basin[1,2]	NA	NA	NA	NA	M	M	M	M	H	H	H	H	M	M	M	M	M	M	NA	NA	NA	NA	NA	NA
Sac River mainstem[3]	NA	NA	NA	NA	M	M	M	M	M	M	M	M	M	M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mill Creek[4]	NA	NA	NA	NA	L	L	M	H	H	H	H	M	M	L	L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Deer Creek[4]	NA	NA	NA	L	L	L	H	H	H	H	H	M	M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butte Creek[4]	NA	NA	M	M	M	M	M	M	M	M	M	M	M	M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Adult Holding[f]

Location	January		February		March		April		May		June		July		August		September		October		November		December	
Mill, Deer, Butte creeks[5]	NA	NA	M	M	M	M	M	H	H	H	H	H	H	H	H	H	H	M	M	L	NA	NA	NA	NA

Adult Spawning

Location	January		February		March		April		May		June		July		August		September		October		November		December	
Mill, Deer, Butte creeks[5]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	L	M	H	H	M	L	NA	NA	NA	NA

Juvenile Migration

Location	January		February		March		April		May		June		July		August		September		October		November		December	
Sac River Tribs[6]	M	M	M	M	M	M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	M	M	H	H	H	H
Upper Butte Creek[5]	H	H	H	H	M	M	M	M	M	M	L	L	NA	NA	NA	NA	NA	NA	L	L	L	L	H	H
Mill, Deer, Butte creeks[4]	H	H	H	H	M	M	M	M	M	M	L	L	NA	NA	NA	NA	NA	NA	L	L	L	L	L	L
Sac River at RBDD[3]	H	H	L	L	L	L	L	L	L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	H	H	H	H
Sac River at KL[7]	M	M	H	H	H	H	H	H	H	H	M	M	I	L	L	L	L	I	L	L	I	L	H	H

Notes:

KL = Knight's Landing

RBDD = Red Bluff Diversion Dam

Relative Abundance: L = Low, M = Medium, H = High, NA = Not Applicable

Sac = Sacramento

Tribs = tributaries

Portions of this table originally appeared in *Recovery Plan for The Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley Spring-run Chinook Salmon and the DPS of California Central Valley Steelhead* (National Marine Fisheries Service 2014).

Yearling juvenile spring-run Chinook salmon outmigration for Mill and Deer creeks occurs March through June and is highest in May.

Sources:

[1]Yoshiyama et al. 1998

[2]Moyle 2002

[3]Myers et al. 1998

[4]Lindley et al. 2007

[5]McReynolds et al. 2005; Ward et al. 2003

[6]California Department of Fish and Wildlife 1998

[7]Snider and Titus 2000.

Adult Central Valley spring-run Chinook salmon enter the mainstem Sacramento River from March through September, with the peak upstream migration into Deer Creek occurring May through June (Yoshiyama 1998). Spring-run Chinook salmon 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, including upper Deer Creek (National Marine Fisheries Service 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. Yearlings rear in their natal streams through the first summer following their birth and 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 1998). Rearing occurs in natal streams and in downstream areas of Lower Deer Creek, the mainstem of the Sacramento River, inundated floodplains, and the Sacramento-San Joaquin Delta. Downstream migration of yearlings typically coincides with the onset of the winter storm season, and migration may continue through March.

The Central Valley Technical Recovery Team delineated 19 historic independent populations of Central Valley spring-run Chinook salmon, and a number of smaller dependent populations, that are distributed among four diversity groups (Lindley et al. 2007; National Marine Fisheries Service 2016). Of these independent populations, only three are extant, or still occurring (in Mill, Deer, and Butte creeks). The three extant populations passed through prolonged periods of low abundance before increasing in abundance moderately (Mill and Deer creeks) or robustly (Butte Creek) in the 1990s, as shown in Table 4.5-4. Until 2015, Mill Creek and Deer Creek populations both improved from high extinction risk in 2010 to moderate extinction risk because of recent increases in abundance (National Marine Fisheries Service 2016).

Table 4.5-4 Central Valley Spring-run Chinook Salmon Total Spawning Fish Observed in Deer Creek (1994–2019)

Spring-run Chinook Salmon Spawning Fish Observed in Deer Creek	
Year Observed	Number Recorded
1994	485
1995	1,295
1996	614
1997	466
1998	1,879
1999	1,591
2000	637
2001	1,622
2002	2,195
2003	2,759
2004	804
2005	2,239
2006	2,432
2007	644
2008	140
2009	213
2010	262
2011	271
2012	734
2013	708
2014	830
2015	268
2016	331
2017	219
2018	159
2019	578

Source: Azat 2020

Central Valley Winter-run Chinook Salmon ESU (*Oncorhynchus tshawytscha*)

The Central Valley winter-run Chinook salmon ESU, which is federally and state-listed as threatened (70 FR 37160, June 28, 2005), is likely to occur in the project area. A recent study documents juvenile Central Valley winter-run Chinook salmon using lower Deer Creek for non-natal rearing. Phillis et al. (2017) evaluated the natural variation in otolith strontium isotopes to identify freshwater rearing habitats associated with winter-run. Four isotopically unique juvenile winter-run rearing habitat groups, including a "Lassen Tributaries" group comprising Mill, Battle, and Deer creeks, were identified. This research revealed that 44 to 65 percent of Sacramento River winter-run adults surviving to spawn produced juveniles that reared for at least three weeks in non-natal stream habitats, and that 7 to 34 percent of these fish reared in the "Lassen Tributaries" group. Rotary screw trap investigations conducted on the Sacramento River at the Red Bluff Diversion Dam from 2002 through 2012 showed that weekly passage of winter-run fry consistently begins in July, builds through September, and peaks in early October (Poytress et al. 2014). This timing suggests that juvenile winter-run could utilize lower Deer Creek for non-natal rearing habitat beginning in late summer.

Hardhead (*Mylopharadon conocephalus*)

The hardhead is a CDFW Species of Special Concern. Adult and juvenile hardhead are known to occur within Lower Deer Creek (Johnson 2021). This species inhabits undisturbed mid- to low- elevation streams that have clear, deep pools with sand, gravel, and boulder substrates and low water velocities (Moyle 2015). Threats to the species include loss of habitat from changes in stream flows and temperature regimes, elimination of habitat because of dams, and predation by non-native fish species (Moyle 2015). In the Sacramento River system, hardhead are widely distributed in most of the larger tributaries as well as the river.

Pacific Lamprey (*Entosphenus tridentata*)

The Pacific lamprey is a USFWS species of concern and a CDFW species of special concern. This species is known to hold and spawn in Upper Deer Creek. Adults migrating to upstream holding and spawning area could occur seasonally in the Lower Deer Creek project area. The Pacific lamprey is an anadromous fish with a very long freshwater rearing period. Recent data and anecdotal accounts indicate that distribution of Pacific lamprey has been reduced in many river systems, including the Sacramento-San Joaquin, primarily because of migratory barriers (Moyle et al. 2009). Adult Pacific lamprey at varying levels of sexual maturity and ammocoetes are likely present in the Sacramento-San Joaquin River Basin throughout the year.

Adults spend six 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 from 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 ammocoete 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 2009). They are mostly sedentary and remain burrowed in the stream substrate for 3 to 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 (Luzier et al. 2011). Pacific lamprey are thought to remain in the ocean for approximately 18 to 40 months before returning to freshwater as sexually immature adults, typically between late winter and early summer, then migrating to natal streams to spawn.

Riffle Sculpin (*Cottus gulosus*)

The riffle sculpin is a CDFW species of special concern. Riffle sculpin are known to be present in the Deer Creek watershed (Johnson 2021). This species faces numerous threats from dams, agricultural runoff, urbanization mining, and logging (Moyle et al. 2015). Both adult and young riffle sculpin have poor dispersal abilities (Moyle 2015). Larvae do not move far after hatching, which greatly reduces their ability to quickly recolonize areas (Moyle 2015). They are found in isolated watersheds in the Central Valley and the central coast. In the Sacramento River drainage, they are found from the American River north to the upper Sacramento and McCloud rivers. Riffle sculpin are found exclusively in permanent cold-water streams. This species spawns at the end of their second year, in February, March, and April (Moyle et al. 2015). Adults spawn under rocks in swift riffles or inside cavities in submerged logs. Riffle sculpin feed mainly on benthic invertebrates, primarily active insect larvae.

Sacramento River Fall-run/Late Fall-run Chinook Salmon (*Oncorhynchus tshawytscha*)

The Sacramento River fall–run and late fall–run Chinook salmon is a federal species of concern and CDFW species of special concern. Lower Deer Creek supports Sacramento River fall-run and late fall-run Chinook salmon life stages during migration, rearing, and spawning.

Adult Sacramento River fall-run Chinook salmon migrate into the Sacramento River and its tributaries June through December in mature condition and spawn late September through December, soon after arriving at their spawning grounds. The spawning peak occurs in October and November. Sacramento River fall-run Chinook salmon use spawning habitat that occurs in the lower reaches of Deer Creek. The project area includes active fall-run Chinook salmon spawning habitat. Emergence occurs December through March. Juveniles migrate downstream through Lower Deer Creek, into the Sacramento River, down to the Sacramento-San Joaquin Delta, and out to the ocean soon after emerging, rearing in fresh water for only a few months. Smolt outmigration typically occurs March through July (Yoshiyama 1998).

Sacramento River late fall-run Chinook salmon migrate upstream before they are sexually mature and hold near the spawning grounds for 1 to 3 months before spawning. Upstream migration takes place October through April and spawning occurs late January through April, with peak spawning in February and March. Fry emerge April through June, and juveniles rear in their natal stream during summer and remain throughout the year in some streams. Smolt outmigration can occur from November through May (Yoshiyama 1998).

Important habitat during juvenile rearing occurs in Lower Deer Creek and 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 low-velocity refugia to minimize energy expenditures.

4.5.1.4 Designated Critical Habitat

Designated critical habitat for spring-run Chinook salmon and Central Valley steelhead (70 FR 52488, September 2, 2005) occurs in the project area. Critical habitat is defined as specific areas that contain primary constituent elements

(PCEs) and physical habitat elements essential to the conservation of species listed as threatened or endangered under the ESA. PCEs for spring-run Chinook salmon and Central Valley steelhead include sites essential to support one or more life stages of the ESU (sites for spawning, rearing, migration, and foraging). These sites, in turn, contain physical or biological features essential to the conservation of the ESU (for example, spawning gravels, water quality and quantity, side channels, forage species). The PCEs for these species within the project area, which include freshwater rearing habitat and freshwater migration corridors, are described below.

4.5.1.5 Freshwater Rearing Habitat

Freshwater rearing sites are those with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks. Both spawning areas and migratory corridors comprise rearing habitat for juveniles, which feed and grow before, and during, their out-migration. Non-natal intermittent tributaries may be used for juvenile rearing. Rearing habitat condition is strongly affected by habitat complexity, food supply, and presence of predators of juvenile salmonids. Freshwater rearing habitat also has a high conservation value as the juvenile life stage of salmonids is dependent on the function of this habitat for survival and recruitment.

4.5.1.6 Freshwater Migration Corridors

Ideal freshwater migration corridors are free of obstruction with water quantity and quality conditions and contain natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility, survival and food supply. These corridors allow the upstream passage of adults and the downstream emigration of out-migrant juveniles. Migratory habitat condition is strongly affected by the presence of barriers, which can include dams, unscreened or poorly screened diversions, and degraded water quality. For successful survival and recruitment of salmonids, freshwater migration corridors must function sufficiently to provide adequate passage. For this reason, freshwater migration corridors are considered to have a high conservation value.

4.5.1.7 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act requires the identification of essential fish habitat (EFH) and the implementation of measures to conserve and enhance habitat with a Fishery Management Plan for all federally managed fishery species that may be adversely affected by a federal action. EFH may overlap with designated critical habitat when a species is both federally managed and listed as threatened or endangered. Within the project area, EFH has been identified for Chinook salmon, including spring-run Chinook salmon and Sacramento River fall-run and late fall-run Chinook salmon.

EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity. For the purpose of interpreting the definition of EFH, "waters" includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means habitat required to support a sustainable fishery and a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers all habitat types used by a species throughout its life cycle.

Habitat areas of particular concern (HAPC) are a subset of EFH and are considered high-priority areas for management, conservation or research efforts, as these areas provide important ecological functions or are especially vulnerable to degradation. Chinook salmon HAPCs include spawning habitat (National Marine Fisheries Service 2015).

4.5.2 Regulatory Setting

The following plans, policies, regulations, or laws related to fish and aquatic habitat apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- ESA (protects species listed as threatened and endangered from take.) — Applies to impact analysis, project design, and construction.

- Magnuson-Stevens Fishery Conservation and Management Act — Applies to impact analysis and construction.
- CWA, Section 404 (regulates discharge of dredged or fill material into waters of the United States, including wetlands.) — Applies to impact analysis and construction.
- CWA, Section 401 (State Certification of Water Quality, regulates construction that may result in a pollutant discharge to navigable waters.) — Applies to impact analysis and construction.
- CWA, Section 402 (NPDES permit, required permit for pollutant discharge.) — Applies to impact analysis and planning.

State Regulations

- CESA (prohibits take of species listed under CESA.) — Applies to impact analysis, design, and construction.
- California Fish and Game Code, Section 1602 (Notification of Lake or Streambed Alteration, requires notification of CDFW for any activity that would substantially change or use any material from bed, channel, or bank of a stream.) — Applies to impact analysis and construction.
- Porter-Cologne Water Quality Control Act (regulates discharges of waste into waters of the State.) — Applies to impact analysis and construction.

Regional and Local Regulations

- Tehama County General Plan (2009), Policy OS-3.1 (The County shall preserve and protect environmentally sensitive and significant lands and water valuable for their plant and wildlife habitat, natural appearance, and character.) — Applies to impact analysis, design, and construction.

4.5.3 Impacts and Mitigation

4.5.3.1 Methodology

The presence of special-status fish species and their associated aquatic habitat in the project area are presented above, and further detail on findings and methodology is provided in Appendix B. After establishing the presence of special-status fish species and their associated aquatic habitat, the proposed project was evaluated for its potential effect on these resources in the short- and long-term through construction activity and project operation and maintenance, respectively.

4.5.3.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Impacts on fish and aquatic habitat would be significant if they would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any fish species identified as a sensitive or special-status species in local or regional plans, policies, or regulations, or by NMFS, USFWS, or CDFW.
- Interfere substantially with the movement of any native resident or migratory fish species.
- 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 HCP.

Impacts on riparian habitat, including riparian habitat that may serve as shaded riverine aquatic habitat are discussed in Section 4.8, "Biological Resources — Wildlife."

4.5.3.3 Topics Not Evaluated Further

During environmental analysis, the following topics were eliminated from detailed analysis because no impacts from project implementation are anticipated:

- Conflict with any local policies or ordinances. There would be no conflicts with local policies or provisions of adopted HCPs or NCCPs. There are no HCPs or NCCPs in the project vicinity. The nearest HCP boundary is noted in the Butte Regional Conservation Plan NCCP/HCP; that boundary ends 3.5 miles from the closest project element. Project construction, operation, and maintenance would have no effect on areas within the HCP boundary.
- China Slough Construction Activities. Construction activities in China Slough would occur when the slough is not flowing; habitat conditions at this time of year would not be expected to support fish species. Accordingly, construction activities in China Slough are anticipated to have no impact on special-status fish species or their aquatic habitat.

4.5.4 Impact Analysis

Impact FISH-1: *Have a substantial adverse effect, either directly or through habitat modifications, on any fish species identified as a sensitive or special-status species in local or regional plans, policies, or regulations, or by NMFS, USFWS, or CDFW.*

No Project Alternative

Significant Impact. Under the no project alternative, no construction would occur and hydrology would not be changed. Maintenance of Deer Creek for flood management would continue in a similar manner to existing conditions. Impacts to fish and fish habitat from maintenance activities, particularly from potential channel grading or levee reinforcement, could have **significant impacts** on fish and fish habitat. The consequences and environmental effects of continued O&M are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than Significant with Mitigation Incorporated**.** The project area provides habitat for the special-status fish species listed in Table 4.5-1. Construction activities within and adjacent to Deer Creek cannot be timed to avoid all life stages of special-status fish species because of the year-round presence of at least one life stage. But, Chinook salmon and steelhead are least likely to occur in Deer Creek in August and September (refer to Tables 4.5-2 and 4.5-3). Construction activities that require in-channel work or ground disturbance immediately adjacent to Deer Creek have the potential to adversely affect these special-status fish species through changes in water quality, direct harm, the generation of noise and vibration, and habitat modification. The potential impacts on special-status fish species are discussed below by type of effect.

Water Quality

Construction activities involving levee raises, levee setbacks, private levee and berm removal, bank protection, bridge realignment, and floodplain lowering adjacent to the Deer Creek channel would involve ground disturbance that could have indirect effects on special-status fish species from temporary increases in turbidity and suspended sediment, and from the accidental leak or spill of hazardous materials (such as fuel, lubricants, or hydraulic fluids) into the creek.

Increases in turbidity and suspended sediment could potentially affect spawning habitat or feeding or holding behavior of special-status and resident fish species downstream of construction activities, and a hazardous leak or spill could have adverse effects on all life stages of fish species and their habitat, resulting in a potentially significant impact.

Implementation of the erosion and sediment control measures included in Mitigation Measure GEO-1 and the protective measures for hazardous materials included in Mitigation Measure HAZ-1 would ensure that water quality would not be substantially degraded and would reduce these potential impacts to **less than significant**.

Dewatering activities associated with Red Bridge realignment would also have the potential to degrade water quality in receiving waters, resulting in indirect impacts to fish species present during these activities that would be potentially significant. Implementation of the dewatering permit requirements included in Mitigation Measure WQ-1 would ensure that water quality would not be substantially degraded and would reduce this potential impact to **less than significant**.

Direct Harm

Realignment of Red Bridge would require in-channel work during coffer dam installation and dewatering. These activities would have the potential to directly harm fish. Adult fish would likely move out of the area before or immediately after equipment begins work in the water. But, juvenile fish are less mobile than adults and typically use cover near the bank. If fish did not move out of the area, they may be become stranded during the dewatering process. If direct displacement, stranding, mortality, or injury of special-status fish species were to occur during these activities, the impact would be potentially significant. Implementation of the avoidance work windows included in Mitigation Measure FISH-1, and the fish removal and protective measures for dewatering and fish rescue included in Mitigation Measure FISH-2 would reduce these potential impacts to **less than significant**.

Noise and Vibration

Coffer dam and bridge pier installation may require the use of a pile driver, which would generate noise and vibration that could adversely affect all life stages of fish. Noise and vibration can cause fish to modify behavior and can cause auditory tissue damage, resulting in a potentially significant impact. However, pile driving activities would be temporary and both adult and juvenile fish within the project area would be able to avoid areas of high noise or vibration by moving out of the area. In addition, implementation of the avoidance work windows in Mitigation Measures FISH-1 combined with the use of a vibratory pile driver as required in Mitigation Measure FISH-3 would minimize impacts to **less-than-significant** levels.

Habitat Modification

Construction site dewatering during Red Bridge realignment would result in the temporary loss of access to aquatic habitat, including designated critical habitat and EFH. While the area is dewatered, flows would be diverted so that fish would still have access to upstream and downstream aquatic habitat; once coffer dams are removed, habitat conditions would be restored in the dewatered area. In addition, the project would ultimately result in expanded aquatic habitat in this location. Therefore, this impact would be **less than significant**.

Setting back the existing levees, both in the setback reach (for alternatives A through E) and east of Leininger Road (for all alternatives), would expose the area between the channel and the proposed setback levee to seasonal flooding. The setback areas would be planted with riparian vegetation and during flooding would provide additional available aquatic habitat for special-status fish species, resulting in a beneficial effect.

O&M-related Impacts

All setback areas would be exposed to seasonal flooding that could leave areas of standing water as flood flows recede. But, the setback areas would be graded appropriately such that inundation would be temporary and no standing water would remain, resulting in no adverse impact to habitat conditions.

Setting back the existing levees under Alternatives A through E would increase the area of channel maintenance responsibility between the channel and the proposed setback levees. The area of channel maintenance responsibility would also be increased upstream of Red Bridge in the setback area proposed under all alternatives. But, hydraulic modeling indicates that the need for maintenance would be reduced and likely eliminated post-project (refer to Chapter 3, "Description of the Project Alternatives," and Section 4.13, "Hydrology, Hydraulics, and Flood Risk"). Maintenance of Deer Creek for flood management could be required to address local and acute issues caused by sediment, vegetation, or debris transported during extreme high-water events (e.g., the 10-

to 25-year flood event). For this reason, future flood maintenance activities may include maintenance and repair of USACE and non-USACE levees; clearing a path to a debris jam (including vegetation removal); cutting, excavating, and hauling away sediment, uprooted vegetation, and debris; and restoration of vegetation that may need to be removed for access. Channel maintenance for flood conveyance would not include general sediment removal in the channel. However, if flow is directed toward a levee that could threaten the levee, channel grading or sediment removal could be required to reduce that threat. These maintenance activities could adversely impact special-status fish species similar to the impacts described above for construction activities. Maintenance activities would comply with all relevant federal, State, and local laws and regulations, and all relevant permits and approvals would be obtained prior to the start of these activities. Therefore, maintenance of Alternatives A through F would have a **less-than-significant** impact.

Any required future vegetation management or sediment removal along China Slough would also comply with all relevant federal, State, and local laws and regulations, and these activities would occur when China Slough is not flowing, resulting in **no impact** to special-status fish species.

<u>Mitigation Measures</u>

Mitigation Measure FISH-1: *Implement Avoidance Work Windows.*

- All instream work shall be conducted between August 1 and September 30 to minimize impacts to migration of anadromous fish, pending discussion with CDFW. By scheduling activities when anadromous fish are least likely to be present, this work window avoids rearing and migration windows for Central Valley spring-run Chinook salmon, Central Valley steelhead, and fall-run and late-fall-run Chinook salmon. NMFS and CDFW approvals will be required for work instream work if it is to occur before July 1 or after September 30 (but no later than October 14).

Mitigation Measure FISH-2: *Implement Measures to Minimize Injury or Mortality to Fish Species During Dewatering and Diversion Activities.*

- Work conducted within the channel and banks outside of the August 1 to September 30 instream work window must be isolated from flowing water and fish rescue will be required prior to the onset of dewatering.
- Immediately prior to implementation of any necessary diversion of the creek during construction (as well as maintaining flows in the creek

upstream and downstream of the dewatered construction area), surveys shall be conducted for presence of sensitive fish species to ensure no sensitive species are present. A qualified biologist, in coordination with CDFW, will conduct surveys.

- The contractor, in consultation with the NMFS and CDFW, shall prepare a dewatering and fish rescue plan prior to the start of construction. Fish rescues, in conjunction with dewatering, shall be conducted by qualified fish biologists approved by the NMFS and CDFW. Methods may include herding, seining, or electrofishing. Best professional determination will decide which method(s) of rescue is best and where the relocation of captured fish, either upstream or downstream of the temporary diversion, is to occur. Biologists will first try to herd fish out of the fish exclusion area. If fish biologists determine that the use of electrofishing is necessary for the efficient and successful removal of fish, the NMFS electrofishing guidelines (National Marine Fisheries Service 2000) will be followed. NMFS and CDFW shall be contacted in the event sensitive fish species are encountered during the dewatering and rescue effort.
- All pumps used during dewatering for construction will be screened to meet CDFW and NMFS criteria (National Marine Fisheries Service 1997).
- All dewatering and rewatering activities will be conducted slowly to minimize disturbance to fish. A qualified fisheries biologist will be on site during these activities, and CDFW will be notified prior to these activities.

Mitigation Measure FISH-3: *Construction Activities requiring Pile Driving will be conducted with a Vibratory Pile Driver.*

Mitigation Measure GEO-1: *Acquire Appropriate Regulatory Permits, Prepare and Implement a Stormwater Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.*

Refer to Impact GEO-2 in Section 4.10, “Geology, Soils, and Paleontological Resources,” for the full text of this mitigation measure.

Mitigation Measure HAZ-1: *Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.*

Refer to Impact HAZ-1 in Section 4.12, “Hazards and Hazardous Materials,” for the full text of this mitigation measure.

Mitigation Measure WQ-1: *Obtain Appropriate Discharge and Dewatering Permit and Implementation Provisions for Dewatering.*

Refer to Impact WQ-1 in Section 4.17, "Water Quality," for the full text of this mitigation measure.

Impact FISH-2: *Interfere Substantially with the Movement of any Native Resident or Migratory Fish Species.*

No Project Alternative

No Impact. No construction would occur under the no project alternative. No operation or maintenance of new facilities would be required. Maintenance of Deer Creek for flood management would continue in a similar manner to existing conditions. With no change to existing O&M practices, the no project alternative would have **no impact.** The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

<u>Construction-related Impacts</u>

***Less than Significant*.** Construction site dewatering during Red Bridge realignment would result in the temporary loss of access to a portion of Deer Creek, which could adversely affect fish passage in the area. But, dewatering activities would be temporary, and flows would be diverted so that fish would still have access to upstream and downstream aquatic habitat, resulting in a **less-than-significant** impact. Potential impacts would be further reduced with implementation of the avoidance work window included in Mitigation Measure FISH-1.

<u>O&M-related Impacts</u>

Setting back the existing levees would expose the area between the channel and the proposed setback levee to seasonal flooding. As flood waters recede, topographic low points could remain inundated but become isolated from receding floodwaters and result in fish stranding, which would be potentially significant. But, the setback area would be designed and graded appropriately to include proper drainage following floodplain inundation to avoid potential for fish stranding and reduce impacts to **less-than-significant** levels.

Red Bridge realignment would improve fish passage conditions in that area of Deer Creek, and levee setback areas would provide areas of slower velocity for fish species during flood flows, resulting in beneficial effects to fish passage.

Excavation and vegetation removal in China Slough would remove potential barriers to fish passage in the slough and may result in a beneficial effect when the slough is flowing.

As described above, maintenance of Deer Creek for flood management could be required to address local and acute issues caused by sediment, vegetation, or debris transported during extreme high-water events (e.g., the 10- to 25-year flood event). For this reason, future flood maintenance activities may include maintenance and repair of USACE and non-USACE levees; clearing a path to a debris jam (including vegetation removal); cutting, excavating, and hauling away sediment, uprooted vegetation, and debris; and restoration of vegetation that may need to be removed for access. Channel maintenance for flood conveyance would not include general sediment removal in the channel. However, if flow is directed toward a levee that could threaten the levee, channel grading or sediment removal could be required to reduce that threat.These maintenance activities could adversely impact fish passage. But, these activities would comply with all relevant federal, State, and local laws and regulations and all relevant permits and approvals would be obtained. Therefore, maintenance of Alternatives A through F would have a **less-than-significant** impact**.**

Any required future vegetation management or sediment removal along China Slough would also comply with all relevant federal, State, and local laws and regulations, and these activities would occur when China Slough is not flowing, resulting in **no impact** to fish passage.

4.6 Biological Resources — Wetlands and Other Waters

This section discusses jurisdictional wetlands and other waters of the United States, as defined by the CWA, and wetlands and other waters of the State, as defined by the Porter-Cologne Water Quality Act. Wetlands are defined as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support vegetation typically adapted for life in saturated soil conditions. Jurisdictional wetlands must meet three wetland delineation criteria: (1) they must support hydrophytic vegetation; (2) they must have hydric soil types; and (3) they must have a wetland hydrology. Jurisdictional other waters include areas with a bed and bank that exhibit an ordinary high water mark.

Jurisdictional waters of the United States are also defined as navigable waters, interstate waters, and all other waters where their use, degradation, or destruction could affect interstate of foreign commerce; tributaries of any of these waters; and wetlands that meet any of these criteria or are adjacent to any of these waters or their tributaries. Jurisdictional waters of the State are any surface water or groundwater within the boundaries of the state.

4.6.1 Environmental Setting

4.6.1.1 Biological and Aquatic Resources Assessments

The environmental setting for wetlands and other waters is based on observations made during field surveys, review of aerial photographs, and soil maps. WRA, Inc. performed a BRA in April 2018 within an approximately 2,827-acre assessment area. The assessment area was larger than the defined project area because not all project description details were known at the time of assessment. The assessment area, which was centered on the mainstem of Lower Deer Creek, was used to describe Deer Creek and is shown in Figures 4.6-1 and 4.6-2 and in Appendix E, Figure 1. Portions of the assessment area were not surveyed because of lack of access from landowners, particularly the areas west of SR 99. Figures 4.6-1 and 4.6-2 show the project area in relation to the potentially jurisdictional wetlands and waters. The assessment area included portions or the entireties of 23 land parcels, several of which are currently dedicated largely to orchards and other intensive agriculture. In addition to Deer Creek and associated sloughs, the assessment area is relatively undeveloped and consists predominantly of grassland and pastureland.

Prior to the BRA, wetlands and other waters with the potential to be considered jurisdictional were identified using remote sensing software eCogntion 9.3 and ArcGIS 10.3. This analysis was conducted using a recent near-infrared aerial photograph of the assessment area. Potential wetlands and other waters were identified by their unique aerial signature, then mapped and exported into ArcGIS format for analysis and field map creation. These results were used to guide the field investigation and identify areas that warranted closer examination and mapping refinement. Additionally, the Soil Survey of Tehama County, California (United States Department of Agriculture 1967) and aerial imagery (Google Earth 2018) were examined to determine if hydric soil types that could support wetlands were present in the assessment area.

Horizon Water and Environment performed a separate aquatic resources assessment (ARA) in January 2018 within an assessment area that included a smaller area of Deer Creek than the BRA described above, but did include the entire reach of China Slough from SR 99 to its confluence with Deer Creek (Appendix B). Similar to the BRA, the assessment area of the ARA excluded areas where landowners did not grant access. The ARA was conducted in accordance with the 1987 *Corps of Engineers Wetlands Delineation Manual* (United States Army Corps of Engineers 1987), the *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Arid West Region* (Version 2.0) (United States Army Corps of Engineers 2008a), and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (United States Army Corps of Engineers 2008b). The analysis was conducted using Natural Resource Conservation Service (NRCS) Soil Survey Data (Natural Resource Conservation Service 2019a), the NRCS National Hydric Soils list (Natural Resource Conservation Service 2019b), National Wetlands Inventory data (United States Fish and Wildlife Service 2019), and the BRA (Appendix E), and the entire assessment area was surveyed on foot. The ARA was used in this EIR to describe China Slough. The China Slough assessment area is shown in Figure 4.6-3 and in Appendix B, Figure 5 (Sheets 9 through 11).

Figure 4.6-1 Potentially Jurisdictional Wetlands and Other Waters Mapped in the Deer Creek Assessment Area — Upstream

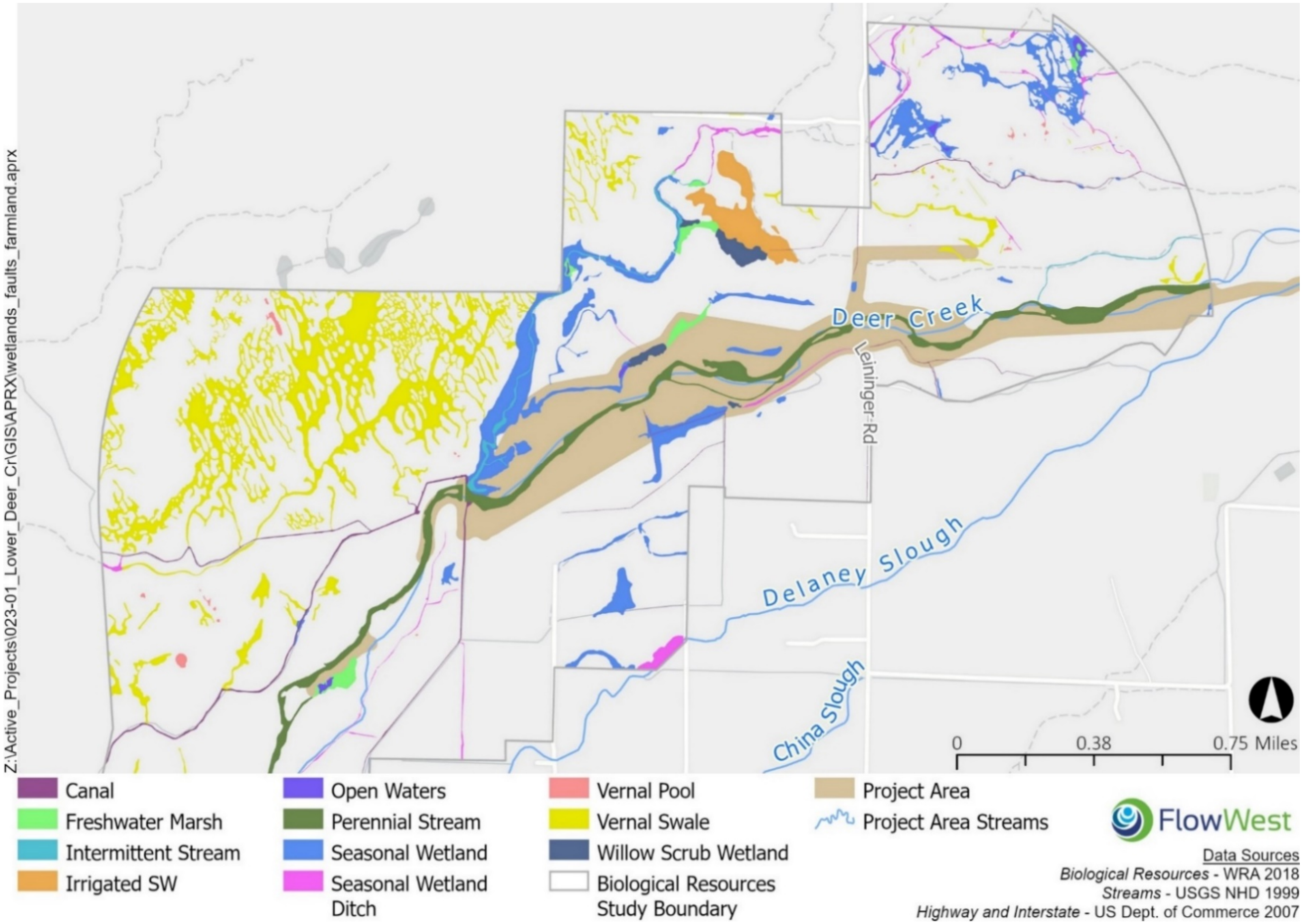


Figure 4.6-2 Potentially Jurisdictional Wetlands and Other Waters Mapped in the Deer Creek Assessment Area — Downstream

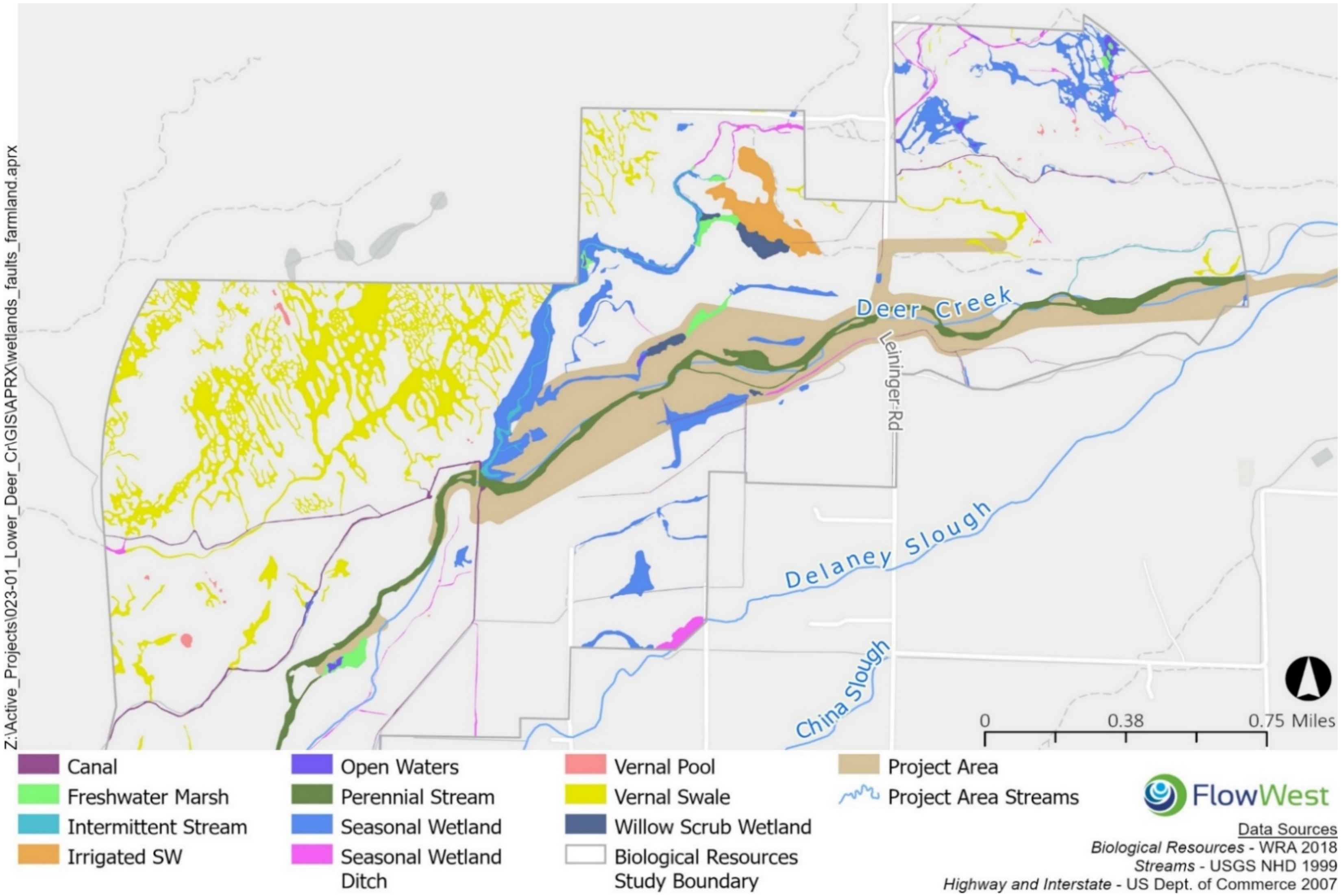
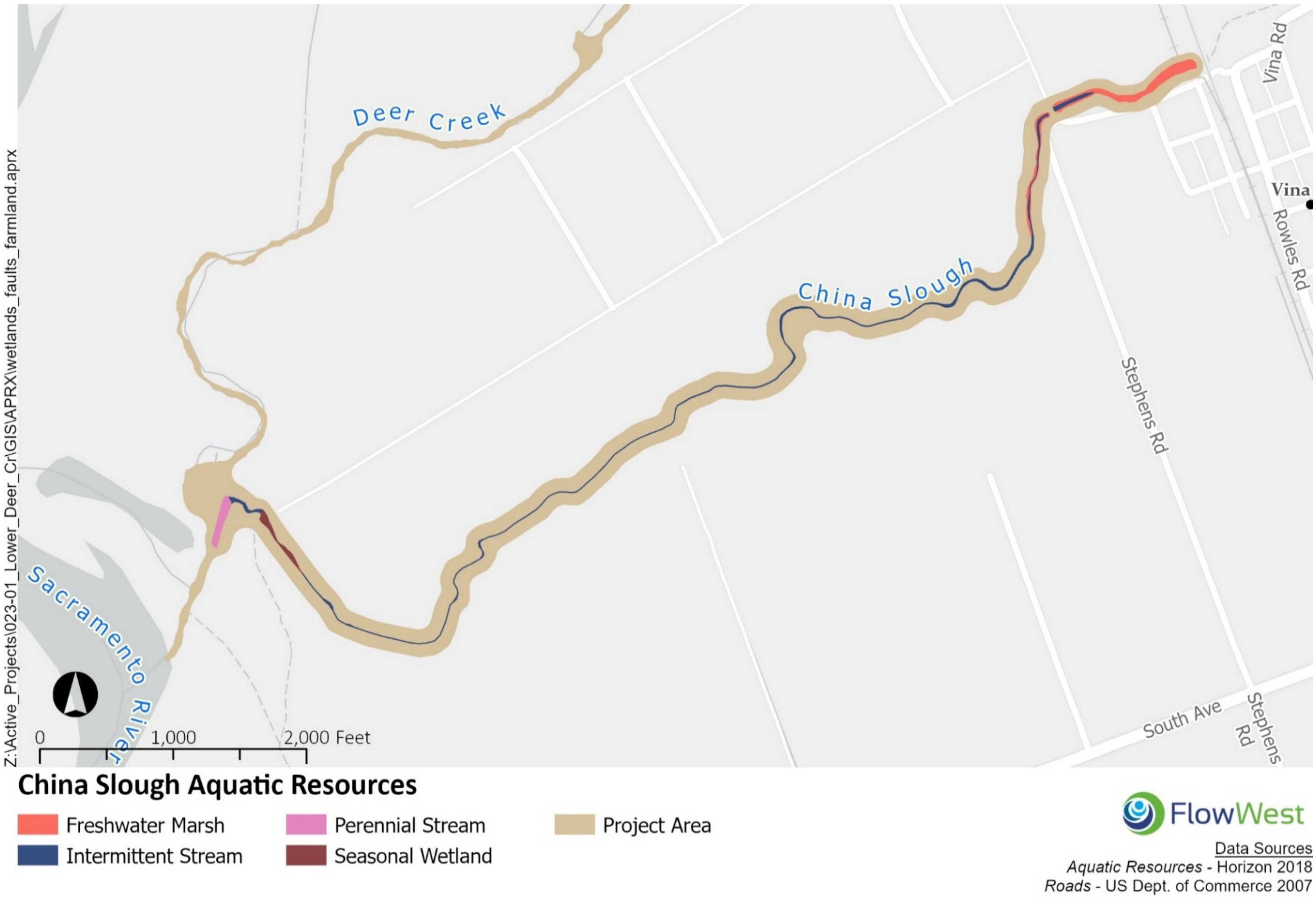


Figure 4.6-3 Potentially Jurisdictional Wetlands and Other Waters Mapped in the China Slough Assessment Area — Upstream



4.6.1.2 Identified Wetlands and Other Waters

Potentially jurisdictional wetlands and other waters that were identified in the Deer Creek and China Slough assessment areas are listed in Table 4.6-1. A description of each wetland or water type is provided below.

Table 4.6-1 Potential Jurisdictional Wetlands and other Waters Identified in the Deer Creek Assessment Area

Wetland or Water Type	Acreage within the Deer Creek Assessment Area (linear feet)	Acreage within the China Slough Assessment Area (linear feet)
Canal	13.77 (51,538)	NA
Intermittent stream	5.77 (11,970)	2.98 (9,203)
Open waters	3.48	NA
Perennial stream	55.26 (29,976)	0.51 (387)
Freshwater marsh	10.54	1.78
Irrigated Seasonal wetland	16.95	NA
Riparian wetland	3.34	NA
Seasonal wetland	82.88	0.39
Seasonal wetland ditch	12.72	NA
Vernal pool	2.15	NA
Vernal swale	156.92	NA
Willow scrub wetland	6.88	NA
Total Acreage	**367.32**	**5.66**

Canal

Canals comprise approximately 13.77 acres of the Deer Creek assessment area. Canals are human-made channels constructed for the purpose of conveying water. There are canals on the north and south side of the SVRIC Dam within the assessment area. The canal on the north side of the SVRIC Dam conveys water west. The canal on the south side of the SVRIC Dam conveys water to agricultural lands to the south and southwest. In some areas of the canals, the soil is thin and rocky with cobbles.

Intermittent Stream

Intermittent stream comprises approximately 5.77 acres (11,970 linear feet) of the Deer Creek assessment area and 2.98 acres (9,203 linear feet) of the China Slough assessment area. Intermittent streams form in drainages where seasonal flow is sufficient to incise channel walls and scour channel bottoms. A small network of intermittent streams that drain into Deer Creek are present in the northeastern portion of the assessment area. Ordinary high water mark indicators are present, including a change in slope, sediment texture, and vegetation. These streams are interconnected with wetland features but do not support much vegetation. Vegetation includes Italian ryegrass, Mediterranean barley, and sporadic valley oaks and willows.

Open Waters

Open waters comprise approximately 3.48 acres of the Deer Creek assessment area. Open waters are characterized by open water and low vegetation cover, although emergent vegetation, willows, or trees bordering the open water areas are often present. Several small areas of open waters were mapped in association with seasonal wetlands or freshwater marsh.

Perennial Stream

Deer Creek, which flows east to west through the assessment area, is a perennial stream that comprises approximately 55.26 acres (29,976 linear feet) of the Deer Creek assessment area. Deer Creek is a Sacramento River tributary that originates near the summit of Butte Mountain in the Lassen National Forest. It flows in a southwesterly direction, descends into the Sacramento Valley, and then enters the Sacramento River approximately 1 mile west of the town of Vina. The channel bed and banks are often rocky and composed of cobbles and boulders. The channel itself is typically unvegetated, with riparian forests or grasslands bordering. Approximately 0.51 acres (387 linear feet) of China Slough at its confluence with Deer Creek is also considered to be a perennial.

Freshwater Marsh

Freshwater marsh comprises approximately 10.54 acres of the Deer Creek assessment area and 1.78 acres of the China Slough assessment area. Freshwater marshes are areas of land where water covers ground for long periods of time. These marshes form a transition between the aquatic and terrestrial ecosystems. Freshwater marsh in the assessment areas is dominated by vegetation such as tule, Himalayan blackberry, broadleaf cattail, common rush, valley sedge, and other freshwater emergent vegetation.

Irrigated Seasonal Wetland

Irrigated seasonal wetlands comprise approximately 16.95 acres of the assessment area. Similar to seasonal wetlands, these areas exhibit a mesic hydrologic regime maintained by irrigation, in some cases causing standing water within the fields. Dominant vegetation within the irrigated seasonal wetlands includes Italian ryegrass, Lemmon's canary grass *(Phalaris lemmonii)*, Mediterranean barley, and valley sedge.

Riparian Wetland

Riparian wetlands comprise approximately 3.34 acres of the assessment area. Riparian wetlands generally support surface water for brief periods during the growing season, but the water table usually is situated below the soil surface for the majority of the growing season. This wetland type supports vegetation that can occur in both uplands and wetlands. Vegetation structure in riparian wetlands often varies and can include mature stands of riparian trees or complex suites of low-lying shrubs and forbs. An area of riparian wetland was observed and mapped adjacent to and south of the Deer Creek mainstem. As this riparian wetland area is located within the Deer Creek floodplain, it experiences temporary inundation during flood events. Although riparian vegetation also occurs along the Deer Creek levees, this vegetation does not appear to meet all three wetland parameters.

Seasonal Wetland

Seasonal wetlands comprise approximately 82.88 acres of the Deer Creek assessment area and 0.39 acres of the China Slough assessment area. Seasonal wetlands usually occur in closed topographic depressions where seasonal inundation or saturation occur during the growing season. Seasonal wetlands are dominated by non-native generalist species able to tolerate seasonally wet conditions such as Italian ryegrass and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), though native species such as cocklebur (*Xanthium strumarium*), rushes such as common bog rush (*Juncus effusus*), and valley sedge are sometimes present.

Seasonal Wetland Ditch

Seasonal wetland ditches comprise approximately 12.72 acres (51,538 linear feet) of the Deer Creek assessment area. Ditches are human-made channels constructed for the purpose of conveying water. At the time of the BRA, the majority of the ditches were wet and supported wetland species along the edges including tule (*Schoenoplectus acutus* var*. occidentalis*) and broadleaf cattail (*Typha latifolia).*

Vernal Pool

Vernal pool habitat comprises approximately 2.15 acres of the Deer Creek assessment area. Vernal pools are shallow, seasonally inundated depressional wetlands that form in soils with a subsurface layer that restricts the downward flow of water. Similar to seasonal wetlands, vernal pools occur in naturally occurring and anthropogenic depressions throughout the assessment area. As a specific type of seasonal wetland, vernal pools are characterized by a suite of species restricted to or indicative of vernal pools. These are mostly native species, such as vernal pool goldfields *(Lasthenia fremontii*)*,* Great Valley button celery (*Eryngium castrense*), woolly heads (*Psilocarphus brevissimus*), and Sacramento mint (*Pogogyne zizyphoroides*).

Vernal Swale

Vernal swales comprise approximately 156.92 acres of the Deer Creek assessment area and occur as dendritic networks of generally narrow, roughly linear depressions that convey channelized flow during the wet season. These vernal wetlands are an important component of the larger vernal pool complex and act as swales, which often provide hydrologic connections between multiple vernal pools. These wetlands are highly variable in plant composition, depending on the frequency and duration of inundation or saturation, as well as average flow velocities. For example, larger swales with higher flow velocities typically have large areas of bare bedrock and very sparse vegetative cover (approximately 5 percent), and smaller swales typically have deeper soils (still less than 5 inches in depth) and higher vegetative cover.

Compared to vernal pools, vernal swales are typically more sparsely vegetated because of the presence of channelized flow and are dominated by a mix of generalist hydrophytic species, rather than the suite of vernal pool endemics that typically dominate vernal pools in the Deer Creek assessment area. These features are typically sparsely vegetated with hydrophytic grasses and forbs such as barley, Italian ryegrass, coyote thistle, and vernal pool goldfields. Vegetation composition is likely seasonally variable with upland species encroaching more into swale features during the dry season. Dominant vegetation within the riverine seasonal wetlands includes Italian ryegrass, spikerush, and Mediterranean barley.

Willow Scrub Wetland

Willow scrub wetlands intergrade with seasonal wetlands and freshwater marsh to comprise 6.88 acres of the Deer Creek assessment area. Willow scrub wetlands are characterized by a dense overstory of willows with an understory of emergent vegetation or bare ground. These wetlands were mapped adjacent to irrigated agricultural fields.

4.6.2 Regulatory Setting

The following plans, policies, regulations, or laws related to wetlands and other waters apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- Clean Water Act, Section 404 (regulates the discharge of dredged or fill material into waters of the United States, including wetlands.) — Applies to impact analysis and construction.
- Clean Water Act, Section 401 (water quality certification.) — Applies to impact analysis and construction.

State Regulations

- Porter-Cologne Water Quality Control Act (regulates water quality in California.) — Applies to impact analysis and construction.
- California Fish and Game Code, Section 1602 (required when streambed is altered.) — Applies to this impact analysis and construction.

Regional and Local Regulations

- Tehama County General Plan (2009) Policy OS-3.1 (The County shall preserve and protect environmentally sensitive and significant lands and water valuable for their plant and wildlife habitat, natural appearance, and character.) — Applies to impact analysis, design, and construction.

4.6.3 Impacts and Mitigation

4.6.3.1 Methodology

The location and description of wetlands and other waters in the assessment areas are presented above, and further detail on findings and methodology is provided in Appendix B and Appendix E. Upon establishing the presence of wetlands and other waters in the assessment area, the proposed project was evaluated for its potential to affect these resources in the short and long term through construction activity and alteration of on-site conditions, respectively.

4.6.3.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Impacts on wetlands and other waters would be significant if they would:

- Have a substantial adverse effect on State or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Impacts on the species associated with these wetlands and other waters are discussed in Section 4.5 "Biological Resources — Fish and Aquatic Habitat," Section 4.7, "Biological Resources — Vegetation," and Section 4.8, "Biological Resources — Wildlife." Impacts on riparian communities are also discussed in Section 4.7, "Biological Resources — Vegetation."

4.6.3.3 Topics Not Evaluated Further

The BRA assessment area was much larger than the defined project area described in this EIR. As such, many of the mapped areas do not have the potential to be affected by project implementation. Specifically, the vernal pools, irrigated seasonal wetlands, seasonal wetland ditches, and canals that were identified within the assessment area are not located within the defined project area and would not be affected by construction or maintenance activities, including construction of the canal cutoff structure, which would only be open and closed within the canal. Because project implementation would have no impact on these wetland and water types, impacts are not discussed further in this section.

4.6.4 Impact Analysis

Impact WETLAND-1: *Have a substantial adverse effect on State or federally protected wetlands or waters through direct removal, filling, hydrological interruption, or other means.*

No Project Alternative

No Impact. Under the no project alternative, there would be no construction and no changes to the hydrology of the wetlands and other waters in the assessment area.

O&M of the Deer Creek channel and levees for flood management would continue in a similar manner to existing conditions. Maintenance activities could result in temporary impacts to jurisdictional waters, but these activities would be unchanged from baseline conditions. With no construction and no change to existing O&M practices, the no project alternative would have no impact.

Alternatives A through F

Construction-related Impacts

Less than Significant with Mitigation Incorporated. All construction activities have the potential to adversely affect water quality in wetlands and other waters through the inadvertent introduction of sediment or pollutants into the water. Increases in turbidity or contamination would adversely affect water quality and would have a **potentially significant impact** on wetlands and other waters. Implementation of the protective measures and adherence to the regulatory requirements included in Mitigation Measures WETLAND-1, WQ-1, GEO-1, and HAZ-1 would reduce these potential impacts to **less than significant**.

Construction of the raised levees would require the widening of the base of the levees to maintain the levee design slope. This widening has the potential to adversely affect adjacent riparian wetlands and seasonal wetlands through permanent removal or hydrologic interruption. Loss of these wetlands would result in a **potentially significant impact**. Implementation of the compensatory measures included in Mitigation Measure WETLAND-2 would ensure no net loss of these wetlands and would reduce impacts to **less than significant**.

Private berm removal would result in a slight increase of perennial stream and increase the potential for natural recruitment of riparian vegetation. Impacts would therefore be **less than significant and potentially beneficial**. Private levee removal has the potential to adversely affect open water and seasonal wetlands, but levee removal would improve Deer Creek's connection with its floodplain and result in an overall increase in wetlands and waters in this area.

Bank protection and construction of the new levee have the potential to result in the permanent loss of riparian wetlands. Loss of these wetlands would result in a **potentially significant impact**. Construction of the levee setback upstream of Red Bridge has the potential to result in the loss or hydrologic interruption of a vernal swale, resulting in a **potentially significant impact**. Implementation of the compensatory measures included in Mitigation Measure WETLAND-2 would ensure no net loss of these wetlands or vernal swales and would reduce impacts to **less than significant**.

Vegetation removal, excavation, and culvert replacement in China Slough would result in the conversion of freshwater marsh and seasonal wetland to intermittent stream, preserving and enhancing the functions and values of slough. In addition, disturbed areas along the bank would be replanted, and the improved hydrology of the slough would facilitate natural recruitment of riparian vegetation. Construction activities in China Slough would result in a conversion to intermittent stream and riparian wetlands, resulting in no net loss of wetlands or other waters. Impacts would be **less than significant**.

Construction activities associated with levee setbacks and floodplain lowering in Alternatives A through E would have direct effects on perennial stream (i.e. Deer Creek) and riparian habitat along Deer Creek, and would potentially affect seasonal wetlands adjacent to the creek. Levee setbacks would widen the creek corridor and allow more narrow and complex channels to form, resulting in enhanced functions and services for fish species and a **beneficial** effect for this water type. The smallest increase would occur under Alternative E and the largest would occur under Alternative A.

A loss of riparian vegetation would occur when the levees are set back and the floodplain is lowered. Although this riparian vegetation does not appear to meet the criteria for riparian wetlands, if it is determined to be jurisdictional after a formal wetland delineation is conducted, the loss would be **potentially significant**. However, this loss would be temporary because setback areas and the floodplain would be replanted and the improved hydrology in these areas would support natural recruitment of riparian vegetation. There would be no net loss of riparian wetlands in the setback and floodplain areas, and impacts would be **less than significant**. If it is determined during the permitting process that a net loss would occur, implementation of the compensatory measures in Mitigation Measure WETLAND-2 would reduce impacts to **less than significant**.

Levee setbacks would also have the potential to adversely affect seasonal wetlands. If levee setbacks were to result in the loss or hydrologic interruption of adjacent seasonal wetlands, impacts would be **potentially significant**. Implementation of the compensatory measures included in Mitigation Measure WETLAND-2 would ensure no net loss of these wetlands and would reduce impacts to **less than significant**.

Under Alternative F, no levee setbacks or floodplain lowering would occur between the SVRIC Dam and Red Bridge, so there would be no widening of the creek corridor and no impact to the riparian or seasonal wetlands in this portion of the project area.

Mitigation Measure WETLAND-1: *Implement avoidance and minimization measures for identified wetlands and other waters.*

- Project activities will avoid impacts to wetlands and other waters to the extent possible.
- High-visibility fencing will be installed in areas where equipment will be operating near any wetlands or other waters that are not to be disturbed.

- Construction crews will be informed about the importance of avoiding sensitive areas, including wetlands and other waters.

Mitigation Measure WETLAND-2: *Compensate for the loss of state or federally protected wetlands.*

Construction and placement of project features shall be limited to the smallest area necessary to meet the project purpose. Final determination of jurisdictional status and associated project impacts on such jurisdictional wetlands shall be decided by USACE and the SWRCB. If, as a result of a wetland delineation and jurisdictional determination, it is determined that the proposed project would impact jurisdictional wetlands, avoidance, minimization, and mitigation measures shall be implemented pursuant to USACE and SWRCB guidance to ensure that the project would result in no-net-loss of jurisdictional wetlands.

Mitigation Measure WQ-1: *Obtain Appropriate Discharge and Dewatering Permit and Implementation Provisions for Dewatering.*

Refer to Impact WQ-1 in Section 4.17, "Water Quality," for the full text of this mitigation measure.

Mitigation Measure GEO-1: *Acquire Appropriate Regulatory Permits, Prepare and Implement a Stormwater Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.*

Refer to Impact GEO-1 in Section 4.10, "Geology, Soils, and Paleontological Resources," for the full text of this mitigation measure.

Mitigation Measure HAZ-1: *Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.*

Refer to Impact HAZ-1 in Section 4.12, "Hazards and Hazardous Materials," for the full text of this mitigation measure.

O&M-related Impacts

Less than Significant. Setting back the existing levees would expose the area between the channel and the proposed setback levees to seasonal flooding. This flooding could adversely impact wetland or vernal swale habitat in the setback area. But, the setbacks would be graded appropriately such that inundation would be temporary and wetlands and vernal swales would maintain their functions and services for the special-status plant species that they support. Operational impacts would be **less than significant**.

Setting back the existing levees under Alternatives A through E would increase the area of channel maintenance responsibility between the channel and the proposed setback levees. The area of channel maintenance responsibility would also be increased upstream of Red Bridge in the setback area proposed under all alternatives. But, hydraulic modeling indicates that the need for maintenance would be reduced and likely eliminated post-project (refer to Chapter 3, "Description of the Project Alternatives," and Section 4.13, "Hydrology, Hydraulics, and Flood Risk"). Maintenance of Deer Creek for flood management could be required to address local and acute issues caused by sediment, vegetation, or debris transported during extreme high-water events (e.g., the 10- to 25-year flood event). For this reason, future flood maintenance activities may include maintenance and repair of USACE and non-USACE levees; clearing a path to a debris jam (including vegetation removal); cutting, excavating, and hauling away sediment, uprooted vegetation, and debris; and restoration of vegetation that may need to be removed for access. Channel maintenance for flood conveyance would not include general sediment removal in the channel. However, if flow is directed toward a levee that could threaten the levee, channel grading or sediment removal could be required to reduce that threat. These maintenance activities could adversely affect wetlands and waters along Deer Creek. Maintenance activities would comply with all relevant federal, State, and local laws and regulations, and all relevant permits and approvals would be obtained and adhered to. Therefore, maintenance activities on Deer Creek would have a **less-than-significant** impact on wetlands and other waters. Similarly, any required future vegetation management or sediment removal along China Slough would comply with all relevant federal, State, and local laws and regulations, and all relevant permits and approvals would be obtained and adhered to. Therefore, maintenance activities on China Slough would have a **less-than-significant** impact on wetlands and other waters.

4.7 Biological Resources — Vegetation

4.7.1 Environmental Setting

This section describes the vegetation present (or potentially present) in the proposed project area and vicinity, including sensitive biological communities and special-status plant species.

4.7.1.1 Methodology

The environmental setting for vegetation 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 project area and vicinity. WRA, Inc. performed a BRA in April 2018 within an approximately 2,827-acre assessment area (Appendix E). The assessment area was larger than the defined project area because not all project description details were known at the time of assessment. The purpose of the assessment was to determine if existing conditions provided suitable habitat for any special-status plant species, and if sensitive vegetation communities are present. All plant species encountered were recorded and are summarized in Appendix E. Plant nomenclature follows the Jepson eFlora (Jepson Flora Project 2018), except where noted. For cases in which regulatory agencies, California Native Plant Society (CNPS), or other entities base rarity on older taxonomic treatments, precedence was given to the treatment used by those entities. The BRA is based on information available at the time of the study and on-site conditions that were observed on the date of the site visit.

Prior to the BRA site visit, potential aquatic features were identified using remote sensing software eCogntion 9.3 and ArcGIS 10.3. This analysis was conducted using a recent near-infrared aerial photograph of the site. Potential aquatic features were identified by their unique aerial signature, mapped, and exported into ArcGIS format for analysis and field map creation. These results were used to guide the field investigation and identify areas that needed closer examination and mapping refinement. Additionally, the Soil Survey of Tehama County, California (United States Department of Agriculture 1967) and aerial imagery (Google Earth 2018) were examined to determine if any unique soil types that could support sensitive plant communities and/or aquatic features were present in the BRA study area. Biological communities present in the BRA study area were classified based on existing plant community descriptions described in *California Vegetation*, an online manual that classifies and describes California vegetation (California Native Plant Society 2018a). In some cases, WRA described variants of community types or to describe non-vegetated areas that are not described in the literature. Biological communities were classified as "non-sensitive" or "sensitive". For the purposes of this analysis, non-sensitive biological communities are those communities that are not afforded special protection under federal, State, and local laws, regulations, and ordinances. These communities may, however, provide suitable habitat for some special-status species. Sensitive biological communities are those communities that are given special protection by applicable federal, State, and local laws, regulations, and ordinances as defined by CEQA and other applicable laws and regulations, including riparian areas recognized by CDFW and potentially jurisdictional wetlands or waters recognized by USACE.

In addition, McBain Associates performed a rare plant survey and habitat assessment in 2018. The habitat assessment included the larger assessment area described above, while focused rare plant surveys were conducted along portions of Deer Creek (Appendix D).

Several online biological data resources were also queried to ascertain which native, non-native, and sensitive plant species could be found within and adjacent to the project area. Searches for known occurrences of special-status species, which focused on the Vina 7.5-minute USGS quadrangle and eight surrounding quadrangles, were conducted using the following five databases:

- Critical Habitat for Threatened and Endangered Species: online mapping tool (United States Fish and Wildlife Service 2018a).
- USFWS Information for Planning and Consultation Database (United States Fish and Wildlife Service 2018b).
- CDFW's California Natural Diversity Database (CNDDB) (California Department of Fish and Wildlife 2018a).
- CNPS Inventory of Rare and Endangered Vascular Plants of California (California Native Plant Society 2018a).
- Consortium of California Herbaria (2017).

4.7.1.2 Biological Communities

Non-sensitive Biological Communities

Major non-sensitive plant communities within the BRA study area include annual grassland, developed ruderal, and agricultural. These communities are described below.

Annual Grassland

Lower Deer Creek is predominately inhabited by the annual grassland plant community. Annual grassland is found on upland sites, slopes, and terraces. It intergrades with blue oak woodland and savannah along the drier edges and openings of the mixed riparian and scrub communities that are also found along the Deer Creek corridor adjacent to the project area. Annual grassland is common in open areas of valleys and foothills throughout California. Elements of two vegetation affiliations (California Native Plant Society 2018b) occur in non-native grassland in the BRA study area, but they are typically too small or too intermixed to map separately. These affiliations include *Avena* (*barbata, fatua*) semi-natural herbaceous stands (wild oats grasslands) and *Bromus* (*diandrus, hordeaceus*)—*Brachypodium distachyon* semi-natural herbaceous stands (annual brome grasslands). Annual grassland dominates the northern portion of the BRA study area, where most of it is grazed by cattle.

Developed/Ruderal

Developed and ruderal habitats include areas that have been heavily altered by humans and may contain built structures, landscaping, gravel roads, paved areas, or other non-natural surfaces. Because they are typically in active use, developed and ruderal areas are primarily bare ground, but ruderal herbaceous vegetation is often present and dominated by non-native annual species. Developed and ruderal areas are located sporadically throughout the project area and are represented by residences.

Agricultural

Within the BRA study area, the areas in agricultural production generally extend along the southern boundary of Deer Creek. Agricultural crops in this area include irrigated orchards of walnuts, almonds, olives, and prunes. Other crops include grapes or row crops, but at a lower density than orchards. Agricultural areas are generally managed for weeds, but may include non-native annual species including brome, wild oats, or other ruderal vegetation.

4.7.1.2 Sensitive Biological Communities

A total of 13 sensitive biological communities were identified within the BRA study area, representing 515 acres (Appendix E): Twelve of the sensitive biological communities, listed below, are aquatic communities considered to be potentially jurisdictional wetlands and other waters. Descriptions of each of these communities are provided in Section 4.6, "Biological Resources — Wetland and Other Waters" and their distribution in the BRA study area is shown in Figures 4.6-1 and 4.6-2 of that section.

1. Canal
2. Intermittent stream
3. Open waters
4. Perennial stream
5. Freshwater marsh
6. Irrigated seasonal wetland
7. Riparian wetland
8. Seasonal wetland
9. Seasonal wetland ditch
10. Vernal pool
11. Vernal swale
12. Willow scrub wetland

For the purposes of this section, riparian woodland was also identified as a sensitive biological community. Riparian woodland is described below.

<u>Riparian Woodland</u>

Riparian woodland covers 138.35 acres of the BRA study area. This plant community occurs in and adjacent to the project area on the banks of Lower Deer Creek and is represented by a medium to tall, broadleaved, winter deciduous, closed-canopy riparian forest. This community is generally restricted to the higher parts of the floodplains of Deer Creek and is subsequently less subject to physical disturbance from flooding, but still receives annual hydrological inputs. This community is regulated by CDFW under the CFGC (Section 1600 et seq.) and is dominated by California sycamore (*Platanus racemosa*), box elder (*Acer negundo*), and valley oak (*Quercus lobata*). The understory is composed primarily of willows, including narrowleaf (*Salix exigua*), red (*S. laevigata*), and arroyo willow (*S. lasiolepis*), as well as white alder (*Alnus rhombifolia*), blue elderberry (*Sambucus nigra ssp. caerulea*), California wild rose (*Rosa californica*), and spicebush (*Calycanthus occidentalis*).

4.7.1.3 Special-status Plant Species

Special-status plants include species/taxa that have been listed as endangered or threatened, or are formal candidates for such listing, under the ESA or CESA. Plant species on the CNPS Rare and Endangered Plant Inventory with California Rare Plant Ranks (CRPR) of 1, 2, and 3 are also considered special-status plant species and must be considered under CEQA. Rank 4 species are included in this analysis for completeness and because of their potential to receive an updated, higher rank. A description of the CNPS ranks and threat codes is provided below in Table 4.7-1.

Table 4.7-1 California Native Plant Society Ranks and Threat Codes

California Rare Plant Ranks (formerly known as CNPS Lists)	
Rank 1A	Presumed extirpated in California and either rare or extinct elsewhere.
Rank 1B	Rare, threatened, or endangered in California and elsewhere.
Rank 2A	Presumed extirpated in California, but more common elsewhere.
Rank 2B	Rare, threatened, or endangered in California, but more common elsewhere.
Rank 3	Plants about which more information is needed - A review list.
Rank 4	Plants of limited distribution - A watch list.
Threat Ranks	
0.1	Seriously threatened in California.
0.2	Moderately threatened in California.
0.3	Not very threatened in California.

Note: CNPS = California Native Plant Society

The potential for each special-status plant species to occur in the BRA study area was evaluated according to the following criteria:

- No Potential — Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
- Unlikely — Few of the habitat components meeting the species requirements are present, or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
- Moderate Potential — Some of the habitat components meeting the species requirements are present, or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- High Potential — All of the habitat components meeting the species requirements are present, or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- Present — Species is observed on the site or has been recorded (i.e., CNDDB or other reports) on the site recently.

4.7.1.4 Special-status Species in the Study Area

A total of 27 special-status plant species were documented within 5 miles of the project area (Appendix E, Figure 5). The BRA study area has a moderate to high potential to support 23 of these species; two of these species were observed during the site assessment. The remaining four special-status plant species were determined to have no potential or to be unlikely to occur within the BRA study area based on a lack of suitable habitat elements (e.g., soil type) or the elevation of the BRA study area (Appendix E, Table 2).

The two special-status plants that were observed within the BRA study area and the 21 special-status plants that have the potential to occur there are shown in Table 4.7-2 and discussed in detail below. See Table 4.7-1 for the definitions of CRPR designations.

Table 4.7-2 Special-status Plant Species with the Potential to Occur in the Biological Resources Assessment Study Area

Species (Scientific Name)	Federal Status	State Status	CRPR Rank	Potential to Occur
Hogwallow starfish (*Hesperevax caulescens*)	None	None	4.2	Present
Shield-bracted monkeyflower (*Mimulus glaucescens*)	None	None	4.3	Present
Hairy Orcutt grass (*Orcuttia pilosa*)	Endangered	Endangered	1B.1	High
Ahart's paronychia (*Paronychia ahartii*)	None	None	1B.1	High
Greene's tuctoria (*Tuctoria greenei*)	Endangered	Rare	1B.1	High
Henderson's bent grass (*Agrostis hendersonii*)	None	None	3.2	Moderate
Depauperate milk-vetch (*Astragalus pauperculus*)	None	None	4.3	Moderate
Silky cryptantha (*Cryptantha crinita*)	None	None	1B.2	High
Dwarf downingia (*Downingia pusilla*)	None	None	2B.2	Moderate
Hoover's spurge (*Euphorbia hooveri*)	None	None	1B.2	High
Stony Creek spurge (*Euphorbia ocellata* ssp. *rattanii*)	None	None	1B.2	High
Adobe-lily (*Fritillaria pluriflora*)-	None	None	1B.2	High
Bogg's Lake hedge-hyssop (*Gratiola heterosepala*)	None	Endangered	1B.2	High
Coulter's goldfields	None	None	1B.1	High

Species (Scientific Name)	Federal Status	State Status	CRPR Rank	Potential to Occur
(Lasthenia glabrata ssp. coulteri)				
Legenere (*Legenere limosa*)	None	None	1B.1	Moderate
Butte County meadowfoam (*Limnanthes floccosa* ssp. *californica*)	Endangered	Endangered	1B.1	Moderate
Woolly meadowfoam (*Limnanthes floccosa* ssp. *floccosa*)	None	None	4.2	High
Tehama navarretia (*Navarretia heterandra*)	None	None	4.3	High
Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*)	None	None	1B.1	Moderate
Adobe navarretia (*Navarretia nigelliformis* ssp. *nigelliformis*)	None	None	4.2	Moderate
Slender Orcutt grass (*Orcuttia tenuis*)	Threatened	Endangered	1B.1	High
Bidwell's knotweed (*Polygonum bidwelliae*)	None	None	4.3	High
Sanford's arrowhead (*Sagittaria sanfordii*)	None	None	1B.2	Moderate

Notes: CRPR = California rare plant rank

Moderate = Some of the habitat components meeting the species requirements are present, or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

High = All of the habitat components meeting the species requirements are present, or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.

Present = Species was observed on the site or has been recorded (i.e., California Natural Diversity Database other reports) on the site recently.

Hogwallow starfish (*Hesperevax caulescens*)

Hogwallow starfish is a CRPR-designated 4.2 plant. It is an annual forb in the sunflower family that blooms from March to June. It typically occurs in mesic, clay soils in valley and foothill grassland and shallow, sometimes alkaline vernal pool habitats at elevations ranging from approximately 0 to 1,660 feet (California Native Plant Society 2018b). This species is an obligate wetland plant (Lichvar et al. 2016) and is regularly known from vernal pool habitat in some regions, but may occur in other wetland habitat types in other regions (Keeler-Wolf et al. 1998). Hogwallow starfish was observed in annual grassland habitat and on the edges of vernal pool and seasonal wetland habitats on fine-textured substrates in the BRA study area.

Shield-bracted monkeyflower (*Mimulus glaucescens*)

Shield-bracted monkeyflower is a CRPR-designated 4.3 plant. It is a locally common annual plant that occurs on seeps and streambanks in chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grassland from 197 to 4,068 feet (California Native Plant Society 2018a). The blooming period for this species is from February through September (California Native Plant Society 2018a). This species was observed along the banks of the Deer Creek; seasonal wetlands and drainages (perennial and intermittent) within the BRA study area also provide habitat for this species.

Hairy Orcutt grass (*Orcuttia pilosa*)

Hairy Orcutt grass is a federally endangered, State-endangered, and CRPR-designated 1B.1 plant. It is an annual grass in the Poaceae family that blooms from May to September. This species is found in vernal pools at elevations from approximately 150 to 655 feet (California Native Plant Society 2018a). Observed associated species include Hoover's spurge (*Euphorbia hooveri*), swamp grass (*Crypsis schoenoides*), awnless spiralgrass (*Tuctoria greenei*), alkali weed (*Cressa truxillensis*), saltgrass (*Distichlis spicata*), alkali heath (*Frankenia salina*), and coyote thistle.

This species is known from 16 USGS 7.5-minute quadrangles in Butte, Glenn, Madera, Merced, Stanislaus, and Tehama counties. This species has been documented in the large vernal pool complex known as "Leininger Lakes" in the northern portion of the BRA study area (California Department of Fish and Wildlife 2018a). It has a high potential to occur in the BRA study area.

Ahart’s paronychia (*Paronychia ahartii*)

Ahart’s paronychia is a CRPR-designated 1B.1 plant. It is an annual herb in the Caryophyllaceae family that blooms from February to June. This species is found in vernal pools in cismontane woodland and valley and foothill grassland communities at elevations ranging from approximately 100 to 1,670 feet (California Native Plant Society 2018a). Observed associated species include Fremont’s tidy tips (*Layia fremontii*), California goldfields (*Lasthenia fremontii*), California plantain (*Plantago erecta*), Tehama navarretia (*Navarretia heterandra*), white brodiaea (*Triteleia hyacinthina*), and annual hairgrass (*Deschampsia danthonioides*).

This species is known from 21 USGS 7.5-minute quadrangles in Butte, Shasta, and Tehama counties. Vernal pools in the BRA study area provide suitable habitat for this species, and this species has been documented in the large vernal pool complex known as “Leininger Lakes” in the northern portion of the BRA study area (California Department of Fish and Wildlife 2018a). It has a high potential to occur in the BRA study area.

Greene's tuctoria (*Tuctoria greenei*)

Greene’s tuctoria is a federally endangered, State-listed rare plant, and is a CRPR-designated 1B.1 plant. It is an annual herb in the Poaceae family that blooms from May to July. This species is found in vernal pools at elevations ranging from approximately 100 to 3,510 feet. This species has been documented in the Vina and Richard Springs north-western quadrangle maps. Vernal pools in the BRA study area provide suitable habitat for this species. This species has been documented in the large vernal pool complex known as “Leininger Lakes” in the northern portion of the BRA study area (California Department of Fish and Wildlife 2018a). It has a high potential to occur in the BRA study area.

Henderson's bent grass (*Agrostis hendersonii*)

Henderson’s bent grass is a CRPR-designated 3.2 plant. It is an annual in the Poaceae family that blooms from April to June. This species is found in vernal pools, freshwater wetlands, and wetland-riparian areas. Vernal pools within the BRA study area have a moderate potential to support this species.

Depauperate milk-vetch (*Astragalus pauperculus*)

Depauperate milk-vetch is a CRPR-designated 4.3 plant. It is an annual herb in the Fabaceae family that blooms from March to June. It typically occurs in vernally mesic areas within chaparral, cismontane woodland, or valley and foothill grassland communities, often on thin soils of volcanic origin, and at elevations ranging from approximately 200 to 3,990 feet (California Native Plant Society 2018a).

This species is known from 26 USGS 7.5-minute quadrangles in Butte, Placer, Shasta, Tehama, and Yuba counties. Depauperate milk-vetch was considered to have a moderate potential to occur in vernally mesic grassland with stony, volcanically derived soils in the BRA study area. However, this species was not observed in the BRA study area during April or July 2016 vegetation surveys.

Silky cryptantha (*Cryptantha crinita*)

Silky cryptantha is a CRPR-designated 1B.2 plant. It is an annual herb in the Boraginaceae family that blooms from March to June. This species typically occurs on rocky volcanic soils, streambanks and gravel bars, and foothill wetlands at elevations ranging from approximately 270 to 3,360 feet. Vernal pools and seasonal wetland habitats within the BRA study area have high potential to support this species.

Dwarf downingia (*Downingia pusilla*)

Dwarf downingia is a CRPR-designated 2B.2 plant. It is an annual forb in the harebell family (*Campanulaceae*) that blooms from March to May. It typically occurs on slightly acidic clay to clay loam mesic areas on the edge of pools and lakes in valley and foothill grassland and vernal pool habitat at elevations ranging from approximately 3 to 1,450 feet (California Department of Fish and Wildlife 2018b). This species is an obligate wetland plant (Lichvar et al. 2016) and is regularly known from vernal pool habitat but may occur in other wetland habitat types (Keeler-Wolf et al. 1998).

Dwarf downingia has a moderate potential to occur in the BRA study area because of the presence of seasonal wetland and vernal pool habitats and the presence of associated species.

Hoover's spurge (*Euphorbia hooveri*)

Hoover's spurge is federally threatened and a CRPR-designated 1B.2 plant. It is an annual herb in the Euphorbiaceae family that blooms from July to September. This species is found in vernal pools at elevations ranging from approximately 80 to 820 feet (California Native Plant Society 2018a). Observed associated species include coyote thistle (*Eryngium vaseyi*), barley (*Hordeum marinum*), annual hairgrass (*Deschampsia danthonioides*), white headed navarretia (*Navarretia leucocephala*), Tehama navarretia (*N. heterandra*), stalked popcornflower (*Plagiobothrys stipitatus*), Downingia (*Downingia* sp.), hairy waterclover (*Marsilea vestita*), and woolly marbles (*Psilocarphus brevissimus*).

This species is known from 11 USGS 7.5-minute quadrangles in Butte, Colusa, Glenn, Merced, Stanislaus, Tehama, and Tulare counties. This species is documented to occur within vernal pools in the "Leininger Lakes" in the northern portion of the BRA study area (California Department of Fish and Wildlife 2018a). Vernal pools in the BRA study area could provide suitable habitat for this species.

Stony Creek spurge (*Euphorbia ocellata* ssp. *rattanii*)

Stony creek spurge is a CRPR-designated 1B.2 plant. It is an annual herb in the Euphorbiaceae family that blooms from May to October. Typical habitats for this species include chaparral, riparian scrub (streambanks), seasonal streambed, and valley and foothill grassland.

The BRA study area contains potentially suitable riparian scrub, and valley and foothill grassland underlain by rocky soils. Additionally, the nearest documented occurrence is approximately 6 miles west-southwest of the BRA study area (California Department of Fish and Wildlife 2018a). Because of this, it has a high potential to occur in the BRA study area.

Adobe-lily (*Fritillaria pluriflora*)

Adobe lily is a CRPR-designated 1B.2 plant. It is a perennial bulb in the Liliaceae family that blooms from February to April at elevations below approximately 2,700 feet. Habitat typically consists of heavy clay or serpentine of interior foothills. The BRA study area contains potentially suitable clay soils known to support this species, and this species is reported from within the BRA study area approximately 200 yards east of SR 99 East and 100 yards north of Deer Creek (California Department of Fish and Wildlife 2018a). Because of this, it has a high potential to occur in the study area.

Boggs Lake hedge-hyssop (*Gratiola heterosepala*)

Boggs Lake hedge hyssop is State-endangered and a CRPR-designated 1B.2 plant. It is an annual forb in the plantain family (Plantaginaceae) that blooms from April to August. It typically occurs on clay soils in pools, depressions, and lake margins within freshwater marsh and swamp, and vernal pool habitat at elevations ranging from approximately 30 to 7,720 feet (10 to 2,375 meters) (California Department of Fish and Wildlife 2018b, California Native Plant Society 2018b). This species is an obligate wetland plant (Lichvar et al. 2016) and is restricted to vernal pool habitat (Keeler-Wolf et al. 1998). Observed associated species include coyote thistle (*Eryngium vaseyi*), common vernal pool allocarya, horned downingia (*Downingia ornatissima*), dwarf downingia, bristled downingia (*D. bicornuta*), longstalk water-starwort (*Callitriche longipedunculata*), whitehead navarretia (*Navarretia leucocephala*), vernal pool goldfields (*Lasthenia fremontii*), and common hedge hyssop (California Department of Fish and Wildlife 2018a). Boggs Lake hedge hyssop has a moderate potential to occur in the BRA study area because of the presence of seasonal wetland and vernal pool habitats, and the presence of associated species.

Coulter's goldfields *(Lasthenia glabrata ssp. coulteri)*

Coulter's goldfields is a CRPR-designated 1B.1 plant. It is an annual herb in the Asteraceae that blooms from February to June. Typical habitat includes marshes, playas and vernal pools. The BRA study area contains potentially suitable vernal pools and mesic grasslands which could support this species. Additionally, this species is documented from less than 5 miles southeast of the BRA study area on the Vina Plains Preserve (California Department of Fish and Wildlife 2018a). Because of this, it has a high potential to occur in the BRA study area.

Legenere (*Legenere limosa*)

Legenere is a CRPR-designated 1B.1 plant. It is annual forb in the harebell family (Campanulaceae) that blooms from April to June. It typically occurs in the lower portions of vernal pool habitat at elevations ranging from approximately 0 to 2,890 feet (California Department of Fish and Wildlife

2018a; California Native Plant Society 2018b). This species is an obligate wetland plant (Lichvar et al. 2016) and is restricted to vernal pool habitat (Keeler-Wolf et al. 1998). Observed associated species include needle spikerush (*Eleocharis acicularis*), water chickweed (*Montia fontana*), goldfields (*Lasthenia* spp.), meadowfoams (*Limnanthes* spp.), and non-native annual grasses (California Department of Fish and Wildlife 2018a). Legenere has moderate potential to occur within the seasonal wetland and vernal pool habitats within the BRA study area.

Butte County meadowfoam (*Limnanthes floccosa* ssp. *californica*)

Butte County meadowfoam is a federally endangered, State-endangered, and CRPR-designated 1B.1 plant. It is an annual herb in the Limnanthaceae family that blooms from March to May. This species is found in vernal pools and vernally mesic areas in valley and foothill grassland communities at elevations ranging from approximately 150 to 3,050 feet (California Native Plant Society 2018a). Observed associated species include peppergrass, vernal pool goldfields, big heron bill (*Erodium botrys*), common stickyseed (*Blennosperma nanum*), stalked popcorn flower, Fremont's tidy tips (*Layia fremontii*), butter 'n' eggs (*Triphysaria eriantha*), soft blow wives (*Achyrachaena mollis*), common meadowfoam (*Limnanthes douglasii*), typical white meadowfoam (*L. alba* ssp. *alba*), woolly meadowfoam (*L. floccosa* ssp. *floccosa*), California goldfields (*Lasthenia californica* ssp. *californica*), pacific foxtail (*Alopecurus saccatus*), Italian ryegrass, and barley.

This species is known from six USGS 7.5-minute quadrangles in Butte County (California Native Plant Society 2018a) and occurs approximately 6 miles south of the BRA study area. Suitable vernal pool habitats occur within the BRA study area. Because of this, it has a moderate potential to occur in the BRA study area.

Woolly meadowfoam (*Limnanthes floccosa* ssp. *floccosa*)

Woolly meadowfoam is a CRPR-designated 4.2 plant. It is an annual herb in the Limnanthaceae family that blooms from March to May. This species is found in vernal pools and vernally mesic areas in chaparral, cismontane woodland, and valley and foothill grassland communities at elevations ranging from approximately 200 to 4,380 feet (California Native Plant Society 2018a). Observed associated species include Butte County meadowfoam, padre’s shooting star (*Primula clevelandii*), butter ‘n’ eggs, rusty popcorn flower (*Plagiobothrys nothofulvus*), cowbag clover (*Trifolium depauperatum*), and Fremont’s tidy tips.

This species is known from 39 USGS 7.5-minute quadrangles in Butte, Lake, Lassen, Napa, Shasta, Siskiyou, Tehama, and Trinity counties. There are five reported occurrences of this species in the vicinity of the BRA study area (California Department of Fish and Wildlife 2018a). Woolly meadowfoam is considered to have a high potential to occur in vernal pools and vernally mesic grassland in the BRA study area.

Tehama navarretia (*Navarretia heterandra*)

Tehama navarretia is a CRPR-designated 4.3 plant. It is an annual herb in the Polemoniaceae family that blooms from April to June. This species in found in vernal pools in valley and foothill grassland communities at elevations ranging from approximately 100 to 3,310 feet (California Native Plant Society 2018a). This species is known from 17 USGS 7.5-minute quadrangles in Butte, Colusa, Lake, Napa, Shasta, Tehama, Trinity, and Yuba counties. Tehama navarretia was considered to have a high potential to occur in vernal pools and vernally mesic grasslands in the BRA study area.

Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*)

Baker’s navarretia is a CRPR-designated 1B.1 plant. It is an annual herb in the Polemoniaceae that blooms from April to July. Habitat for this species includes cismontane woodland, lower montane coniferous forest, meadows and seeps, and valley and foothills grassland. The BRA study area contains potentially suitable vernal pool and mesic grassland habitats which could support this species. The non-rare *N. l.* ssp. *leucophala* was observed in vernal pools in the BRA study area. Because of this, it has a moderate potential to occur in the BRA study area.

Adobe navarretia (*Navarretia nigelliformis* ssp. *nigelliformis*)

Adobe navarretia is a CRPR-designated 4.2 plant. It is an annual herb in the Polemoniaceae that blooms from April to July. Habitat for this species includes valley and foothill grassland and vernal pools. The BRA study area contains potentially suitable vernal pools and mesic grassland habitats underlain by clay soils that could support this species. It has a moderate potential to occur in the BRA study area.

Slender Orcutt grass (Orcuttia tenuis)

Slender Orcutt grass is a federally threatened, State-endangered, and CRPR-designated 1B.1 plant. It is an annual in the Poaceae that blooms from May to September. Habitat includes vernal pools at elevation from approximately 110 to 5,775 feet. The BRA study area contains potentially suitable vernal pool habitat and this species is documented from less than 5 miles southeast on the Vina Plains Preserve (California Department of Fish and Wildlife 2018a). It has a moderate potential to occur in the BRA study area.

Bidwell's knotweed (*Polygonum bidwelliae*)

Bidwell's knotweed is a CRPR-designated 4.3 plant. It is an annual herb in the Polygonaceae family that blooms from April to July. This species is found in volcanic soils in chaparral, cismontane woodland, and valley and foothill grassland communities at elevations from approximately 200 to 3,940 feet (California Native Plant Society 2018a).

This species is known from 17 USGS 7.5-minute quadrangles in Butte, Shasta, and Tehama counties. Bidwell's knotweed is considered to have a high potential to occur in grasslands in the BRA study area.

Sanford's arrowhead (*Sagittaria sanfordii*)

Sanford's arrowhead is a CRPR-designated 1B.2 plant. It is an aquatic rhizomatous perennial forb in the water-plantain family (Alismataceae) that blooms from May to October. It typically occurs in standing or slow-moving freshwater ponds, lakes, marshes, and ditches in marsh and swamp habitat at elevations ranging from approximately 0 to 2,130 feet (California Department of Fish and Wildlife 2018a, California Native Plant Society 2018b). This species is an obligate wetland plant (Lichvar et al. 2016) and is known to exist in vernal pools and other wetlands in one region, but not in vernal pools in other regions (Keeler-Wolf et al. 1998). It has a high potential to occur in the BRA study area.

4.7.2 Regulatory Setting

The following plans, policies, regulations, or laws related to wetlands and other waters apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable

Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- ESA (protects species listed as threatened and endangered from take.) — Applies to this impact analysis, project design, and construction.
- CWA, Section 404 (regulates discharge of dredged or fill material into waters of the United States, including wetlands.) — Applies to this impact analysis and construction.
- CWA, Section 401 (State Certification of Water Quality, regulates construction that may result in a pollutant discharge to navigable waters.) — Applies to this impact analysis and construction.

State Regulations

- CESA (prohibits take of species listed under CESA.) — Applies to impact analysis, design, and construction.
- California Fish and Game Code, Section 1602 - Streambed Alteration Agreement (Notification of Lake or Streambed Alteration, requires notification of CDFW for any activity that would substantially change or use any material from bed, channel, or bank of a stream.) — Applies to impact analysis and construction.
- Porter-Cologne Water Quality Control Act (regulates discharges of waste into waters of the State.) — Applies to this impact analysis and construction.

Regional and Local Regulations

- Tehama County General Plan (2009)
    - Policy OS-3.1 (The County shall preserve and protect environmentally sensitive and significant lands and water valuable for their plant and wildlife habitat, natural appearance, and character.) — Applies to impact analysis, design, and construction.
    - Policy OS-3.2 (The County shall protect areas identified by the California Department of Fish and Game (CDFG) and the CNDDB as critical riparian zones)- Applies to planning, design, and construction.

  - Policy OS-6.3 (The County shall promote the reestablishment of native under story species)- Applies to planning, design, and construction.

4.7.3 Impacts and Mitigation

4.7.3.1 Methodology

The presence of sensitive natural communities and special-status plant species was assessed as described in the environmental setting section. Upon establishing the presence of these biological resources, the proposed project was assessed for its potential to affect these resources in the short and long term through construction activity and alteration of on-site conditions, respectively.

4.7.3.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Impacts to sensitive biological communities and special-status plant species would be considered significant if they would:

- Have a substantial adverse effect, either directly or through habitat modification, on any plant species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations by CDFW or USFWS.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural species or communities identified in the local or regional plans, policies, regulations or by CDFW or USFWS through direct removal, filling, hydrological interruption, or other means.
- Conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance, or conflict with the provisions of an adopted HCP or NCCP.

4.7.3.3 Topics Not Evaluated Further

During environmental analysis, the following topics were eliminated from detailed analysis because no impacts from project implementation are anticipated:

- The BRA study area was much larger than the project area described in this draft EIR. As such, many of the mapped areas do not have the potential to be affected by project implementation. Specifically, the vernal pools, irrigated seasonal wetland, and seasonal wetland ditches that were identified within the BRA study area are not located within or adjacent to the defined project area and would not be affected by construction or maintenance activities. Because no impact would occur, these biological communities and the special-status plant species associated with them are not discussed further. Specifically, 15 the special-status plant species not discussed further include: hairy and slender Orcutt grass; Ahart's paronychia; Green's tuctoria; Henderson's bent grass; Hoover's spurge; Boggs Lake hedge-hyssop; Coulter's goldfields; legenere; Butte County and woolly meadowfoam; Tehama, Baker's, and adobe navarretia; and depauperate milk-vetch.

4.7.4 Impact Analysis

Impact VEG-1: *Have a substantial adverse effect, either directly or through habitat modification, on any plant species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or CDFW or USFWS regulations.*

No Project Alternative

No Impact. Under the no project alternative, no construction would occur. Maintenance of Deer Creek for flood management would continue in a similar manner to existing conditions. With no change to existing O&M practices, the no project alternative would have no impact. The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than Significant with Mitigation Incorporated. Construction of the proposed project would have the potential to adversely affect special-status plant species that occur or have the potential to occur in the project area (refer to Table 4.7-2).

Suitable habitat may exist in the project area for silky cryptantha, Sanford's arrowhead, dwarf downingia, Bidwell's knotweed, Stony Creek spurge, and Adobe-lily, but these species were not encountered during focused rare plant survey. Although not anticipated, if construction activities were to adversely affect populations of these special-status species, the impacts would be potentially significant. Implementation of the pre-construction surveys and avoidance measures included in Mitigation Measure VEG-1, and, if necessary, the compensatory measures included in Mitigation Measures VEG-2 would reduce these potential impacts to **less than significant**. The area of disturbance would vary among the project alternatives, but the total amount of disturbance to suitable habitat would be similar for Alternatives A through F.

Construction activities that include ground disturbance in suitable seasonal wetland habitat could directly harm individuals of the Hogwallow starfish and Shield-bracted monkeyflower. In particular, the Shield-bracted monkeyflowers encountered within the SR 99-to-SVRIC Dam easement could be affected by the proposed private levee and berm removal. However, it should be noted that this species occurs on gravel bars and streambanks and its ecology includes periodic flood scouring, sediment deposition, and continuous re-introduction events from robust upstream source populations. So, although individuals of this species may be damaged during construction activities, overall impacts to this locally abundant population would be **less than significant**.

Special-status plants could also be indirectly affected by construction activities if habitat quality is degraded through the accidental release of fuels, oil, or contaminants; unintended erosion or sedimentation; or the accidental introduction of invasive plant species or noxious weeds not currently present. These impacts, if they were to occur, would be **potentially significant**.

Implementation of the preventative measures included in Mitigation Measure VEG-3 and the water quality protection measures included in Mitigation Measures GEO-1 and HAZ-1 would reduce these potential impacts to **less than significant**.

Following completion of construction, disturbed areas would be restored and the new levee setback areas would provide suitable habitat for these special-status plant species if repropagated.

O&M-related Impacts

Less than Significant. Setting back the existing levees under Alternatives A through E would increase the area of channel maintenance responsibility between the channel and the proposed setback levees. The area of channel maintenance responsibility would also be increased upstream of Red Bridge in the setback area proposed under all alternatives. But, hydraulic modeling indicates that the need for maintenance would be reduced and likely eliminated post-project (refer to Chapter 3, "Description of the Project Alternatives," and Section 4.13, "Hydrology, Hydraulics, and Flood Risk Management"). Maintenance of Deer Creek for flood management could be required to address local and acute issues caused by sediment, vegetation, or debris transported during extreme high-water events (e.g., the 10- to 25-year flood event). For this reason, future flood maintenance activities may include maintenance and repair of USACE and non-USACE levees; clearing a path to a debris jam (including vegetation removal); cutting, excavating, and hauling away sediment, uprooted vegetation, and debris; and restoration of vegetation that may need to be removed for access. Channel maintenance for flood conveyance would not include general sediment removal in the channel. However, if flow is directed toward a levee that could threaten the levee, channel grading or sediment removal could be required to reduce that threat. These maintenance activities could adversely affect special-status plant species. But, these activities would comply with all relevant federal, State, and local laws and regulations, and all relevant permits and approvals would be obtained prior to the start of these activities. Therefore, maintenance of Alternatives A through F would have **a less-than-significant** impact.

Similarly, any required future vegetation management or sediment removal along China Slough would also comply with all relevant federal, State, and local laws and regulations and would have a less-than-significant impact on special-status plant species.

Mitigation Measure VEG-1: *Conduct Focused Surveys for Special-status Plants and Avoid Impacts, where Feasible.*

To avoid adverse effects from setback levees on special-status plants, the following measures would be implemented before the start of ground-disturbing activities:

- Conduct preconstruction special-status plant surveys during the blooming periods. A qualified botanist will conduct surveys for hogwallow starfish and star-bracted monkeyflower, as well as the other special-status plant species with potential to occur in appropriate habitat within the construction footprint. 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 is clearly identifiable. If no special-status plants are found during focused surveys, no further action would be required.
- If special-status plants are found, the special-status plant and occupied habitat in the project area will be marked for avoidance during construction activities. Marking will include a minimum habitat buffer for each occurrence of 25 feet. The construction contractor will avoid these areas where feasible. Temporary fencing will be installed to protect all occupied habitat located in levee setback construction areas that can be avoided.

Mitigation Measure VEG-2: *If Avoidance of Special-Status Plant Species is Infeasible, Develop and Implement a Compensatory Mitigation Plan.*

- If habitat occupied by special-status plants cannot be avoided during levee setback construction, an appropriate and feasible mitigation plan to compensate for direct loss of special-status plants will be developed and provided to CDFW for approval. The plan will detail appropriate compensatory 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 (1) salvaging and transplanting individual plants; (2) collecting the seeds of affected plants; and (3) 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 determined in consultation with CDFW. The mitigation plan will be developed in consultation with and approved by CDFW before construction activities begin in areas containing special-status plant species.

Mitigation Measure VEG-3: *Prevent the Introduction of Invasive Plant Species.*

The contractor shall implement the following best management practices, to the extent feasible, to prevent the introduction of invasive plant species:

- All heavy equipment shall be thoroughly cleaned prior to mobilization on site to remove any soil, weed seeds, and plant parts to reduce the importation and spread of invasive exotic plant species. Only certified weed-free straw shall be used for erosion control or other purposes to reduce the importation and spread of invasive exotic plant species.
- All revegetation materials (e.g., mulches, seed mixtures) shall be certified weed-free and come from locally adapted native plant materials, to the extent practicable.

Mitigation Measure GEO-1: *Acquire Appropriate Regulatory Permits, Prepare and Implement a Stormwater Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.*

Refer to Section 4.10, "Geology, Soils, and Paleontological Resources," for the full text of this mitigation measure.

Mitigation Measure HAZ-1: *Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.*

Refer to Section 4.12, "Hazards and Hazardous Materials," for the full text of this mitigation measure.

Impact VEG-2: *Have a substantial adverse effect on any riparian habitat or other sensitive natural species or communities identified in the local or regional plans, policies, regulations or by the CDFW or USFWS through direct removal, filling, hydrological interruption, or other means.*

No Project Alternative

No Impact. Under the No Project Alternative, no construction or changes to hydrology would occur. Maintenance activities related to Deer Creek flood management would continue in a similar manner to existing conditions. With no change to existing O&M practices, the no project alternative would have **no impact**.

Alternatives A through F

<u>Construction-related Impacts</u>

Less than Significant with Mitigation Incorporated. Sensitive habitats in the study area include riparian and aquatic habitats. Impacts on potentially jurisdictional wetlands and other waters are described in Section 4.6, "Biological Resources — Wetlands and Other Waters." Therefore, this discussion focuses on impacts to riparian woodland habitat, which is protected under Section 1602 of the CFGC and may also be considered to be a sensitive natural community by CDFW.

Construction activities that could disturb riparian woodland habitat include bridge abutment removal, private levee and berm removal, grading of the floodplain adjacent to the streambed to create lower off-channel habitat areas, and constructing the setback levees. These activities have the potential to cause the temporary loss of approximately 7 acres of riparian woodland habitat under all alternatives. The amount of riparian woodland habitat that could be temporarily removed is relatively small compared to the overall amount of similar adjacent habitat, and areas of disturbance would be replanted and expected to resprout or naturally recruit. This temporary loss would not result in substantial adverse impacts and would be **less than significant**.

Under Alternatives A through E, levee setbacks and modifications have the potential to result in the additional temporary loss of approximately 28 acres of riparian woodland habitat. This temporary loss is not anticipated to have a substantial adverse effect because it would be offset by proposed floodplain plantings and the natural riparian recruitment, including vigorous resprouting of sandbar willow, that is anticipated to occur in response to the reconnection of Deer Creek to its floodplain. However, because it is not assured that plantings and natural recruitment would fully compensate for the riparian habitat loss that would occur, impacts on riparian habitat under Alternatives A through E are considered to be **potentially significant.** If required**,** the compensatory measures included in Mitigation Measure VEG-4 would reduce impacts to **less-than-significant** levels.

Construction of the new embankment and levee and installation of bank protection have the potential to result in the permanent loss of approximately 2.5 acres if riparian woodland. Although this amount is relatively small compared to the overall amount of similar adjacent habitat, this loss combined with the potential net loss of riparian woodland described above would be **potentially significant**. The compensatory measures included in Mitigation Measure VEG-4 would reduce impacts to **less-than-significant** levels.

Mitigation Measures VEG-4: *If a Net Loss of Riparian Woodland Habitat Occurs, Develop and Implement a Compensatory Mitigation Plan.*

If necessary, a mitigation plan will be prepared to compensate for loss of riparian woodland to ensure no-net-loss of riparian functions and values. 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 riparian woodland habitat.

<u>O&M-related Impacts</u>

Less than Significant and Potentially Beneficial. Setting back the existing levees would expose the area between the channel and the proposed setback levee to seasonal flooding. The setbacks would be graded appropriately such that inundation would be temporary; this reconnection with the floodplain would improve the survival of riparian plantings and facilitate natural recruitment of native riparian habitat, resulting in a **beneficial** effect.

Existing maintenance activities could be required to address local and acute issues caused by sediment, vegetation, or debris transported during extreme high-water events (e.g., the 10- to 25-year flood event). For this reason, future flood maintenance activities may include maintenance and repair of USACE and non-USACE levees; clearing a path to a debris jam (including vegetation removal); cutting, excavating, and hauling away sediment, uprooted vegetation, and debris; and restoration of vegetation that may need to be removed for access. Channel maintenance for flood conveyance would not include general sediment removal in the channel. However, if flow is directed toward a levee that could threaten the levee, channel grading or sediment removal could be required to reduce that threat. Potential vegetation removal during these activities is anticipated to be minimal and would not have a substantial adverse effect on riparian habitat in the area. In addition, these activities would comply with all relevant federal, State, and local laws and regulations and all relevant permits and approvals would be obtained prior to the start of these activities. Therefore, maintenance impacts would be **less than significant.**

Similarly, any required future vegetation management or sediment removal along China Slough would also comply with all relevant federal, State, and local laws and regulations and would have a less-than-significant impact on riparian habitat.

Impact VEG-3: *Conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance, or conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan.*

No Project Alternative

No Impact. There would be no conflicts with local policies or provisions of adopted HCPs or NCCPs because there would be no construction under the no project alternative, and there are no HCPs or NCCPs in the project vicinity. Continued maintenance activities would comply with permits and regulations and would not conflict with any local policies or ordinances, resulting in no impact.

Alternatives A through F

<u>Construction-related Impacts</u>

No Impact. There are no HCPs or NCCPs in the project vicinity. The nearest HCP boundary is noted in the Butte Regional Conservation Plan NCCP/HCP; that boundary ends 3.5 miles from the closest project element. Therefore, there would be no conflicts with local policies or provisions of adopted HCPs or NCCPs. Tree removal would be necessary during project construction, but trees would be replaced in accordance with CDFW mitigation requirements, and would recruit naturally within the reconnected floodplain. Construction activities would not conflict with local policies or ordinances, resulting in **no impact**.

O&M-related Impacts

No Impact. Refer to the construction-related impacts discussion. There would be no conflicts with local policies or provisions of adopted HCPs or NCCPs, so **no impact** would occur.

4.8 Biological Resources — Wildlife

4.8.1 Environmental Setting

This section describes wildlife habitat and associated wildlife species, including designated critical habitat and special-status wildlife species, which are present or potentially present within the project area.

4.8.2 Methodology

The environmental setting for wildlife and wildlife habitat 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 project area and vicinity. WRA, Inc. performed a BRA in April 2018 within an approximately 2,827-acre assessment area (Appendix E). The assessment area was larger than the defined project area because not all project description details were known at the time of assessment. The purpose of the assessment was to determine if existing conditions provided suitable habitat for each special-status wildlife species known to occur in the vicinity and to evaluate each species' potential to occur in the BRA study area. The site visits do not constitute a protocol-level survey and were not intended to determine the actual presence or absence of a species. Where little information was known about species occurrences and habitat requirements, the species evaluation was based on best professional judgment. Experts in individual species biology were contacted to obtain the most up to date information regarding species biology. All wildlife species encountered were recorded and are summarized in Appendix E.

- Several online biological databases were also queried to ascertain which special-status wildlife species could be found within and adjacent to the project area. Searches for known occurrences of special-status species, which focused on the Vina 7.5-minute USGS quadrangle and eight surrounding quadrangles, were conducted using the databases listed below. Several publications (listed below) were also referenced for information on species ecology and listing status. USFWS Information for Conservation and Planning Database (United States Fish and Wildlife Service 2018a).

- The CDFW's CNDDB (California Department of Fish and Wildlife 2018b).
- The CDFG publication *California Bird Species of Special Concern* (Shuford and Gardali 2008).
- eBird: an online database of bird distribution and abundance (Cornell Lab of Ornithology 2018).
- CDFW and University of California Press publication *California Amphibian and Reptile Species of Special Concern* (Thomson et al. 2016).
- *A Field Guide to Western Reptiles and Amphibians* (Stebbins 2003).
- Habitat for Threatened and Endangered Species: online mapping tool (United States Fish and Wildlife Service 2018b).
- CDFW Special Animals List (California Department of Fish and Wildlife 2021).

4.8.3 Wildlife Habitat

A description of survey methods used to map vegetation communities is provided in Section 4.6, "Biological Resources — Wetlands and Other Waters," and a map of vegetation communities is provided in Section 4.7, "Biological Resources — Vegetation." Sixteen vegetation communities and land cover types that provide potentially suitable habitat for wildlife were identified within the BRA study area. The annual grassland, developed ruderal, agricultural, and riparian woodland habitat types are described in Section 4.7, "Biological Resources — Vegetation." The remaining habitat types (canal; intermittent and perennial stream; open waters; freshwater marsh; irrigated seasonal, riparian, seasonal, and willow scrub wetland; seasonal wetland ditch; and vernal pools and swales) are described in Section 4.6, "Biological Resources — Wetlands and Other Waters."

4.8.3.1 Special-Status Wildlife Species

Special-status wildlife include species and taxa that have been listed as endangered or threatened, or are formal candidates for such listing, under the ESA or CESA. The CFGC also outlines the following special-status wildlife species designations:

- Fully Protected — Designation indicates that take of that species cannot be authorized through a State permit.
- CDFW Species of Special Concern — Species that face extirpation in California if current population and habitat trends continue.

Additional protections and designations for special-status wildlife species include:

- Bald and Golden Eagle Protection Act — Provides federal protection for the bald (*Haliaeetus leucocephalus)* and golden eagle (*Aquila chrysaetos*).
- USFWS Birds of Conservation Concern — Although species in under this designation generally have no special legal status, they are typically given special consideration under CEQA.
- Migratory Bird Treaty Act of 1918 — Includes most native birds in the United States, including non-status species, and includes protections under CFGC sections 3503, 3503.5, and 3513 that prohibit deliberately destroying or collecting active nests, eggs, and young.
- Western Bat Working Group (WBWG) — Designates conservation status for species of bats; those with a high or medium priority are typically given special consideration under CEQA.

The potential for special-status wildlife species to occur in the BRA study area was evaluated according to the following criteria:

- No Potential — Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).
- Unlikely — Few of the habitat components meeting the species requirements are present, or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
- Moderate Potential — Some of the habitat components meeting the species requirements are present, or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.

- High Potential — All of the habitat components meeting the species requirements are present or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- Present — Species is observed on the site or has been recorded (i.e., CNDDB, other reports) on the site recently.

The BRA study area was also evaluated for the presence of designated critical habitat. Critical habitat is a term defined in the ESA as a specific and formally-designated geographic area that contains features essential for the conservation of a threatened or endangered species and that may require special management and protection. The ESA requires federal agencies to consult with the USFWS to conserve listed species on their lands and to ensure that any activities or projects they fund, authorize, or carry out will not jeopardize the survival of a threatened or endangered species. In consultation for those species with critical habitat, federal agencies must also ensure that their activities or projects do not adversely modify critical habitat to the point that it will no longer aid in the species' recovery. Critical habitat areas that are currently unoccupied by the species but which are needed for the species' recovery are protected by the prohibition against adverse modification.

4.8.3.2 Special-status Species in the Study Area

A total of 45 special-status wildlife species were documented within 5 miles of the BRA study area (Appendix E, Figure 5). The BRA study area has moderate or high potential to support 26 of the 45 species. Of these 26, six were observed in the BRA study area during the site assessment, and five others are considered present based on available literature. Additionally, 15 species have a moderate or high potential occur within the BRA study area.

The remaining 19 special-status wildlife species were determined to have no potential or to be unlikely to occur within the BRA study area based primarily on a lack of suitable habitat elements or apparent local extirpation.

The six special-status wildlife species observed within the BRA study area, five that are otherwise considered present, and 19 that have the potential to occur within the BRA study area are listed in Table 4.8-1 and discussed in detail individually in the sections that follow the table.

Table 4.8-1 Special-status wildlife species with the potential to occur in the Biological Resources Assessment Study Area

Species (Scientific Name)	Federal Status	State Status	Other Status	Potential to Occur
Invertebrates				
Conservancy fairy shrimp (*Branchinecta conservatio*)	E	NA	NA	Moderate
Vernal pool fairy shrimp (*Branchinecta lynchi*)	T	NA	NA	High
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	T	NA	NA	High
Vernal pool tadpole shrimp (*Lepidurus packardi*)	E	NA	NA	Moderate
Reptiles and Amphibians				
Western pond turtle (*Actinemys marmorata*)	NA	SSC	NA	Present
Western spadefoot toad (*Spea hammondii*)	NA	SSC	NA	Moderate
Birds				
Tricolored blackbird (*Agelaius tricolor*)	BCC	T	NA	Present
Grasshopper sparrow (*Ammodramus savannarum*)	NA	SSC	NA	Moderate
Great egret (*Ardea alba*)	NA	NA	Nesting sites (rookeries) are monitored by CDFW	Moderate
Great blue heron (*Ardea herodias*)	NA	NA	Nesting sites (rookeries) are monitored by CDFW	Present

Species (Scientific Name)	Federal Status	State Status	Other Status	Potential to Occur
Burrowing owl (*Athene cunicularia*)	BCC	SSC	NA	Moderate
Oak titmouse (*Baeolophus inornatus*)	BCC	NA	NA	Present
Swainson's hawk (*Buteo swainsoni*)	BCC	T	NA	High
Northern harrier (*Circus cyaneus*)	NA	SSC	NA	Present
White-tailed kite (Elanus leucurus)	NA	FP	NA	Moderate
Yellow-breasted chat (*Icteria virens*)	NA	SSC	NA	Moderate
Loggerhead shrike (*Lanius ludovicianus*)	BCC	SSC	NA	Moderate
Yellow-billed magpie (*Pica nuttalli*)	BCC	NA	NA	Moderate
Nuttall's woodpecker (*Picoides nuttallii*)	BCC	NA	NA	Present
Mammals				
Pallid bat (*Antrozous pallidus*)	NA	SSC	WBWG High Priority	High
Western red bat (*Lasiurus blossevillii*)	NA	SSC	WBWG High Priority	High
Long-eared myotis (*Myotis evotis*)	NA	NA	WBWG Medium Priority	Moderate

Notes: BCC = Bird of Conservation Concern; E = Endangered; FP = Fully Protected, NA = not listed; SSC = Species of Special Concern; T = Threatened; WBWG = Western Bat Working Group

4.8.3.3 Invertebrates

Conservancy fairy shrimp (*Branchinecta conservatio*)

The Conservancy fairy shrimp was federally listed as endangered in 1994 and is endemic to California's Central Valley, where at least seven populations exist (United States Fish and Wildlife Service 2007). This species inhabits vernal pools and similar seasonal water features; the majority of occupied features are relatively large, turbid, cool- water vernal pools typically referred to as playa pools (Helm 1997, Eriksen and Belk 1999). Playa pools typically remain inundated much longer than most vernal pools, even though they often have maximum depths comparable to typical vernal pools. The Conservancy fairy shrimp have been collected from early November (when pools start to fill) to early April. Average time to maturity from hatching is 49 days, although it can be as little as 19 days in warmer pools (Eriksen and Belk 1999).

There are three CNDDB occurrences of this species within 1.5 miles of the BRA study area, with the nearest of those located at an area known as the "Leininger Lakes" (larger and longer-lasting vernal pools) approximately 0.2 mile to the north of the BRA study area (California Department of Fish and Wildlife 2018). A small number of seasonal water features within the BRA study area near the aforementioned occurrence appear to be longer-lasting vernal pools and are the most likely to support this species within the BRA study area. The Conservancy fairy shrimp has a moderate potential to occur in the study area.

Vernal pool fairy shrimp (*Branchinecta lynchi*)

The vernal pool fairy shrimp was federally listed as threatened in 1994 and is nearly endemic to California. Populations are known from Stillwater Plain in Shasta County, through most of the length of the Central Valley, to Pixley in Tulare County; additional disjunct populations exist at various other locations, including in the central and southern Coast Ranges. Overall, this species is widespread but generally not abundant in occupied areas. Vernal pool fairy shrimp occurs primarily in vernal pools but is also found in a variety of both natural and artificial temporary wetland habitats including alkali pools, ephemeral drainages, stock ponds, vernal swales, rock outcrop pools, and even roadside ditches (Helm 1997). Occupied features are typically small (ranging from 0.1 to 0.05 acre), and pond for a relatively short duration (e.g., as short as three to four weeks) (Eriksen and Belk

1999). Soil types associated with vernal pool fairy shrimp vary greatly with geography and influence the ecology of the species. Known water quality tolerances are 48 to 481 ppm for salinity, and 6.3 to 8.5 for pH (Eriksen and Belk 1999).

There are several CNDDB occurrences of this species within 5 miles of the BRA study area, the nearest of which occurs east of the Leininger Lakes approximately 0.2 mile to the north of the BRA study area (California Department of Fish and Wildlife 2018). Some vernal pools within the BRA study area appear to be relatively small in area and shorter-lived, and thus provide potential habitat for this species. Longer-ponding vernal swales also have the potential to be occupied. Vernal pool fairy shrimp has a high potential to occur in the study area.

Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)

The valley elderberry longhorn beetle (VELB) is federally listed as threatened in 1980. This species is found throughout much of the Central Valley in elderberry (*Sambucus* sp.) shrubs, on which it is completely dependent for larval development, and to a lesser degree, adult feeding. Typical habitat is characterized as large stands of mature elderberry shrubs in riparian or floodplain areas, with a variety of other riparian-affiliated trees and shrubs also present in the canopy.

There is a CNDDB occurrence of this species documented along Deer Creek within the BRA study area, dating back to 2008 and specifically in the immediate vicinity of the SR 99 bridge (California Department of Fish and Wildlife 2018). Elderberry shrubs are relatively common within the BRA study area riparian habitats and adjacent areas, and many are large enough to support the VELB. The VELB has a high potential to occur in the study area.

Vernal pool ta]le shrimp (*Lepidurus packardi*)

The vernal pool tadpole shrimp was federally listed as endangered in 1994 and is virtually endemic to the Central Valley, with the majority of known populations occurring in the Sacramento Valley. Like other branchiopod crustaceans, this species inhabits pools and wetlands that dry down seasonally. Suitable habitats vary considerably and include vernal pools, clay flats, alkaline pools, ephemeral stock ponds, roadside ditches, and deeper road ruts (Rogers 2001). Occupied vernal pools may range in size from small, clear, and well-vegetated to highly turbid, alkali scald pools to large winter "lakes" (Rogers 2001). They may be seasonal or ephemeral and may exhibit a wide range of salinity levels. However, survival for this species requires that water bodies be deeper than five inches, pond for a minimum of 40 days, and not experience wide daily temperature fluctuations (Rogers 2001). Vernal pool tadpole shrimp cysts (resting eggs) must have the opportunity to dry out completely before they can hatch.

As with the vernal pool fairy shrimp, there are several CNDDB occurrences of this species documented within 5 miles of the BRA study area, the nearest of which occurs at Leininger Lakes, located approximately 0.2 mile to the north of the BRA study area (California Department of Fish and Wildlife 2018). Vernal pools and other seasonal aquatic features (e.g., swales) within the BRA study area may support this species; features that tend to have longer average inundation periods or deeper water are the most likely to be occupied. The vernal pool tadpole shrimp has a moderate potential to occur in the BRA study area.

4.8.3.4 Reptile and Amphibian Species

<u>Western pond turtle (*Actinemys marmorata*)</u>

The western pond turtle is a CDFW species of special concern. It is the only freshwater aquatic turtle native to the majority of California, and is associated with rivers, streams, lakes, and ponds throughout much of the state. Typical aquatic habitat features include stagnant or low-gradient water, aquatic vegetation, and aerial basking sites such as logs, rocks, and mudbanks. Adult females excavate nests in riparian and upland areas in the spring or early summer. Nest sites are generally located on unshaded slopes and require friable soil that is sufficiently dry to promote successful egg development; depending on latitude, young may hatch and emerge in the fall or overwinter in the nest (Thomson et al. 2016). Pond turtles may regularly utilize terrestrial habitats under some ecological conditions, including dispersing between aquatic features. This species is a dietary generalist, subsisting principally on invertebrates as well as plant material and carrion.

There is a documented occurrence of this species within the BRA study area, specifically within Deer Creek in 2016 (California Department of Fish and Wildlife 2018). Additionally, two adults were observed. within a patch of freshwater marsh (occurring in association with Deer Creek) during the site visit (Appendix E, Figure 3). Upland areas adjacent to the marsh featured friable soil and otherwise appeared suitable for pond turtle nesting. This species presumably has the potential to occur throughout Deer Creek and directly associated sloughs and backwaters within the BRA study area, as well as longer-lasting seasonal water features (e.g., vernal pools). Pond turtles may also move overland between aquatic habitat areas within the BRA study area.

Western spadefoot toad (*Spea hammondii*)

The western spadefoot, also known as the spadefoot toad, is a CDFW species of special concern. This species ranges throughout California's Central Valley and adjacent foothills. Suitable habitat for this amphibian consists of open areas with sandy or gravelly soils, and includes grassland, scrubland, woodland, washes, and alluvial fans. Spadefoots spend most of the year underground in burrows and similar refugia, and often construct their own burrows. Breeding occurs in shallow, temporary pools formed by heavy winter rains; at least four weeks of continuous inundation are required for successful larval metamorphosis.

The BRA study area provides suitable open annual grassland with friable soil, and mammal burrows are also present. Additionally, seasonal water features (vernal pools and swales) that appear relatively short-lived are also present and may be used for spadefoot breeding. The CNDDB has documented relatively recent breeding occurrences of this species within 6 miles to the southeast of the BRA study area in association with similar soil types to those found within the BRA study area (California Department of Fish and Wildlife 2018). The western spadefoot toad has a moderate potential to occur.

4.8.3.5 Bird Species

Tricolored blackbird (*Agelaius tricolor*)

The tricolored blackbird is a State-threatened and USFWS-listed Bird of Conservation Concern. It was listed under CESA in April 2018 and is a locally common resident in the Central Valley and along coastal California. Most tricolored blackbirds reside in the Central Valley March through August, then move into the Sacramento-San Joaquin Delta, coastal locations, or the eastern foothills during winter (Meese et al. 2014). This species breeds adjacent to fresh water, preferring emergent wetlands with tall, dense vegetation (e.g., cattails, tules), thickets of willow or blackberry, or tall herbs. Flooded agricultural fields with dense vegetation are also used (Shuford and Gardali 2008). This species is highly colonial; nesting habitat must be large enough to support a minimum of 30 pairs, and colonies are commonly substantially larger (thousands of pairs). The tricolored blackbird often intermingles with other blackbird species during the non-breeding season. Insects are the primary prey; individuals may forage up to approximately 6 miles from their colonies, although in most cases only a small part of the area within this range provides suitable foraging (Hamilton and Meese 2006).

Tricolored blackbirds were observed at two locations within the BRA study area (Appendix E, Figure 3). On April 4, 2018, at least two males were singing within an area of freshwater marsh adjacent to the Deer Creek mainstem (also present were several singing male red-winged blackbirds [*A. phoeniceus*]). On April 5, a group of approximately eight tricolored males were singing from a blackberry bramble along an intermittent stream in the north-central portion of the BRA study area; female tricolored were also observed at this location. No clear indication of active nesting was observed, but vegetative substrates at these and several other locations within the BRA study area are suitable for such. The CNDDB lists two nesting occurrences for this species documented within 1.5 miles of the study area (California Department of Fish and Wildlife 2018).

<u>Grasshopper sparrow (*Ammodramus savannarum*)</u>

The grasshopper sparrow is a CDFW species of special concern. It is a summer resident in California, breeding in open grasslands and prairie-like habitats with short- to medium-height vegetation, and often in scattered shrubs. Both perennial and annual (non-native) grasslands are used. Nests are placed on the ground and well concealed, often adjacent to grass clumps (Shuford and Gardali 2008). Grasshopper sparrows are secretive and generally detected by voice. Insects comprise the majority of the diet. Within the BRA study area, open annual grassland areas provide suitable habitat for this species. The grasshopper sparrow has a moderate potential to occur in the study area.

Great egret (*Ardea alba*)

The great egret is not State or federally listed, but its nesting sites (rookeries) are monitored by CDFW. This species is present year-round in California and occurs in association with a variety of aquatic habitats (marshes, rivers and streams, lakes, etc.). This species nests colonially, in a generally similar manner to great blue heron (described above); nests are usually placed in trees near water, and colonies often feature other heron and egret species. Egrets prey primarily on fishes and other aquatic organisms but also take terrestrial prey.

There is a nesting occurrence documented in CNDDB for this species along Mill Creek (approximately 5.5 miles north of the BRA study area); the occurrence involved great egrets nesting in association with great blue herons (California Department of Fish and Wildlife 2018). Riparian trees within the BRA study area provide suitable nesting habitat, as described for great blue heron below. The great egret has a moderate potential to occur, for nesting.

Great blue heron (*Ardea herodias*)

The great blue heron is not State or federally listed; but, its nesting sites (rookeries) are monitored by CDFW. It is present year-round in California and often occurs in association with a variety of aquatic habitats. Nesting occurs colonially or semi-colonially, most typically in trees and often with other heron species; nesting may also occur on human-made structures, in shrubbery, or on the ground in predator-free areas (Vennesland and Butler 2011). Nest sites are usually located near water bodies where abundant forage is present. Herons prey primarily on fishes and aquatic invertebrates but utilize a variety of prey resources including smaller terrestrial vertebrates.

A small nesting colony (rookery) of great blue herons was observed within the BRA study area. The colony was along Deer Creek in the immediate vicinity of SVRIC Diversion Dam, and featured six active nests in one tree. This species may forage throughout the BRA study area, primarily within and near Deer Creek but also opportunistically in upland areas.

Burrowing owl (*Athene cunicularia*)

The burrowing owl is a CDFW-listed Species of Special Concern and USFWS-listed Bird of Conservation Concern. It occurs as a year-round resident in California and winter visitor in much of the state's lowlands, inhabiting open areas with sparse or non-existent tree or shrub canopies. Typical habitat is annual or perennial grassland, although modified areas, such as agricultural lands and airports, are also used (Poulin et al. 1993). This species is dependent on burrowing mammals to provide the burrows that are characteristically used for shelter and nesting, and in northern California is typically found in close association with California ground squirrels (*Spermophilus beecheyi*). Artificial substrates, such as pipes or debris piles, may also be occupied in place of burrows. Prey consists of insects and small vertebrates. Breeding typically takes place from March to July in northern California.

Open grassland within the BRA study area provides suitable year-round habitat for this species. The nearest breeding occurrences documented in CNDDB are located a minimum distance of 10.0 miles northwest of the BRA study area (California Department of Fish and Wildlife 2018). Several burrowing owls have been observed in during the non-breeding season in recent years (2016–2018) along Leininger Road and Lassen Road within 3.0 miles of the BRA study area during the non-breeding season (Cornell Lab of Ornithology 2018). Ground squirrels and their burrows were observed during the site visit. Individuals of this species may occur year-round within the BRA study area, or simply as winter visitors during the non-breeding season. The burrowing owl has a moderate potential to occur in the study area.

Oak titmouse (*Baeolophus inornatus*)

The oak titmouse is a USFWS-listed Bird of Conservation Concern. This relatively common species is a year-round resident throughout much of California including most of the coastal slope, the Central Valley, and the western Sierra Nevada foothills. Its primary habitat is woodland dominated by oaks. Local populations have adapted to woodlands of pines or junipers in some areas. The oak titmouse nests in tree cavities, usually natural cavities or those excavated by woodpeckers, although they may partially excavate their own (Cicero 2000). Seeds and arboreal invertebrates make up the birds' diet. The BRA study area provides oak and riparian woodland that provides suitable year-round habitat for this species, and individuals were observed at several locations there.

Swainson's hawk (*Buteo swainsoni*)

The Swainson's hawk is a State threatened species and USFWS-listed Bird of Conservation Concern. It is a summer resident and migrant in California's Central Valley. Nesting typically occurs at the edge of narrow bands of riparian trees, in isolated patches of oak woodland, in lone trees, and in planted and natural trees associated with roads and farmyards and in adjacent urban residential areas. Foraging occurs in open areas including grasslands, open woodlands, and agricultural land. While breeding, adults feed primarily on rodents (and other vertebrates); for the remainder of the year, large insects (e.g., grasshoppers, dragonflies) comprise most of the diet. In many areas, Swainson's hawks have adapted to foraging primarily in and around agricultural plots (particularly alfalfa, wheat, and row crops), as prey is both numerous and conspicuous at harvest or during flooding or burning (Bechard et al. 2010).

The BRA study area contains numerous trees that are suitable for Swainson's hawk nesting as well as suitable foraging habitat (such as grasslands and pastureland). The nearest documented nesting occurrence in CNDDB is located approximately 1.2 miles northwest of the BRA study area (California Department of Fish and Wildlife 2018). Swainson's hawks were not observed within the BRA study area during the site visit, but protocol-level surveys were not conducted. The Swainson's hawk has a high potential to occur in the study area.

Northern harrier (*Circus cyaneus*)

The northern harrier is a CDFW species of special concern. It occurs as a resident and winter visitor in open habitats throughout most of California, including freshwater and brackish marshes, grasslands and fields, agricultural areas, and deserts. Harriers typically nest in treeless areas within patches of dense, relatively tall vegetation, the composition of which is highly variable; nests are placed on the ground and often located near water or within wetlands (Shuford and Gardali 2008). Harriers are birds of prey and subsist on a variety of small mammals and other vertebrates.

One northern harrier was observed foraging over grassland north of Deer Creek. Open and relatively undisturbed portions of the BRA study area (e.g. grasslands, including mesic areas with wetlands) provide suitable nesting habitat. This species is generally unlikely to nest in close proximity to woodland and development.

White-tailed kite (*Elanus leucurus*)

The white-tailed kite is a CDFW fully protected species. It is a resident in open to semi-open habitats throughout the lower elevations of California, including grasslands, savannahs, woodlands, agricultural areas, and wetlands. Vegetative structure and prey availability appear to be more important habitat elements than associations with specific plants or vegetative communities (Dunk 1995). Nests are constructed mostly of twigs and placed in trees, often at habitat edges. Nest trees are highly variable in size, structure, and immediate surroundings, ranging from shrubs to trees greater than 150 feet tall (Dunk 1995). This species preys upon a variety of small mammals, as well as other vertebrates and invertebrates.

The BRA study area provides suitable habitat for this species, with open annual grassland areas for foraging and a variety of trees for nesting. Although not observed during the site visit, this species was recently observed at several locations within 5 miles of the BRA study area (Cornell Lab of Ornithology 2018). The white-tailed kite has a moderate potential to occur in the study area.

Yellow-breasted chat (*Icteria virens*)

The yellow-breasted chat is a CDFW-listed Species of Special Concern. It is a generally uncommon summer resident that occurs throughout most of California. It is an aberrantly large member of the wood-warbler family (Parulidae). Breeding habitat consists of early successional-type riparian habitats where a dense understory of thickets and tangles forms below an open canopy. Plant species typically used for nesting include blackberry, wild grape, and willows (Shuford and Gardali 2008). Although males often sing from exposed perches in trees, this species is generally secretive and difficult to observe.

Riparian woodland and thickets within the BRA study area provide suitable nesting habitat for this species, and this species was recently observed during the breeding season within 5 miles of the BRA study area (Cornell Lab of Ornithology 2018). The yellow-breasted chat has a moderate potential to occur.

Loggerhead shrike (*Lanius ludovicianus*)

The loggerhead shrike is a CDFW-listed Species of Special Concern and a USFWS-listed Bird of Conservation Concern. It is a year-round resident and winter visitor in lowlands and foothills throughout California. This species is associated with open country comprised of short vegetation and scattered trees, shrubs, fences, utility lines, or other perches. Although they are songbirds, shrikes are predatory and forage on a variety of invertebrates and small vertebrates. Captured prey items are often impaled for storage purposes on suitable substrates, including thorns or spikes on vegetation, and barbed wire fences. This species nests in trees and large shrubs; nests are usually placed 3 to 10 feet off the ground (Shuford and Gardali 2008).

The BRA study area provides suitable open annual grassland and pasture areas with scattered trees and shrubs for foraging and nesting, as well as many sections of barbed-wire fencing. Although not observed during the site visit, this species was recently observed at several locations within 5 miles of the BRA study area (Cornell Lab of Ornithology 2018). The loggerhead shrike has a moderate potential to occur in the BRA study area.

Yellow-billed magpie (*Pica nuttalli*)

The yellow-billed magpie is a USFWS-listed Bird of Conservation Concern. It is endemic to California, occurring year-round in the Central Valley and associated foothills and in the central Coast Ranges. This species inhabits open park-like areas including oak savanna and woodland, the margins of stream courses, and some agricultural areas (e.g., orchards). Breeding typically occurs in loose colonies. The large, dome-shaped nests are placed high in trees, usually oaks, and often in clumps of mistletoe (Koenig and Reynolds 2009). This species is an omnivore and an opportunistic feeder.

The BRA study area provides suitable year-round habitat for this species, including oak woodland, riparian groves, and orchards. Although not observed during the site visit, this species was recently observed at several locations within 5 miles of the BRA study area (Cornell Lab of Ornithology 2018). It has a moderate potential to occur.

Nuttall’s woodpecker (*Picoides nuttallii*)

Nuttall’s Woodpecker is a USFWS-listed Bird of Conservation Concern. Common in much of its range, it is a year-round resident throughout most of California west of the Sierra Nevada. Typical habitat is oak or mixed woodland, and riparian areas (Lowther 2000). Nesting occurs in tree cavities, principally those of oaks and larger riparian trees. This species forages on a variety of arboreal invertebrates. Trees within the BRA study area are of sufficient age and complex structure to support small cavities, which may be used for nesting by the species.

The BRA study area provides oak and riparian woodland that provides suitable year-round habitat for this species, and individuals were observed at several locations there.

4.8.3.6 Mammal Species

Pallid bat (*Antrozous pallidus*)

The pallid bat is a CDFW-listed Species of Special Concern and WBWG-listed High Priority species. It is broadly distributed throughout much of western North America and typically occurs in association with open, rocky areas. Occupied habitats are variable and range from deserts to forests in lowland areas and include higher-elevation forests. Roosting may occur singly or in groups of up to hundreds of individuals. Roosts must offer protection from high temperatures and are typically in rock crevices, mines, caves, or tree hollows; human-made structures are also used, including buildings (both vacant and occupied) and bridges. This species is highly sensitive to disturbance while roosting. Pallid bats are primarily insectivorous, feeding on large prey that is usually taken on the ground but sometimes in flight (Western Bat Working Group 2018).

There are three CNDBB occurrences for this species documented within 10 miles of the BRA study area, all located to the north and two are in affiliation with riparian trees (California Department of Fish and Wildlife 2018). Within the BRA study area, larger tree cavities, tree hollows, and bridges have the potential to support roosting, including maternity roosting. The pallid bat has a high potential to occur in the study area.

Western red bat (*Lasiurus blossevillii*)

The Western red bat is a CDFW-listed Species of Special Concern and WBWG-listed High Priority species. It is migratory species that occurs throughout much of the western United States and is associated with a variety of woodland and forest types. Western red bats are typically solitary, roosting primarily in the foliage of broad-leafed trees or shrubs. Day roosts are commonly in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas. There appears to be an affiliation for riparian trees (particularly willows, cottonwoods, and sycamores) (Pierson et al. 2006). It is believed that males and females maintain different distributions during the reproductive season, where females take advantage of warmer inland areas and males occur in cooler areas along the coast.

Similar to pallid bat, there are CNDDB occurrences for this species documented within 10 miles of the BRA study area, with most in affiliation with riparian trees (California Department of Fish and Wildlife 2018). The BRA study area provides mature riparian trees including willows, cottonwoods, and sycamores, and features numerous habitat edge habitats as well as orchards. Tree foliage within the BRA study area is suitable for roosting, including maternity roosting. The Western red bat has a high potential to occur in the study area.

Long-eared myotis (*Myotis evotis*)

The long-eared myotis (bat) is not State or federally listed but is a WBWG Medium Priority species. It is primarily associated with coniferous forest (from sea level to approximately 9,000 feet elevation), but also occurs in semiarid shrublands, sage scrub, chaparral, and agricultural areas. This species roosts under loose tree bark, in tree hollows, caves, mines, crevices in rocky outcrops, in buildings, under bridges, and occasionally on the ground. Long-eared myotis primarily consume beetles and moths, gleaning prey from foliage, trees, rocks, and from the ground (Western Bat Working Group 2018).

Similar to the other bat species described, there are CNDDB occurrences for this species documented within 10 miles of the BRA study area in affiliation with riparian trees as well as grassland and shrubs (California Department of Fish and Wildlife 2018). Trees (e.g., hollows) and bridges within the BRA study area provide potential roosts, including for maternity roosting. The long-eared myotis has a moderate potential to occur in the study area.

4.8.3.7 Designated Critical Habitat in the Study Area

The southwestern edge of the project area overlaps with designated critical habitat for the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*). The boundary of this designated critical habitat coincides with riparian vegetation along the Sacramento River and overlaps with the project area from the Deer Creek confluence to approximately 0.8 mile upstream on Deer Creek. The China Slough confluence falls within this reach.

The western yellow-billed cuckoo prefers dense riparian forests, typically with early successional vegetation present. Laymon and Halterman (1989) proposed that optimum habitat patches for the western yellow-billed cuckoo are greater than 200 acres and wider than 1,950 feet. Sites ranging from 101 to 200 acres and wider than 650 feet were defined as suitable, sites ranging from 50 to 100 acres with widths from 65 to 325 feet were defined as marginal, and sites with smaller habitat patches were defined as unsuitable.

Riparian forest within the BRA study area is restricted largely to narrow strips along Deer Creek and is considered not suitable to support nesting by this species. There are five occurrences documented in CNDDB within 5 miles of the study area, all in association with large tracts of riparian forest along the Sacramento River; the nearest of these is located near the mouth of Deer Creek (California Department of Fish and Wildlife 2018). Because of the lack of suitable dense riparian habitat within the study area, this species was considered to have a low potential to occur and consequently was not included in Table 4.8-1.

4.8.4 Regulatory Setting

The following plans, policies, regulations, or laws related to wildlife and wildlife habitat apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- ESA (protects species listed as threatened and endangered from take.) — Applies to impact analysis, project design, and construction.
- Migratory Bird Treaty Act (prohibits the take of protected migratory bird species without prior authorization by the USFWS.) — Applies to the impact analysis, project design, and construction.

- Clean Water Act, Section 404 (regulates discharge of dredged or fill material into waters of the United States, including wetlands.) — Applies to impact analysis and construction.
- Clean Water Act, Section 401 (State Certification of Water Quality, regulates construction that may result in a pollutant discharge to navigable waters.) — Applies to impact analysis and construction.

State Regulations

- CESA (prohibits take of species listed under CESA.) — Applies to impact analysis, design, and construction.
- California Fish and Game Code, Section 1602: Streambed Alteration Agreement (notification of lake or streambed alteration, requires notification of CDFW for any activity that would substantially change or use any material from bed, channel, or bank of a stream.) — Applies to impact analysis and construction.
- California Fish and Game Code, Fully Protected Species (provides additional protection against take or possession to species that previously faced or currently face possible extinction.) — Applies to the impact analysis.
- California Fish and Game Code, Protection of Bird Nests and Raptors (provides protection against take, possession, and destruction of nests and eggs of birds.) — Applies to the impact analysis.
- Porter-Cologne Water Quality Control Act (regulates discharges of waste into waters of the State.) — Applies to impact analysis and construction.

Regional and Local Regulations

- Tehama County General Plan (2009)
    - Policy OS-3.1 (The County shall preserve and protect environmentally-sensitive and significant lands and water valuable for their plant and wildlife habitat, natural appearance, and character.) — Applies to impact analysis, design, and construction.
    - Policy OS-3.2 (The County shall protect areas identified by the CDFG and the CNDDB as critical riparian zones.) — Applies to planning, design, and construction.

- Policy OS-3.7 (The County shall promote best management practices for natural resources that will enhance wildlife habitat.) — Applies to planning, design, and construction.
- Policy OS-6.3 (The County shall promote the reestablishment of native under story species.) — Applies to planning, design, and construction.

4.8.5 Impacts and Mitigation

4.8.5.1 Methodology

The presence of wildlife habitat and special-status wildlife species was assessed as described in Section 4.8.1, "Environmental Setting." Upon establishing the presence of these biological resources, the proposed project was assessed for its potential to affect these resources in the short and long term through construction activity and alteration of on-site conditions, respectively.

4.8.5.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Impacts to sensitive biological communities and special-status wildlife species would be considered significant if they would:

- Have a substantial adverse effect, either directly or through habitat modification, on any wildlife species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations by the CDFW or USFWS.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in the local or regional plans, policies, regulations or by the CDFW, NMFS, or USFWS through direct removal, filling, hydrological interruption, or other means; or interfere substantially with the use of habitat.

4.8.5.3 Topics Not Evaluated Further

During environmental analysis, the following topics were eliminated from detailed analysis because no impacts from project implementation are anticipated:

- The BRA study area was much larger than the project area described in this draft EIR. As such, many of the mapped areas do not have the potential to be affected by project implementation. Specifically, the vernal pools, irrigated seasonal wetland, and seasonal wetland ditches that were identified within or adjacent to the BRA study area are not located within the defined project area and would not be affected by construction or maintenance activities. Because no impact would occur, the special-status wildlife species associated exclusively with these habitat types (Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp) are not discussed further.

4.8.6 Impact Analysis

Impact WILDLIFE-1: *Have a substantial adverse effect, either directly or through habitat modification, on any wildlife species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or CDFW and USFWS regulations.*

No Project Alternative

No Impact. Under the no project alternative, no construction would occur. Maintenance of Deer Creek for flood management would continue in a similar manner to existing conditions. With no change to existing O&M practices, the no project alternative would have no impact. The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than Significant with Mitigation Incorporated. Construction of the proposed project would have the potential to adversely affect special-status wildlife species that occur or have the potential to occur in the project area (refer to Table 4.8-1). Construction activities have the potential to cause direct harm to individuals of these species and temporarily degrade wildlife habitat through erosion, sedimentation, noise, dust, accidental spills, or the accidental introduction of invasive plant species. Excavation, filling, and removing or grading soils for the setback levees could directly modify or destroy nesting, breeding, or foraging areas that are present in the project area. If any of these impacts were to occur, they would be **potentially significant**. Implementation of a worker environmental awareness program (WEAP) that includes construction best management practices for the protection of wildlife habitat and associated wildlife (Mitigation Measure WIDLIFE-1), the water quality protection measures included in Mitigation Measures GEO-1 and HAZ-1, and the preventative measures to avoid invasive plant species introductions included in Mitigation Measure VEG-3 would reduce the level of significance of these impacts. Implementation of the species-specific mitigation measures described below for special-status wildlife species, in combination with Mitigation Measures WILDLIFE-1, GEO-1, HAZ-1, and VEG-3, would reduce potential impacts to **less than significant**.

Levee construction has the potential to result in the permanent loss of approximately 1.8 acres of grassland comprised of non-irrigated pasture. This construction activity has the potential to cause direct harm to individual western pond turtles and destroy turtle nests during the nesting season if they are present. This construction activity also has the potential to cause direct harm to burrowing owls and destroy their burrows if they are present. If this construction activity were to occur during the nesting season, it would also have the potential to adversely affect grasshopper sparrows. Levee setbacks and floodplain lowering have the potential to result in the permanent loss of approximately 225 acres of grassland comprised of irrigated pasture. Irrigated pasture may also provide suitable habitat for these species, so construction activities in this habitat type have the potential to result in the same impacts as those described for non-irrigated pasture. If any of these impacts were to occur, they would be **potentially significant**. Implementation of the western pond turtle and burrowing owl protection measures included in Mitigation Measure WILDLIFE-2 and Mitigation Measure WILDLIFE-3, respectively, as well as the migratory bird protection measures included in Mitigation Measure WIDLIFE-4, would reduce these impacts to **less than significant**.

The permanent loss of grassland described above also has the potential to decrease available foraging habitat for Swainson's hawk, northern harrier, loggerhead shrike, and grasshopper sparrow. But, extensive amounts of these habitat types are available immediately adjacent to the project area. In addition, higher value field crops are also available for Swainson's hawk foraging in the vicinity of the project area. The permanent loss of grassland would not be substantial and would result in a **less-than-significant impact**.

Construction activities in the grassland habitat discussed above would not be expected to affect the western spadefoot toad because this species occurs in grassland areas associated with vernal swales. In addition, this species is active during the winter rain season, the timing of which would not coincide with construction activities. Construction activities are anticipated to have **no impact** on this species.

Construction activities that could disturb or remove freshwater marsh or blackberry brambles have the potential to disturb nesting tri-colored blackbirds. If these impacts were to occur during the nesting season, impacts would be **potentially significant**. Implementation of the tri-colored blackbird protection measures included in Mitigation Measure WILDLIFE-5 would reduce these potential impacts to **less than significant**. The potential permanent loss of freshwater marsh is discussed in Section 4.6, "Biological Resources — Wetlands and Other Waters." Implementation of compensatory measures included in Mitigation Measure WETLAND-2 would ensure not net loss of wetlands and reduce impacts to **less-than-significant** levels.

Tree removal that would occur in riparian woodland habitat along Deer Creek during construction activities has the potential to adversely affect nesting raptors including Swainson's hawk and white-tailed kite, as well as nesting great egrets and great blue herons and other nesting birds including the oak titmouse, yellow-billed magpie, Nuttall's woodpecker, and yellow-breasted chat. It is possible that trees along China Slough also provide suitable habitat for some of these species. If these species were disturbed during nesting or their nests were destroyed, impacts would be **potentially significant**. Implementation of the nesting raptor and nesting migratory bird protection measures included in Mitigation Measure WILDLIFE-6 and Mitigation Measures WILDLIFE-4, respectively, would reduce these potential impacts to **less than significant**.

Tree removal also has the potential to adversely affect roosting bats. If tree removal were to result in the harm or mortality of the pallid bat, western red bat, or long-eared myotis, impacts would be **potentially significant**. Implementation of the protective measures during removal of trees that provide suitable bat roosting habitat included in Mitigation Measure WILDLIFE-7 would reduce these potential impacts to **less than significant**.

The deconstruction of Red Bridge has the potential to adversely affect the pallid bat or long-eared myotis if these species use the bridge for roosting habitat. If the bridge is used for roosting, construction activities during the maternity season would have a potentially **significant impact** on these species. Implementation of the bat protection measures included in Mitigation Measure WILDLIFE-8 would reduce these impacts to **less than significant**, and the newly constructed Red Bridge has the potential to provide roosting habitat for these species.

Construction activities that would occur within the vicinity of elderberry shrubs have the potential to degrade habitat quality, directly harm the VELB, or result in the loss or relocation of the shrubs. If avoidance is feasible, implementation of the elderberry shrub protection measures included in Mitigation Measure WILDLIFE-9 would reduce potential impacts to **less than significant**. If avoidance is not feasible, implementation of the compensatory measures included in Mitigation Measures WILDLIFE-10 would reduce potential impacts to **less than significant**.

<u>O&M-related Impacts</u>

Less than Significant. Setting back the existing levees under Alternatives A through E would increase the area of channel maintenance responsibility between the channel and the proposed setback levees. The area of channel maintenance responsibility would also be increased upstream of Red Bridge in the setback area proposed under all alternatives. But, hydraulic modeling indicates that the need for maintenance would be reduced and likely eliminated post-project (refer to Chapter 3, "Description of the Project Alternatives," and Section 4.13, "Hydrology, Hydraulics, and Flood Risk Management"). Maintenance of Deer Creek for flood management could be required to address local and acute issues caused by sediment, vegetation, or debris transported during extreme high-water events (e.g., the 10- to 25-year flood event). For this reason, future flood maintenance activities may include maintenance and repair of USACE and non-USACE levees; clearing a path to a debris jam (including vegetation removal); cutting, excavating, and hauling away sediment, uprooted vegetation, and debris; and restoration of vegetation that may need to be removed for access. Channel maintenance for flood conveyance would not include general sediment removal in the channel. However, if flow is directed toward a levee that could threaten the levee, channel grading or sediment removal could be required to reduce that threat. These maintenance activities could adversely impact special-status wildlife species. Maintenance activities would comply with all relevant federal, State, and local laws and regulations, and all relevant permits and approvals would be obtained and adhered to. Therefore, maintenance of Alternatives A through E would have **a less-than-significant impact** on special status wildlife species.

Any required future vegetation management or sediment removal along China Slough would also comply with all relevant federal, State, and local laws and regulations, and would have a **less-than-significant impact** on special-status wildlife species.

4.8.7 Wildlife Mitigation Measures

Mitigation Measure WILDLIFE-1*: Implement a Worker Environmental Awareness Program.*

A project-specific WEAP for construction personnel shall be conducted by a qualified biologist approved by USFWS and CDFW before commencement of construction activities and as appropriate when new personnel begin work on the project. The program shall inform all construction personnel about the life history and status of all special-status wildlife species with potential to occur on site; the need to avoid damage to suitable habitat and species harm, injury, or mortality; measures to avoid and minimize impacts on species and associated habitats; the conditions of relevant regulatory permits, and the possible penalties for not complying with these requirements. The training could consist of a recorded presentation to be reused for new personnel throughout the duration of construction. The WEAP training shall also generally include:

- Applicable State and federal laws, environmental regulations, proposed project permit conditions, and penalties for non-compliance. A physical description of special-status plant and wildlife species with potential to occur on or in the vicinity of the proposed project Site, avoidance and minimization measures, and protocol for encountering such species including communication chain.
- Best management practices for erosion control and related locations on the proposed project site.

- Documentation signed by contractors stating that they have read, agree to, and understand the required avoidance measures.
- Field identification of any proposed project site boundaries, egress points and routes to be used for work. Work shall not be conducted outside of the proposed project site.
- Installation of wildlife exclusion fencing in several locations throughout the proposed project site. Fencing shall be strategically placed to prevent wildlife from entering staged equipment or active construction areas adjacent to potential habitats. Those areas where wildlife exclusion fencing must be placed include the perimeter of any designated staging areas.
- Inspection of any vehicles or equipment left overnight inside of fenced areas. These shall be inspected for wildlife prior to moving by trained construction personnel. In addition, equipment left outside of staging areas, in unfenced areas, shall be inspected for wildlife prior to moving. Operators and construction personnel may conduct fence and vehicle inspections if they have received training on how to conduct the inspections by the qualified biologist. Fencing shall be checked on a daily basis by a biologist or trained construction personnel to assure it is fully functional.
- Instruction on installation of escape routes and coverings to be installed at any temporary open excavations with steep-sided walls or open pipes that have potential to entrap wildlife. For excavations determined to be sufficiently steep that wildlife may become stranded, an escape ramp shall be installed, or an adjustment to the slope of the wall to be less steep shall be made in a location to allow escape, or the feature shall be completely covered to prevent entrapment of wildlife. If questions occur about excavations, a qualified biologist shall be available to determine if a ramp is necessary and advise on potential solutions for ramp design to allow animal escape.
- Instruction on avoiding the use of plastic, monofilament, jute netting, or similar temporary erosion control matting that could entangle snakes on the project site. Possible substitutes include coconut coir or matting, burlap wrapped straw wattles, tackified hydroseeding compounds, or other materials.
- The importance of eliminating the attraction of predators of special-status wildlife species, by disposing all food-related trash items, such

as wrappers, cans, bottles, and food scraps, in closed containers and hauled off-site on a regular basis.

Mitigation Measure WILDLIFE-2: *Implement Protection Measures for the Western Pond Turtle.*

During construction, the project area shall be checked daily by a trained construction monitor prior to work commencing, including underneath vehicles and equipment that will be used. If turtles are found, they will be moved by a qualified and permitted biologist to an area of safety out of harm’s way.

If a western pond turtle is observed in the project area during construction activities, the contractor shall temporarily halt construction until it is determined that the turtle will not be harmed or until the turtle has moved to a safe location outside of the construction limits. If construction is to occur during the nesting season (late June–July), a pre-construction survey for turtle nest sites shall be conducted by a qualified biologist in areas that will be disturbed within 100 feet of water bodies.

If any turtles or turtle nests are found, a qualified and permitted biologist shall flag the site and determine whether construction activities can avoid affecting the nest. If the nest cannot be avoided, in consultation with CDFW, a no-disturbance buffer zone may be established around the nest until the young have left the nest. If weather conditions prevent implementation of construction beyond two days after completion of turtle surveys, resurvey for this species shall be completed.

Mitigation Measure WILDLIFE-3: *Implement Protective Measures for Nesting Raptors.*

Any tree removal, vegetation clearing, or the onset of potentially disturbing construction activities shall occur between September 1 and January 31 (outside of the nesting season for raptors with potential to occur within, or in the vicinity of, the project area).

If tree removal, vegetation clearing, or the onset of potentially disturbing construction activities must occur during the nesting season (February 1 to August 31), a raptor nesting survey of the construction area and adjacent suitable habitat shall be conducted by a qualified biologist no more than seven days prior to the initiation of the onset of these activities or as appropriate survey protocols require.

If active raptor nests are found, tree removal, vegetation clearing and the onset of potentially disturbing construction activities shall be suspended until a qualified biologist, in consultation with CDFW or USFWS can establish an appropriate protective buffer area to minimize impacts to the nesting raptors. The width of the buffer zone shall be determined by a qualified biologist in coordination with CDFW. This determination, made on a case-by-case basis, will consider the distance of the nest site from construction activities, the line of sight from the nest site to construction activities, the existing level of disturbance, and other factors established with CDFW.

No construction activities shall commence within the buffer area until the qualified biologist determines that the young birds have fledged or the nest is no longer active.

A qualified biologist shall monitor active nests within 500 feet (or the width of the buffer zone) of construction activities. The first monitoring event shall coincide with the initial implementation of construction activities and monitoring shall continue continuously for the duration of construction activities, or any other activities that may impact nesting success, until the young have fledged. If the biologist determines that construction activities are causing the birds to exhibit distress or abnormal nesting behavior or reproductive failure (nest abandonment and loss of eggs or young) is possible, the biologist shall halt work immediately and notify CDFW. Measures to avoid nest failure shall be implemented in coordination with CDFW and may include halting some or all construction activities until the young have fledged.

Construction activities shall occur continuously (excluding weekends) until the end of the nesting season to discourage raptors from initiating nesting. If construction activities cease beyond seven consecutive days (including weekends), all construction activities shall cease until CDFW can be consulted to determine if a subsequent raptor nesting survey must be performed.

Active or inactive nests are not to be disturbed or removed as a result of construction activities without CDFW consultation per CFGC Section 3503.5.

Mitigation Measure WILDLIFE-4: *Habitat Protection — Nesting Migratory Birds.*

Any tree removal, vegetation clearing, or the onset of potentially disturbing construction activities shall occur between August 1 and March 1 (outside of the nesting season for grasshopper sparrow, yellow-breasted chat, loggerhead shrike, yellow warbler, great blue heron, great egret, and other nesting migratory birds).

If tree removal, vegetation clearing, or the onset of potentially disturbing construction activities must occur during the nesting season, a nesting survey of the construction area and adjacent suitable habitat shall be conducted by a qualified biologist no more than seven days prior to the initiation of the onset of these activities. If active bird nests are found to be present, tree removal, vegetation clearing, and the onset of potentially disturbing construction activities shall be suspended until a qualified biologist, in consultation with CDFW, can establish an appropriate protective buffer area to minimize impacts to the nesting birds.

No construction activities shall commence within the buffer area until the qualified biologist determines that the young birds have fledged or the nest is no longer active. Construction activities shall occur continuously (not including weekends) until the end of the nesting season to discourage avian species from initiating nesting.

If construction activities cease beyond seven consecutive days (including weekends), all construction activities shall cease until CDFW can be consulted to determine if a subsequent nesting bird survey must be performed. Active nests are not to be disturbed or removed as a result of construction activities per CFGC Section 3503.

Mitigation Measure WILDLIFE-5: *Tricolored Blackbird Nesting.*

To avoid or minimize impacts to nesting tricolored blackbirds, prior to construction, the following measures shall be implemented:

- If construction is to commence during the nesting season (February 1 - August 31), two pre-construction surveys (the first no more than 14 days prior to, and the second within 48 hours of initial ground disturbance) shall be performed by a qualified biologist.

- If ground disturbance lapses beyond 14 days during the nesting season, the surveys shall be repeated before construction activities resume. Surveys shall include the extent of ground disturbance and the surrounding 250 feet.
- If an active nesting colony is found within the survey area, the colony shall be avoided by a buffer of at least 250 feet. The buffer shall remain in place until a qualified biologist confirms the colony is no longer active and has dispersed.

Mitigation Measure WILDLIFE-6: *Habitat Protection Burrowing Owl.*

Within seven calendar days prior to the onset of potentially disturbing construction activities, a burrowing owl survey of the construction area and adjacent suitable habitat shall be conducted by a qualified biologist. If active burrows are found, visible markers will be placed near burrows to ensure that construction equipment or vehicles do not collapse burrows. The onset of potentially disturbing construction activities shall be suspended until a qualified biologist, in consultation with CDFW, can establish an appropriate protective buffer area to minimize impacts to the burrow. The width of the buffer shall be established in consultation with CDFW and will take into account time of year and level of disturbance in proximity to the burrow site. Avoid disturbing occupied burrows during the nesting period, from February 1 through August 31.

Mitigation Measure WILDIFE-7: *Implement Protective Measures During Removal of Trees That Provide Suitable Bat Roosting Habitat.*

All removal of trees that provide suitable bat roosting (such as trees with deep bark crevices, snags, or holes) shall be conducted between August 31 and October 30, or earlier than October 30 if evening temperatures fall below 45 °F or more than a half inch of rainfall occurs within 24 hours. These dates correspond to the time period when bats would not be caring for non-volant young and have not yet entered torpor. A qualified biologist shall monitor removal or trimming of trees that provide suitable bat roosting habitat. Tree removal and trimming shall occur over two consecutive days. On the first day in the afternoon, limbs and branches shall be removed using chainsaws only. Limbs with cavities, crevices, or deep bark fissures shall be avoided, and only branches or limbs without those features shall be removed. On the second day, the entire tree shall be removed. Prior to tree removal and trimming, each tree shall be shaken gently and several minutes shall pass before felling trees or limbs to allow bats time to arouse and leave the tree. The biologist shall search downed vegetation for dead or injured bat species and report any dead or injured special-status bat species to CDFW**.**

Mitigation Measure WILDLIFE-8: *Implement Bat Protection Measures during Construction Activities Under or Within 100 Feet Red Bridge.*

Construction activities underneath or within 100 feet of Red Bridge shall not occur from April 15 through August 31 to avoid impacts to roosting bats during the bat maternity season (non-volant period for young) or after October 30 (or earlier than October 30 if evening temperatures fall below 45 °F or more than a half inch of rainfall occurs within 24 hours) to avoid impacts to hibernating bats.

If construction activities must be conducted within 100 feet of Red Bridge during the maternity season, a qualified biologist shall conduct pre-construction surveys for active maternity roosts within 48 hours prior to the start of proposed construction activities. If there is a lapse in construction activities of two weeks or greater, the area shall be resurveyed within 48 hours prior to recommencement of work.

If a bat maternity roost is located, appropriate buffers around the roost sites shall be determined in consultation with CDFW and implemented to avoid abandonment of the roost. 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 (which typically ends August 31) or until a qualified biologist confirms the maternity roost is no longer active.

Mitigation Measure WILDLIFE-9: *Implement Protection Measures for the Valley Elderberry Longhorn Beetle.*

The VELB protection measures shall comply with the current USFWS Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) (United States Fish and Wildlife Service 2017). The following protection measures shall be implemented to protect the VELB and its host plant, the elderberry shrub, if elderberry shrubs occur on or within 165 feet of the project area:

- Prior to construction, all elderberry shrubs to be avoided within 150 feet of any project activity will be clearly flagged, marked, and maintained throughout the construction period. All elderberry shrubs to be avoided will be marked with high-visibility orange fencing, and an avoidance area shall be established at least 20 feet from the elderberry shrub's drip-line.
- As feasible, all project-related activities that could occur within 165 feet of an elderberry shrub shall be conducted outside of the flight season of the VELB (March–July).
- Construction personnel shall ensure that dust control measures (e.g., watering) are implemented in the vicinity of any elderberry shrub within 100 feet of construction activities. To avoid affecting the VELB, dirt roads within 100 feet of elderberry shrubs shall be watered at least twice each day when being used by gravel trucks and other project-related vehicles during dry periods.

Impact WILDLIFE-2: *Have a substantial adverse effect on any riparian habitat or other sensitive natural communities identified in the local or regional plans, policies, regulations or by the CDFW or USFWS.*

No Project Alternative

No Impact. Under the no project alternative, no impact would occur because there would be no construction. O&M of Deer Creek for flood management would continue in a similar manner to existing conditions. With no change to existing O&M practices, the no project alternative would have **no impact**. The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

<u>Construction-related Impacts</u>

Less than Significant. Sensitive habitats in the study area include riparian and aquatic habitats. Impacts to potentially jurisdictional wetlands and other waters are described in Section 4.6, "Biological Resources — Wetlands and Other Waters." Impacts to riparian woodland habitat, which is protected under CFGC Section 1602 and may also be considered a sensitive natural community by CDFW, are described in section 4.7, “Biological Resources — Vegetation.”

For the purposes of this section, effects to critical habitat were considered. Construction activities associated with the installation of bank protection near the China Slough confluence would occur near sensitive riparian vegetation within designated critical habitat for the western yellow-billed cuckoo. Bank protection would be installed to establish the limits of meander within the proposed easement in this reach and would be constructed within an agricultural field. A small amount of riparian vegetation would also be disturbed and potentially removed during construction. Although this riparian habitat falls within designated critical habitat, the riparian vegetation occurs in a small patch on the left bank of Deer Creek and is not suitable for the western yellow-billed cuckoo. Temporary disturbance or loss of this riparian habitat would not adversely affect the suitability of this critical habitat, and post-project riparian vegetation is anticipated to naturally recruit within the easement area. Impacts would therefore be **less than significant**.

O&M-related Impacts

Less than Significant. As described above, riparian vegetation is anticipated to establish within the easement area at the China Slough confluence following completion of construction. Maintenance activities within this area of designated critical habitat could include bank protection maintenance, which would not be expected to adversely affect riparian vegetation. In addition, these activities would comply with all relevant federal, State, and local laws and regulations and all relevant permits and approvals would be obtained. Therefore, the maintenance of Alternatives A through F would have a **less-than-significant impact** on designated critical habitat.

4.9 Cultural and Tribal Cultural Resources

This section evaluates known and potential cultural and tribal cultural resources that may be affected by project implementation. Cultural resources include prehistoric and historic archaeological sites, historic buildings and structures (typically 50 years and older), and places important to Native Americans and other ethnic groups. Tribal cultural resources (TCRs) include site features, places, cultural landscapes, and sacred places or objects which are of cultural value to a tribe and are either (1) on or eligible for the California Historic Register or a local historic register or (2) treated as TCRs at the discretion of the CEQA lead agency. Paleontological resources are addressed in Section 4.10, "Geology, Soils, and Paleontological Resources."

4.9.1 Environmental Setting

Prehistoric Context

<u>Paleoindian Period: Western Clovis Tradition (>10,550 years before present [BP])</u>

The arrival of the first people in California remains a persistent line of inquiry and debate among archaeologists, but research currently points to an initial occupation sometime between 15,000 and 11,000 years BP (Erlandson et al. 2010). Often referred to as the Western Clovis Tradition, this time period is generally represented by use of the distinctive Clovis fluted point and other rare flaked stone forms. These early people are presumed to be big game hunters who adapted to the changing landscape of the late Pleistocene and early Holocene, but their diet and settlement patterns of this time period remain a matter of speculation.

In northern California, Clovis points have been found in very few locations, and all have been in isolated contexts. Those with relatively close proximity to the project location were found at Clear Lake in Lake County, Thomes Creek in western Tehama County, Big Meadows (Lake Almanor) in Plumas County, and Hat Creek and Eagle Lake in Lassen County (Rondeau et al. 2010).

<u>Lower Archaic Period: Borax Lake Pattern (10,550–7,550 years BP)</u>

The Borax Lake Pattern is the northern California manifestation of the Western Stemmed Tradition (Willig and Aikens 1988) and dates from approximately 10,550 to 7,550 years ago. The marker artifact types are wide-stemmed projectile points, hand stones, and milling stones. Deep, flute-like basal thinning, large bladelet flakes, and well-worked unifacial tools are carry-overs from Paleoindian technology. A few sites have produced plant and animal remains that indicate the Borax Lake Pattern diet featured large nuts and small and large game. No artifacts or sites from this age have been identified in the Sacramento Valley proper, although Borax Lake

Pattern sites have been documented in the western foothills of Colusa, Glenn, and Tehama Counties (Rosenthal et al. 2010).

Middle Archaic Period (7,550–2,550 years BP)

The Middle Archaic Period corresponds roughly from 7,550 to 2,550 years BP. The early part of the Middle Archaic (7,550 to 4,050 years BP) witnessed widespread climatic instability that is widely documented in North America and is clearly established for northern California (Adam and West 1983; Benson et al. 2002). This climatic instability adversely affected the development of upland and lowland soils, which diminished the capacity of the landscape to store archaeological deposits. Consequently, Middle Archaic archaeology is uncommon and the available record is problematic. In addition, the density and distribution of economically significant resources also appears to have been affected by climatic and landscape instability, which led to cultural responses such as local depopulation, interregional population movements, and dietary change. In contrast, the later part of this period (more recently than 4,550 years BP) is associated with relative climatic stability. As a result, sites attributed to this part of the Middle Archaic Period are relatively well represented.

Archaeological evidence suggests that there were two different cultural and economic adaptations during this period, one for the Central Valley and one for the surrounding foothills. Within the valley, a riverine adaptation seems to have dominated, as people established more sedentary villages along the major rivers. Although these sites are rare in the northern Sacramento Valley, data indicate the adoption of the mortar and pestle and the development of new fishing technologies, as represented by a number of hook styles and increased amounts of fish remains in the faunal assemblages, along with long-sought-after animals such as tule elk, deer, antelope, and a large variety of small mammals and water birds (Rosenthal et al. 2010).

Upper Archaic Period (2,550–900 years BP)

Regional climate stabilized at around 3,000 years BP, and by 2,500 years BP the widespread, generalized technological traditions of the Middle Archaic Period were replaced by distinct regional specializations of the Upper Archaic Period (2,550 to 900 years BP). Archaeologists have also found evidence of an increase over time in the scope and distance of inter-group trade patterns, a widespread change from less to more complex social forms, and a shift from low to high population density. There was also considerable cultural diversity within this period, and local cultures have been identified in the central Sacramento Valley, central North Coast Ranges, Napa Valley, Solano County, and Sacramento Delta regions. Certain traits are common to all cultures during the Upper Archaic Period, including a highly developed bone tool industry, atlatl (a hand-thrown dart-like instrument) engaging hooks, and dart-sized, non-stemmed projectile points (Beardsley 1954; Fredrickson 1974; Lillard 1939).

The economy varied regionally and generally focused on seasonally structured resources that could be harvested and processed in bulk, such as acorns, salmon, shellfish, and deer. The high frequency of mortars and pestles relative to chipped stone tools implies a heavy reliance on acorn processing (Fredrickson 1974; Moratto 2004).

Little information is available about the Upper Archaic Period in the northern Sacramento Valley, although it appears that populations were becoming more sedentary and that year-round occupation was occurring at some sites (Rosenthal et al. 2010).

Emergent Period (1,000–200 years BP)

The relatively stable climatic regimes established at the outset of the Late Holocene continue through the modern period, although a "climatic anomaly" dating approximately 900 years BP may have caused widespread disruption (comparable to the Mid-Holocene) (Jones et al. 1999). In northern California, after 1,200 years BP, many Archaic Period technologies and cultural traditions disappeared and were replaced by the onset of regional cultural patterns and behaviors similar to those existing locally at the time of culture contact with non-native peoples (Rosenthal et al. 2010).

The Emergent Period is a widespread tradition marked by the coalescence of long-distance, integrative trade spheres and the introduction of the bow and arrow that replaced the atlatl as the favored hunting implement. Another significant shift was the development of a more complex social society, as expressed by a wider variety of burial modes and the accompaniment of more elaborate grave offerings. Furthermore, in the Sacramento Valley, large settlements were established along the major rivers and their tributaries where fishing economies developed (Rosenthal et al. 2010).

The Emergent Period has been divided into two phases, Lower and Upper, that were common to most localities. These phases were marked by variations in shell bead and ornament styles, as well as a variety of incised bone whistles and soapstone pipes. Arrow point styles also differentiate the phases, where a small barbed point (Gunther Barbed) is common during the Lower Emergent Period in the project area, followed by the presence of a small side-notched style (Desert side-notched) in the Upper Emergent (Rosenthal et al. 2010).

Ethnohistoric Context

The project area is at the boundary between ethnographic Nomlaki and Konkow Maidu territory. Mapping is vague and irregular, and boundary descriptions conflict, but the literature indicates that the confluence of Deer Creek with the Sacramento River, as well as points farther south on both banks of the river, belonged to the Konkow, and to the east, just beyond the marshes that lined the Sacramento River, the Nomlaki held the lower Deer Creek drainage (Goldschmidt 1951, 1978; Riddell 1978). The Nomlaki also claimed both sides of the Sacramento River a short distance north of Deer Creek. It is possible that the confluence of Deer Creek with the Sacramento River was generally claimed by both groups, or that this boundary shifted to the north or south with some fluidity. No ethnographic villages are recorded for either group within or near the project area. Farther east, however, as the low rolling hills transform into the box canyons of the lower mountain flanks, data are more definitive that the Deer Creek drainage was home to the Yahi (Johnson 1978).

The Nomlaki language belongs to the Wintuan language family of the Penutian linguistic stock (Shipley 1978). Wintuan speakers, represented by three languages (Nomlaki, Wintu to the north, and Patwin to the south), occupied the entire Sacramento Valley from the San Joaquin-Sacramento Delta north to the headwaters of the Sacramento River, along with the mountains on the eastern flank of the Coast Ranges. Ancestral Nomlaki territory included nearly all of modern-day Glenn and Tehama counties (Goldschmidt 1951, 1978). There were Hill and River divisions of the Nomlaki. The Hill Nomlaki territory extended west to the crest of the Coast Ranges and included the west edge of the Sacramento Valley to approximately 5 miles west of the Sacramento River. The River Nomlaki held lands along both sides of the Sacramento River.

The Nomlaki practiced a form of sociopolitical organization identified as the tribelet system. As defined by Kroeber (1925), "tribelets," or little tribes, were the basic political and proprietary unit of central California. The tribelet controlled a local territory recognized by adjoining communities and exercised protective measures against uninvited trespassers. Tribelet territories generally were "well-defined, comprising in most cases a natural drainage area" (Kroeber 1925), and these territories were recognized by adjoining communities. The resources and territories controlled by a tribelet were usually defended against uninvited trespassers but considered to be communal holdings of tribelet members. The tribelet political structure served to coordinate economic activity such as resource scheduling, trade, ceremonies, and feasts. Tribelets were composed of a central village and related hamlets and activity areas. The main village was the population center, the site of the main assembly lodge, and the residence of leaders and specialists, and it held caches of ceremonial regalia, food, and trade goods.

The Konkow Maidu language is one of three members of the Maiduan language family, which is also of the Penutian linguistic stock (Shipley 1978). The cultural groups that spoke, and continue to speak, Maiduan are the Maidu (Northeast or Mountain Maidu), Konkow Maidu, and Nisenan (Southern Maidu). The Maidu lived in the high mountains around Mount Lassen, including the headwaters of the North Fork Feather River, and areas to the east as far as Eagle Lake and Honey Lake in the Great Basin. The Konkow lived south and west of the Maidu, holding the tributaries of the Feather River into the Sacramento Valley to just south of the modern-day Butte and Yuba county line. The Konkow also occupied the area around Chico on both sides of the Sacramento River (Riddell 1978). The Nisenan lived south of the Konkow Maidu, along the east side of the Sacramento River; their southern boundary is poorly defined between the American River and Cosumnes River.

The Konkow Maidu sociopolitical organization was similar to that described for the Nomlaki, although the territories of the tribelets were less defined because of their more widely dispersed communities along river drainages. The tribelet community consisted of a central village and surrounding villages. Whereas the central village was the primary location for ceremonial and subsistence practices on a broad community level, it was not necessarily the population center for the tribelet. Also, the individual villages of the tribelet were "self-sufficient and not bound under any strict political control by the community headman" (Riddell 1978). The headman primarily acted as an advisor, led community ceremonies, and provided leadership during times of war (Riddell 1978).

Historic-Era Context

The Spanish expedition led by Luis Arguello in 1821 is the first documented occasion of non-Native Americans to pass through modern-day Tehama County. But, by the late 1820s American-led fur trappers and traders began to make expeditions up and down the valley, passing through Tehama County along the way. John Bidwell was among those who travelled this road and, in 1843, arrived in the project vicinity in the company of Peter Lassen. Lassen selected the location of his home on Deer Creek during this expedition. Bidwell returned to the area the following year, bringing with him other settlers (William Chard, Albert Toomes, Robert Thomes, and Job Dye), who also selected lands in the region on which to settle (Kyle et al. 2002).

Mexico, which included what would become California, became independent from Spain in 1822, and after that time the government began issuing grants of land to favored citizens. First granted only to Mexican nationals, these tracts of land were soon bestowed upon those outsiders (largely Americans) who agreed to become Mexican citizens (Kyle et al. 2002). During Mexican rule, seven tracts of land, or Ranchos, were granted within what was to become Tehama County (California State Lands Commission 1982; Tehama County Genealogical and Historical Society 2007) (Table 4.9-1). Lassen, Bidwell, and the others from the 1844 trip all received land grants from the Mexican government in 1844. Josiah Belden also received a land grant in 1844 but sold his lands to William Ide in 1847. Once California became part of the United States in 1848, each of the owners received a land patent from the State.

Table 4.9-1 Mexican Land Grants in Tehama County

Rancho Name	Grantee	Settlement, Land Patent Dates	Town	Area (acres)
La Barranco Colorada	Joseph Belden (William Ide)	1844, 1860	Red Bluff	17,707
Bosquejo	Peter Lassen	1844, 1861	Vina	22,206
Capay	Maria Josefa Soto	1844, 1859	Hamilton city	44,388
Las Flores	William Chard	1844, 1859	Gerber-las Flores	13,315
Primer Canon or Rio de los Berrendos	Job Francis Dye	1844, 1871		26,637
Rio de los Molinos	Albert Toomes	1844, 1858	Los Molinos	22,172
Saucos	Robert Thomes	1844, 1857	Tehama	22,212

Source: *Grants of Land in California Made by Spanish or Mexican Authorities* (California State Lands Commission 1982) and *Mexican Land Grants in Tehama County* (Tehama County Genealogical and Historical Society 2007)

The project area lies within the boundary of Peter Lassen's Rancho Bosquejo, near the northern end of the property.

Peter Lassen and Rancho Bosquejo

Peter Lassen was born in Denmark in 1800, and by 1927 had earned his credentials as a master blacksmith (Freeman 2015). He emigrated to the United States in 1829, first settling in Boston. A decade later, he travelled overland to modern-day Oregon and then caught a ship travelling south to modern-day California. He spent some time ranching in Santa Cruz and, by 1841, built the first powered sawmill in the state. Shortly thereafter he sold the mill and travelled to Sutter's Fort in modern-day Sacramento, where he stayed and worked for John Sutter during 1842–1843 (Freeman 2015; Kyle et al. 2002).

While working his way across the continent, Lassen had met and befriended Sutter in Missouri (Freeman 2015). In turn, Sutter helped Lassen gain Mexican citizenship and his Rancho Bosquejo through his friendship with then-Governor Micheltoreno (Freeman 2015; Kyle et al. 2002).

Lassen constructed his first adobe home in 1844 south of Deer Creek on property that is now part of the Abbey, and immediately opened a trading post. Over the years, he developed the land, constructing canals and dams, a grist mill, and additional adobes to support his farming and ranching efforts. One of Lassen's enterprises included establishing the town of Benton City on his property. He laid out the town in 1845, and in 1847 returned overland to Missouri to encourage pioneers to settle in his new town. Lassen travelled back to California in 1848 with a party of emigrants, establishing a new route that became known as the Lassen Trail, which detoured north of more traditionally used trails. It passed through Surprise Valley near Goose Lake in far northeastern California, then headed down the Pit River before heading south through Big Meadows (Lake Almanor) and following the ridge between Mill and Deer creeks to the edge of the Sacramento Valley, then heading south to Deer Creek and west to the rancho (Freeman 2015; Kyle et al. 2002).

Shortly after arriving in Benton City, Lassen's emigrants got word that gold had been found in the Sierra Nevada foothills and abandoned the new settlement. Still, research has determined that at least 50 structures were built at Benton City, most of which were adobe (Freeman 2015). The town was also known as the location of the first Masonic Hall in California, as Lassen brought the charter with him on his trip from Missouri in 1848 (Freeman 2015; Kyle et al. 2002). As Benton City faded, the Masonic Hall was moved to Shasta City in 1851. A monument dedicated to the site is located on the west side of SR 99 just north of Deer Creek.

Lassen deeded his rancho lands north of Deer Creek to Daniel Sill, a trapper and manager of Rancho Bosquejo, in 1848 (Kyle et al. 2002). In 1849 and 1850, Lassen entered into some unfortunate business arrangements with Joel Palmer and John Wilson to finance a riverboat business that ultimately failed, and he lost much of his ranch as a result. Ultimately, he sold or transferred 10,000 acres of the property to Henry Gerke in 1852 to pay off a large debt (History and Happenings 2012a).

Shortly before and after Lassen divested himself of his rancho lands, he turned his attention elsewhere in the region. He led a party to search for Gold Lakes in 1850, and in 1851 he and Isidore Meyerwitz built the first cabin in Indian Valley where they established a trading post and grew vegetables for the miners. California Historical Marker #184 marks the location of the cabin (Office of Historic Preservation 2019a). By 1855, Lassen had moved to the incipient town of Susanville to help founder Isaac Roop promote the community. He found himself back in his old stomping grounds in 1856, as he and Roop were hired to survey the newly formed Tehama County, which was split off from the northern portion of Colusa County. Near the end of his life, in 1858, Lassen became a sub-agent to the federal Bureau of Indian Affairs. The following year he was shot and killed on Clapper Creek in Nevada while prospecting for silver (Lassen Volcanic National Park 2019). California State Historical Landmark #565 is located near Susanville to commemorate Peter Lassen (Office of Historic Preservation 2019b), and his influence on the region as an explorer and entrepreneur is evidenced by the large number of important landmarks that bear his name, including Lassen County, Lassen Volcanic National Park, and Lassen Peak.

Vina

After Henry Gerke acquired the portion of Rancho Bosquejo south of Deer Creek in 1852, he established the Vina Ranch, where he focused on growing wheat and developed a vineyard, building on the small plot of grapes originally planted by Lassen (The Sacramento Bee 2016). In 1861, Gerke petitioned for the patent for Rancho Bosquejo, including five leagues along the Sacramento River; he received the patent the following year (History and Happenings 2012a). By 1872, Vina Ranch contained "[o]ne of the largest and finest vineyards in the State" (History and Happenings 2012a), along with highly productive wheat fields and orchards.

A post office was opened at the Vina Ranch headquarters in 1871 (History and Happenings 2012a), and the Southern Pacific Railroad arrived that same year (Nolan-Wheatley 2016), putting Vina on the map. Gerke began auctioning off portions of his vast holdings in parcels that ranged from 40 to 160 acres in 1875, though he continued to live on the ranch until his death in 1882. Leland Stanford purchased 9,000 acres from Gerke in 1881, and shortly thereafter purchased the remainder of the rancho lands from him. He immediately began to make improvements, employing up to 300 men in 1882. The ranch grew to 55,000 acres and, as Stanford increased the size of the vineyard, reportedly had the "largest vineyard in the world" (History and Happenings 2012b; Kyle et al. 2002). By 1893, the entire property was conveyed to Stanford University. Over time, Stanford University sold off all of the land in pieces (Kyle et al. 2002; The Sacramento Bee 2016).

The vineyards were poorly managed in the early 1900s, and by 1916 they had all been removed (The Sacramento Bee 2016). The Cistercian (or Trappist) monks of the Our Lady of New Clairvaux Abbey purchased 580 acres of the Vina Ranch in the 1950s to establish a monastery (Kyle et al. 2002; The Sacramento Bee 2016). The acreage is located on the south bank of Deer Creek where Lassen's original adobe and the Vina Ranch headquarters once stood. In the late 1990s, the Abbey worked with a local vintner to replant grape vines and begin making wine again on the Rancho Bosquejo lands (The Sacramento Bee 2016).

Previously Recorded Cultural Resources

A record search was conducted by the Northeast Information Center (NEIC) of the California Historical Resources Information System at California State University, Chico. The record search area included the project footprint and an approximate 0.25-mile buffer, for a total of approximately 3,506 acres. The purpose of the record search was to identify the presence of any previously recorded cultural resources within the project area and to determine whether any portions of the project area had been surveyed for cultural resources. The record search (I.C. File #D19-3) indicated that 12 cultural resources surveys had previously been conducted within or overlapping with the project area. These studies covered approximately 62 acres (13.6 percent) of the entire project area. In addition, one multi-county geoarchaeological study, which encompassed the entire project area, was completed. These studies are listed in Table 4.9-2.

Table 4.9-2 Cultural Resources Studies Previously Conducted within the Project Area

Report Number	Author(s)	Year	Title
S-001126	Amy Gilreath Valerie A. Levulett	1985	Archaeological Survey Report for Fourteen Proposed Bridge Improvement Projects Between Los Molinos and Red Bluff, Tehama County.
S-001137	Jerald Jay Johnson Patti Johnson	1974	Cultural Resources Along the Sacramento River from Keswick Dam to Sacramento.
S-001664	William Shapiro Keith Syda	1997	An Archaeological Assessment for the Sacramento River Rock Revetment Sites, Chico Landing to Red Bluff, Butte, Glenn and Tehama Counties, California, Part of the Cultural Resources Inventory and Evaluation for U.S. Army Corps of Engineers, Sacramento District, PL 89-99 Levee Rehabilitation on the Feather, Bear, Sacramento and San Joaquin Rivers System DACW05-97-P-0465.
S-001960	Peak & Associates	1997	Cultural Resources Assessment along Elder and Deer Creeks, Tehama County Flood Control and Water Conversation District, Tehama County, California (SAC 49).
S-003613	Frank Deitz	1999	Cultural Resources Assessment on Deer Creek, Tehama County, California.
S-003644	Lisa Westwood	2000	Vina RCD Stabilization Project, Archaeological Survey.
S-004536	Sheila Mone	1979	Archaeological Survey Report for a Proposed Grading Recovery Project in Tehama County, California.

Report Number	Author(s)	Year	Title
S-004658	Wendy J. Nelson Maureen Carpenter Kimberley L. Holanda	2000	Cultural Resources Survey for the Level (3) Communications Long Haul Fiber Optics Project: Segment WPO4: Sacramento to Redding.
S-007362	Cindy Arrington Bryon Bass	2006	Cultural Resources Final Report of Monitoring and Findings for the Qwest Network Construction Project, State of California.
S-009866	Jack Meyer	2008	The Potential for Buried Archaeological Resources along Part of State Route 99, Tehama County, California.
S-009874	Amanda Martinez Nancy E. Sikes	2008	Cultural Resources Survey for the Levee Repair Project at 20 Locations in Colusa, Sacramento, Sutter, Tehama, and Yolo Counties, California.
S-012349	Jack Meyer	2013	A Geoarchaeological Overview and Assessment of Northeast California, Cultural Resources Inventory of Caltrans District 2 Rural Conventional Highways: Lassen, Modoc, Plumas, Shasta, Siskiyou, Tehama, and Trinity Counties.
S-013827	MaryNell Nolan-Wheatley	2016	Cultural Resources Assessment for the Union Pacific Railroad Bridge, Valley Subdivision, Tehama County, California: Milepost 203.17.

The record search also revealed that five cultural resources (four archaeological sites and one built-environment feature) have been recorded and plotted by the NEIC within the study area (see Table 4.9-3); all are located east of SR 99, and only one is documented in one of the study reports listed above. Two of the archaeological sites (CA-TEH-000035 and CA-TEH-000036) were recorded in 1922 and provide no information, other than location on the north side of Deer Creek, on the site record. It is assumed, however, that the sites are prehistoric Native American village sites, as those were the types of resources archaeologists tended to focus on during that time period. Site CA-TEH-000865/H contains a sparse scatter of both prehistoric Native American artifacts such as obsidian and basalt debitage, flaked stone tools (a basalt chopper and a basalt scraper), and basalt ground stone implements (pestles, a mortar). Historic-era artifacts include shards of "white china" and fragments of brown glass. The site is located on the south bank of Deer Creek within property held by the Abbey. Some test units were reportedly excavated, but the site did not have a subsurface component. None of these archaeological sites have been evaluated for NRHP or CRHR eligibility.

Table 4.9-3 Recorded Cultural Resources within the Project Area

Primary Number	Trinomial	Date Recorded	Resource Type	NRHP/CRHR Eligibility
P-52-000035	CA-TEH-000035	1922	No information; assumed prehistoric.	Unknown
P-52-000036	CA-TEH-000036	1922	No information; assumed prehistoric.	Unknown
P-52-000865	CA-TEH-000865/H	1975	Prehistoric and historic. Obsidian flakes and ground stone artifacts; fragments of brown glass and white china.	Unknown
P-52-002604	CA-TEH-002604H	2016	Historic. 240-foot section of Union Pacific Railroad (originally Central Pacific and then Southern Pacific) track, which includes a 76-foot-long timber trestle bridge across China Slough.	Not eligible
D19-3 (informal resource)	NA	NA	Historic-era refuse.	Unknown

Notes:

CRHR = California Register of Historical Places
NRHP = National Register of Historic Places

Resource CA-TEH-002604H is a railroad trestle bridge across China Slough at milepost 203.17 of the Union Pacific Railroad Valley Subdivision line. The site record provides an NRHP evaluation of the bridge, and although the Valley Subdivision railroad line had previously been determined to be NRHP eligible, the bridge was recommended as not a contributing element to the larger resource, nor as individually eligible.

The NEIC also plotted the location of an informal resource (identified as D19-3), which contained historic-era refuse eroding out of the north bank of Deer Creek, approximately halfway between the Union Pacific Railroad and SR 99. No specific information was provided about the nature of the materials observed.

In addition to the above-referenced resources plotted by the NEIC, the record search materials included a report prepared by members of the Oregon-California Trails Association who conducted an exploration of the remains of Peter Lassen's adobe and immediate surroundings, including the area of Benton City (Freeman 2015). Using 28 maps dating from 1847 to 1937, the group mapped a large number of items and features potentially related to Lassen's Rancho Bosquejo and Benton City. However, it must be emphasized that the entire area between Deer Creek and China Slough, east of the railroad, contains a number of canals and other water-related features (e.g., a mill race, a mill pond, aqueduct tunnels, and various canals) that intersect with Deer Creek from the Sacramento River upstream to the SVRIC Dam. The Lassen Trail also paralleled the north bank of Deer Creek (Horizon Water & Environment 2019). Freeman (2015) identified the area as the Lassen Historic District.

Lastly, there are an additional three known built-environment resources within the project area, though others likely exist. These are the SVRIC Diversion Dam, the levees, and Red Bridge. The SVRIC Diversion Dam and levees have not been recorded or evaluated for NRHP/CRHR eligibility. Red Bridge (Bridge #08C0072), which crosses Deer Creek on Leininger Road and was built in 1930, was evaluated by Caltrans and determined not to be NRHP or CRHR eligible (BridgeReports 2021).

Native American Consultation

AB 52 coordination is required when a tribe has requested that a CEQA lead agency consult with them for a specific geographic area. DWR has not received notification requests pursuant to AB 52 that include the project area, so AB 52 coordination is not required. Consultation by DWR is being conducted in compliance with California Natural Resources Agency Tribal Consultation Policy (California Natural Resources Agency 2012) and the DWR Tribal Engagement Policy. The following summarizes consultation conducted to date by DWR.

- November 2018 — DWR contacted the NAHC to request a sacred lands file search and a list of culturally affiliated Native America contacts for the project area. The NAHC reported negative results for the sacred lands file search and provided contact information for seven Native American contacts. Project planning was delayed and contact letters were not mailed to the list of contacts.
- November 2020 — DWR contacted the NAHC to request an updated sacred lands file search and a list of culturally affiliated Native America contacts for the project area. The NAHC reported positive results for the sacred land file search and advised DWR to contact the Paskenta Band of Nomlaki Indians for more information. The Paskenta Band of Nomlaki Indians was the only contact provided on the contact list.
- December 2020 — A notice of preparation (NOP) of an EIR including details of a public scoping meeting was submitted online to the State Clearinghouse and mailed to appropriate State agencies, including the NAHC.
- December 2020 — DWR sent a tribal engagement letter to the contact for the Paskenta Band of Nomlaki Indians notifying the tribe of project planning activities, that a CEQA document would be prepared, and that a sacred lands search returned positive results. The letter also requested information about cultural resources that may be in close proximity to the project area. At the same time, the NOP was mailed to the tribe. The tribe did not respond to the letter or the NOP.
- December 2020 — The NAHC sent a letter to DWR in response to the NOP mailed by DWR. 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 2021 — DWR sent a second tribal engagement letter to the contact for the Paskenta Band of Nomlaki Indians. The letter contained the same information as the first letter and notified the tribe that DWR was preparing to release the CEQA document for the proposed project for public review in October 2021. To date, the tribe has not responded to the letter.

4.9.2 Regulatory Setting

The following plans, policies, regulations, or laws related to cultural and tribal cultural resources apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- National Register of Historic Places (list of resources that meet the federal criteria for historic importance.) — Applies to impact analysis and planning.
- NHPA, Section 106 (consultation with the State Historic Preservation Officer concerning NRHP eligibility of resources that have not yet been initiated.) — Applies to impact analysis and planning.

State Regulations

- CEQA, Section 15064.5 (determining the significance of impacts to archaeological and historical resources.) — Applies to impact analysis and planning.
- CRHR (includes resources listed or eligible for listing in the NRHP as well as some California Historical Landmarks and resources important to California history and heritage) — Applies to impact analysis and planning.
- 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.) — Applies to impact analysis, planning, and construction.

- California Health and Safety Code 7050.5 (provides guidance in the event of the accidental discovery or recognition of human remains in any location other than a dedicated cemetery.) — Applies to construction.
- California Native American Graves Protection and Repatriation Act (requires that all California Native American human remains and cultural items be treated with dignity and respect.) — Applies to construction.
- AB 52 (amends CEQA to include Native American consultation and tribal cultural resources.) — Applies to impact analysis and planning.
- California Native American Historical, Cultural, and Sacred Sites Act (provides guidelines in the event that human remains are discovered.) — Applies to construction.
- California Natural Resources Agency Tribal Consultation Policy (policy related to effective government-to-government consultation with California Indian Tribes.) — Applies to planning.

Regional and Local Regulations

- Tehama County General Plan (2009)
    - Policy OS-10.1 (The County should protect and preserve significant archaeological and cultural resources.) — Applies to impact analysis, planning, and design.
    - Policy OS-10.3 (The County shall provide incentives and encourage cooperation with the private sector for the preservation, protection, or enhancement of historic, archaeological, and cultural resources.) — Applies to impact analysis and planning.
    - Policy OS-10.4 (The County shall encourage interagency cooperation to protect historic, archaeological, and cultural resources.) — Applies to impact analysis, planning, and design.

4.9.3 Impacts and Mitigation

4.9.3.1 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on

Appendix G of the CEQA Guidelines and professional judgment. Impacts to cultural and tribal cultural resources would be significant if they would:

- Cause a substantial adverse change in the significance of a historical resource pursuant to 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.
- Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:
    1. Listed or eligible for listing in the CRHR or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or
    2. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the new resource to a California Native American tribe.

4.9.4 Impact Analysis

Impact CR-1: *Cause a substantial adverse change in the significance of a historical or archaeological resource as defined in Section 15064.5, or tribal cultural resources as defined in Public Resources Code 21074.*

No Project Alternative

No Impact. Under the no project alternative, no construction activities or associated changes in hydrology would occur. Maintenance activities, including levee inspection and repair and vegetation management would continue. These activities would not be expected to result in and adverse change to the significance of historical or archaeological resources. No impact would occur.

Alternatives A through F

Construction-related impacts

Less than Significant with Mitigation Incorporated. Of the three known built-environment resources within the project area, proposed project construction would affect Red Bridge and the levees. Red Bridge was previously evaluated and determined not eligible for listing. Proposed construction activities would have **no impact** on the historical significance of Red Bridge.

The project area levees have not been recorded or evaluated for NRHP or CRHR eligibility. If they were determined to be eligible, proposed construction activities would alter or remove levees, which could adversely change their historical significance, resulting in a **potentially significant impact**. Implementation of the treatment plan to address affected resources identified as eligible for the NRHP or CRHR described in Mitigation Measure CR-1 would reduce this potential impact to **less than significant**.

In addition to these known historical resources, the presence of Peter Lassen’s Rancho Bosquejo within the project area indicates a very high probability of unrecorded early historic-era archaeological resources, particularly along Deer Creek downstream from the SVRIC Dam. This potential has been substantiated by the work of Freeman (2015) and his associates who investigated and recorded these resources, many of which are directly adjacent to or intersect Deer Creek. The identified resources include water works, adobes, artifact scatters, and a cemetery. Should any unknown historic-era archaeological resources be disturbed or damaged by proposed construction activities, impacts would be **potentially significant**. Implementation of the procedures for inadvertent discovery of archaeological resources included in Mitigation Measure CR-2 would reduce this potential impact to **less than significant**.

Four archaeological resources have been recorded in or immediately adjacent to the project area. Three of the sites are of Native American origin or contain a Native American component and may be considered tribal cultural resources. Because California’s indigenous population regularly settled near or travelled along viable watercourses, such as Deer Creek, and exploited resources available in the creeks or Sacramento River or their respective riparian corridors, it can be expected that additional Native

American sites that may be considered tribal cultural resources are present within the project area. These sites may include village sites, resource-specific activity areas, or trails (Horizon Water & Environment 2019). Construction-related activities associated with all project alternatives would require substantial ground-disturbance, including excavation, soil removal, trenching, grading, construction of a new setback levee, and use of staging areas. These earth-moving activities could result in damage to or destruction of known and undiscovered prehistoric-period archaeological sites and tribal cultural resources if present in the construction area. Should an archaeological or tribal cultural resource be damaged or destroyed during these activities, the significance of the resources could be adversely affected, and a **significant impact** would occur. Implementation of the cultural resource awareness training included in Mitigation Measure CR-2, the procedures for inadvertent discovery of archaeological resources included in Mitigation Measure CR-3, and the evaluation and protection measures included in Mitigation Measure CR-4 would reduce this potential impact to **less than significant**.

O&M-related Impacts

Less than Significant. Project O&M are not anticipated to cause an adverse change in the significance of any known historical and archaeological resources. The ability of the Deer Creek channel to meander and erode the banks more freely in the levee setback reaches and easement areas could expose unidentified historical, archaeological, or tribal cultural resources. Exposure could subject these resources to erosive damage or being washed away. But, because of the age of the sediments and the known historical and archaeological resources, the likelihood of this occurring is very low. Additionally, Deer Creek currently erodes its banks, so the potential for exposure is similar to existing conditions, which is low. Maintenance activities would occur within the footprint of previously disturbed areas and would not be expected to adversely affect historical, archaeological, or tribal cultural resources. Impacts would be **less than significant.**

Mitigation Measure CR-1: *Prepare a Treatment Plan and Perform Treatment to Address the Affected Resources Identified as Significant and Eligible for the NRHP or CRHR.*

The project proponent will prepare a treatment plan that provides measures for the management of identified historic properties and historical resources which cannot be avoided during project-related ground disturbances or other construction activities. The plan will establish a research design, methods, and guidelines for evaluations of unevaluated resources for potential listing on the NRHP or CRHR, and for mitigation of project-related significant impacts to historic properties and historical resources located within the project area. The treatment plan will also describe a process of consultation with appropriate State and federal agencies. Preservation in place, through methods such as redesign of relevant facilities to avoid destruction or damage to eligible resources, capping resources with fill, or deeding resources into conservation easements, shall be the preferred method of mitigation where feasible. If these options are not feasible, the measures that are developed in the treatment plan will be followed.

Mitigation Measure CR-2: *Conduct Cultural Resource Awareness and Sensitivity Training.*

A pre-construction training session will be held for all construction personnel before the beginning of each construction phase or period. The training sessions will be conducted in person in the field. 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 the training sessions will include 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 traditional cultural properties (TCPs), TCRs, or prehistoric archaeological resources. Written materials will be provided to trained personnel, as appropriate.

Mitigation Measure CR-3: *Implement Procedures for Inadvertent Discovery of Archaeological Resources and Implement an Inadvertent Discovery Plan.*

If an inadvertent discovery of archaeological cultural materials (e.g., unusual amounts of shell, animal bone, bottle glass, ceramics, building remains) is made during project-related construction activities, work must be halted within 100 feet of the find until an archaeologist who meets U.S. Secretary of Interior's Professional Qualification Standards for Archaeology evaluates the find. If the discovered materials are potential tribal cultural resources, affiliated Native American tribes will be notified and provided an opportunity to participate in the evaluation of the find. Work may continue on other parts of the proposed project while evaluation and, if necessary, mitigation, take place (CEQA Guidelines Section 15064.5 [f]). Should significant archaeological resources be found, the resources shall be treated in compliance with PRC Section 21083.2. If the project can be modified to accommodate avoidance, preservation of the site is the preferred alternative. Data recovery of the damaged portion of the site also shall be performed pursuant to PRC Section 20183.2(d).

Mitigation Measure CR-4*: In the Event that Tribal Cultural Resources or Traditional Cultural Properties are Discovered during Construction, Implement Procedures to Evaluate and Properly Treat Them.*

Should potential TCRs or TCPs be identified in the project area during construction, each identified TCR or TCP will be evaluated for CRHR and NRHP eligibility through application of established eligibility criteria (CCR 15064.636 and CFR Part 63, respectively), in consultation with interested Native American tribes. 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).

Impact CR-2: *Disturbance of Human Remains, including Outside of Formal Cemeteries*

No Project Alternative

<u>Construction-related Impacts</u>

No Impact. Under the no project alternative, no construction would occur. Continued maintenance activities, including levee inspection and repair and vegetation management would occur in already disturbed areas and would not be expected to affect human remains. **No impact** would occur.

Alternatives A through F

<u>Construction-related Impacts</u>

Less than Significant with Mitigation Incorporated. Resources identified during a records search include a cemetery on Peter Lassen's Rancho Bosquejo (Horizon Water & Environment 2019), but the cemetery is not located near any proposed ground-disturbing construction activities and **no impact** to human remains in the cemetery would occur.

Project-related activities associated with the construction of all project alternatives would require substantial ground disturbance, including excavation, soil removal, trenching, grading, and construction of a new setback levee. Should unknown human remains be disturbed during these activities, a **significant impact** would occur. Implementation of the procedures for the inadvertent discovery of human remains included in Mitigation Measures CR-5 would the impact to human remains to **less than significant**.

<u>O&M-related Impacts</u>

Less than Significant. Project O&M are not anticipated to disturb human remains. The ability of the Deer Creek channel to meander and erode the banks more freely in the levee setback reaches and the easement areas could expose unidentified human remains, but the likelihood of this occurring is very low. Additionally, because Deer Creek currently erodes its banks naturally, the potential for exposure is similar to the existing conditions, which is low. Maintenance activities would occur within the footprint of previously disturbed areas and would not be expected to disturb human remains. Impacts would be **less than significant.**

Mitigation Measure CR-5: *Implement Procedures for the Inadvertent Discovery of Human Remains.*

In accordance with the provisions of California Health and Safety Code Sections 7050.5–7055, if human remains are uncovered during ground-disturbing activities, the project proponent or designated representative will immediately halt potentially damaging excavation within 100 feet of the burial and notify the Tehama County coroner 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, the coroner must contact the NAHC by phone within 24 hours of making that determination. After the coroner's findings have been made, a professionally qualified archaeologist and the NAHC-designated most likely descendant, in consultation with the landowner, shall determine the ultimate treatment of the remains and any items associated with the burial, including preservation and avoidance, relinquishment to the most likely descendant, or dignified removal and re-interment in a location not subject to future disturbance. The professionally qualified archaeologist shall record the site, or the location of re-burial, with the NAHC. Work may recommence after the human remains have been investigated and recommendations have been made for the appropriate treatment and disposition of the remains.

4.10 Geology, Soils, and Paleontological Resources

4.10.1 Environmental Setting

4.10.1.1 Geology

The project area lies in the Sacramento Valley portion of the Great Valley Geomorphic Province. The sediments in the Great Valley vary between three 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. The Great Valley geomorphic province is a large, elongated structural trough that contains a thick sequence of predominantly sedimentary formations that range in age from Jurassic (206 to 144 million years old) to Recent. From the late Triassic Period until the late Jurassic, this area was part of the continental shelf and ocean floor on which the marine Great Valley sequence was deposited. By the early Pleistocene Epoch (approximately 1.8 million years ago), after uplift of the Coast Ranges, the present boundaries of the Great Valley were well developed, and deposition changed from marine to mostly continental.

The Sacramento Valley has been a depositional basin throughout most of the late Mesozoic and Cenozoic periods, covered by alluvial fans during the Pliocene-Pleistocene periods when large volumes of sediment were funneled into the basin. Late Pleistocene and Holocene alluvial deposits now cover low-lying areas.

Deer Creek is located in the southernmost extent of the Cascade Range, which includes volcanic rocks, including pyroclastic deposits and volcanic flows of basaltic, andesitic, and rhyolitic composition. These volcanic rocks overlay Mesozoic and Paleozoic metamorphic rocks of sedimentary and volcanic origin, with marine sedimentary rocks over these. Local geology is the Tuscan Formation of the late Pliocene, which consists of basalt/andesite mudflows and locally derived fluvial deposits of ash flow and air fall tuffs, lava flows, and intrusions (Deer Creek Watershed Conservancy 1998).

Deer Creek originates just south of the Lost Creek Plateau at an elevation of approximately 6,200 feet. Tributaries in this upper watershed area include Lost Creek and Gurnsey Creek. Deer Creek flows through Deer Creek Meadows; downstream of the meadows, Deer Creek flows into a deep canyon underlain by the Tuscan Formation of late Pliocene Age that is composed of ancient volcanic mudflows (California Department of Water Resources 2014). Channel form in the canyon is controlled by bedrock outcrops and channel width is controlled by the canyon walls. Immediately downstream of the canyon [near river mile (RM) 10.5], Deer Creek flows onto its alluvial fan, which extends to the Sacramento River at RM 0. This is the lower, alluvial reach of Deer Creek, and includes the entire project area. Lower Deer Creek has a concave, upward longitudinal profile typical of alluvial rivers, with an average slope of 0.5 percent. Three diversion dams create slope discontinuities along the channel, all of which are relatively minor with the exception of the SVRIC dam. In its natural, unconfined location, lower Deer Creek is a high-energy, dynamic system. Although this represents a challenge to controlling floods and lateral migration, it also means that more natural channel morphology and riparian habitats can be restored, as the system is not limited by energy or sediment supply (Deer Creek Watershed Conservancy 1998).

Deer Creek is incised in cemented alluvium units such as Riverbank Formation, Red Bluff Formation, and older terrace gravels in the upper section of the alluvial fan (from RM 10.5 to RM 6.5). The alluvial fan is bounded by bluffs formed of older geologic units, and Deer Creek actively migrates across the fan. From approximately RM 6.5 to RM 2.0, Deer Creek flows through a more confined and stable corridor on the alluvial fan. While Deer Creek has occupied essentially the same flood channel in this area for the last 100 years (Deer Creek Watershed Conservancy 2011), the primary channel has shifted over centuries or millennia to alternate channels still visible on the alluvial fan and clearly evident on the topographic map.

4.10.1.2 Seismicity

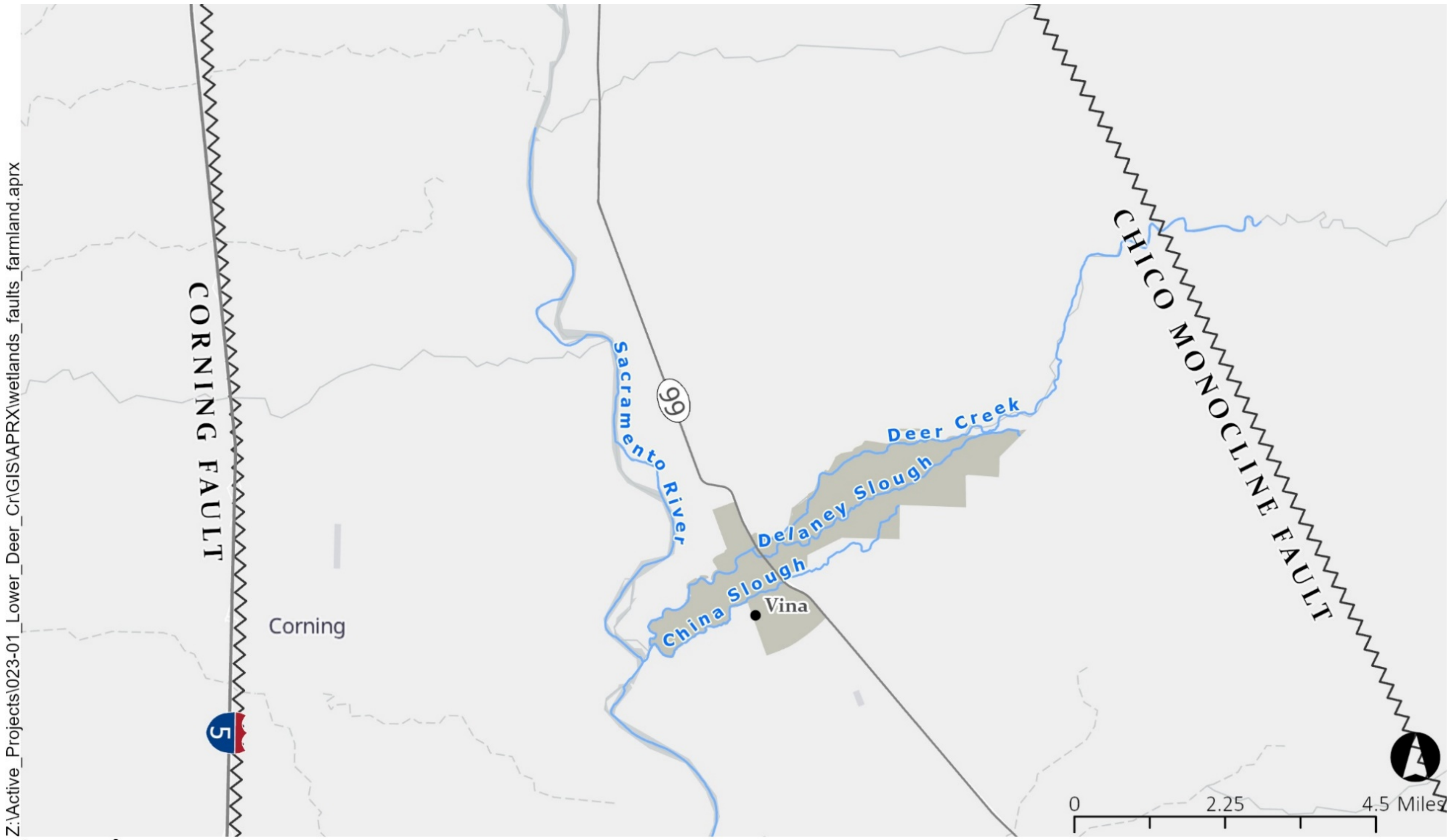
The Sacramento Valley has experienced relatively low seismic activity in the past and does not contain any Alquist-Priolo earthquake fault zones (Branum et al. 2016). The nearest known active (Holocene or Historic) fault trace is located east of the City of Palermo, approximately 40 miles southeast of the project area. Mapped regional faults and their approximate distance from the project vicinity are identified in Figure 4.10-1.

Potential seismic hazards resulting from a nearby moderate to major earthquake can be generally 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 area or in the project vicinity by the California Geological Survey (CGS) or the USGS, and because the project area 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.

- 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, loose, granular soils temporarily behave as a liquid because of earthquake shaking. Structures built 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 can be subject to seismic settlement and differential settlement (Boulanger and Idriss 2004). Potential for differential settlement occurs where low-density and unconsolidated material is

encouraged, 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) because of both immediate settlements in granular soils and the consolidation of fine-grained soils.

Figure 4.10-1 Earthquake faults near the Project Area



Legend

- Fault, Undifferentiated Quaternary Age, Inferred Location
- Project Vicinity
- Highways and Interstate
- Project Area Streams

FlowWest

Data Sources
Faults - USGS 2021
Streams - USGS NHD 1999
Highway and Interstate - US Dept. of Commerce 2007

4.10.1.3 Soils

Figure 4.10-2 shows the locations of each of the 24 soil types within the project area (California Soil Resources Lab 2018). The soil mapping units are listed in Table 4.10-1. Fourteen soil types mapped within the assessment area are included on the NRCS list of hydric soils (Natural Resource Conservation Service 2019). The portion of China Slough that falls within the project area (not shown in Figure 4.10-2) consists predominantly of hydric soils (e.g., Molinos complex and Vina loam).

4.10.1.4 Paleontological Resources

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 refers to the recorded abundance and types of fossil specimens and the number of previously recorded fossil sites. Exposures of a rock formation are most likely to yield fossil remains representing particular species or quantities similar to those previously recorded from the rock formation in other locations. So, 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 DCWC conducted a thorough watershed assessment that identified and quantified archaeological resources (Deer Creek Watershed Conservancy 1998). The authors did not comment on paleontological resources in the assessment area, but noted that there are likely to be extensive (i.e., "hundreds") of archeological resources along Deer Creek between the Sacramento River and the Ishi Wilderness (approximately 10 miles northeast of the project area). But because of the minimal amount of surveys conducted to date (of the 20,000-acre area, approximately 1 percent has been surveyed), data is limited (Deer Creek Watershed Conservancy 1998). Given the extent of proposed project elements, no specific paleontological investigation was conducted during preparation of this EIR. A review of the University of California Museum of Paleontology Specimen Search database (University of California Museum of Paleontology 2021) and Mindat.org (Mindat.org 2021) was conducted for Tehama County. No paleontological resources were identified in either database.

Figure 4.10-2 Soils mapped within the Project Study Area

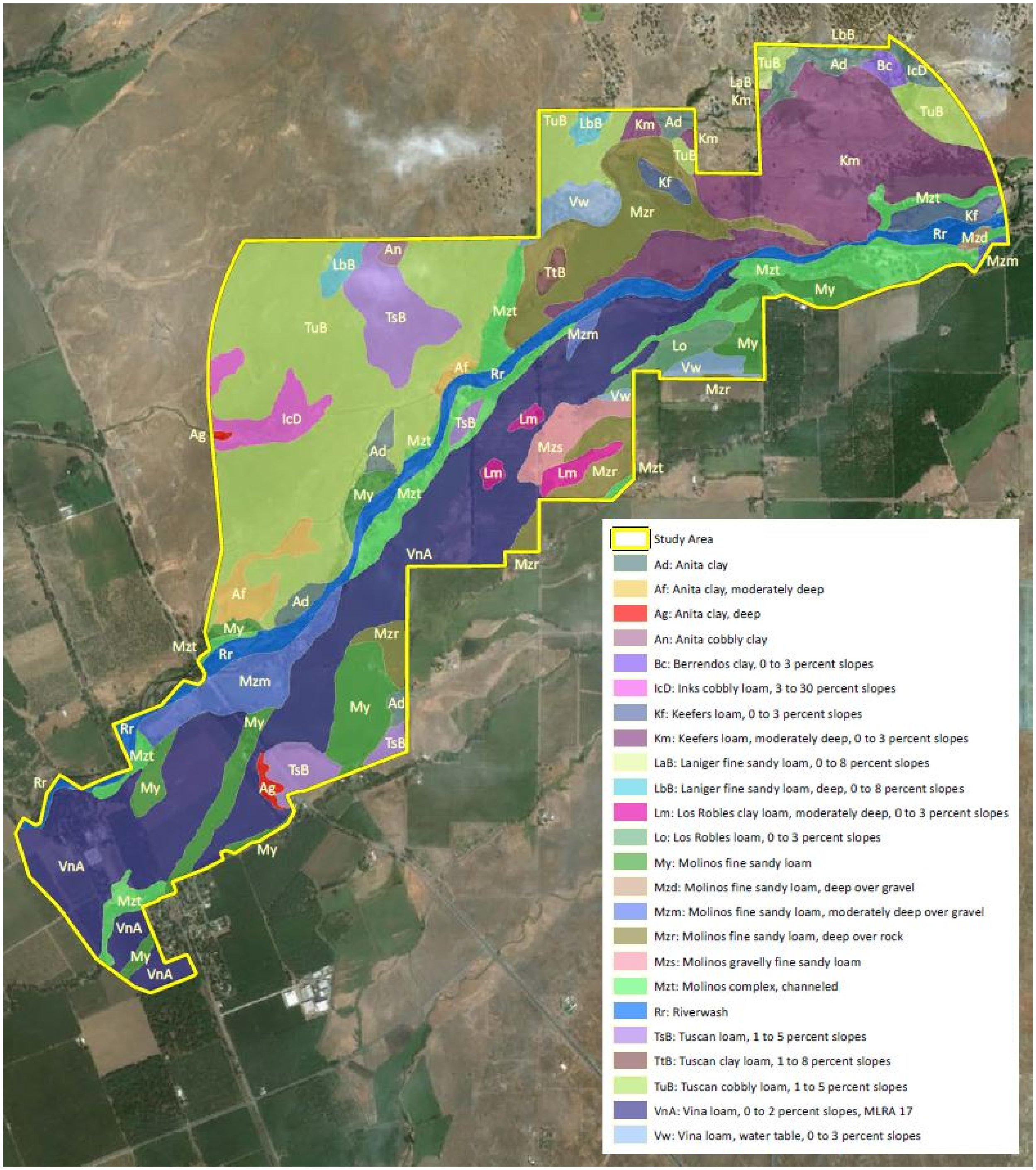


Table 4.10-1 Soil Types in the Project Study Area

Map Unit Symbol	Map Unit Name	Map Unit Details	Hydric Soil
Ad	Anita clay	---	Yes
Af	Anita clay	Moderately deep	Yes
Ag	Anita clay	Deep	Yes
An	Anita cobbly clay	---	Yes
Bc	Berrendos clay	0 to 3 percent slopes	Yes
IcD	Inks cobbly loam	3 to 30 percent slopes	No
Kf	Keefers loam	0 to 3 percent slopes	Yes
Km	Keefers loam	Moderately deep, 0 to 3 percent slopes	Yes
LaB	Laniger fine sandy loam	0 to 8 percent slopes	No
LbB	Laniger fine sandy loam	Deep; 0 to 8 percent slopes	No
Lm	Los Robles loam	0 to 3 percent slopes	No
Lo	Los Robles loam	0 to 3 percent slopes	No
My	Molinos fine sandy loam	0 to 3 percent slopes, Major Land Resource Area (MLRA) 17	Yes
Mzd	Molinos fine sandy loam	Deep over gravel	No
Mzm	Molinos fine sandy loam	Moderately deep over gravel	No
Mzr	Molinos fine sandy loam	Deep over rock	No
Mzs	Molinos gravelly fine sandy loam	---	No
Mzt	Molinos complex	Channeled	Yes
Rr	Riverwash	---	Yes
TsB	Tuscan loam	1 to 5 percent slopes	Yes
TtB	Tuscan clay loam	1 to 8 percent slopes	Yes
TuB	Tuscan cobbly loam	1 to 5 percent slopes	Yes
VnA	Vina loam	0 to 2 percent slopes, MLRA 17	No
Vw	Vina loam	water table, 0 to 3 percent slopes	Yes

Source: California Soil Resources Lab 2018; Natural Resources Conservation Service 2019.

4.10.2 Regulatory Setting

The following plans, policies, regulations, or laws related to geology, soils, and paleontological resources apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- USACE engineering criteria, manual, circular, technical letters, and engineering regulations (related to incorporating safety into the design of levees.) — Applies to project design, construction, and the impact analysis.
  - *Engineering and Design: Design Guidance on Levees. TL 1110-2-555*. (U.S. Army Corps of Engineers 1997)
  - *Design and Construction of Levees. EM 1110-2-1913*. (U.S. Army Corps of Engineers 2000).
  - *Design Guidance for Levee Underseepage. ETL 1110-2-569*. (U.S. Army Corps of Engineers 2005).
  - *USACE Process for the National Flood Insurance Program Levee Systems Evaluation. Engineering Circular (EC) 1110-2-6067*. (U.S. Army Corps of Engineers 2010).
  - *Earthquake Design and Evaluation for Civil Works Projects. Engineer Regulation (ER) 1110-2-1806*. (U.S. Army Corps of Engineers 2016).
- FEMA and 44 CFR Section 65.10 (NFIP regulations related to levee design, operation, and maintenance standards.) — Applies to project design and the impact analysis.
- Earthquake Hazards Reduction Act — Applies to project design and the impact analysis.
- Idriss and Boulanger (2008), *Soil Liquefaction During Earthquakes*. — Applies to project design and the impact analysis.

State Regulations

- Alquist-Priolo Earthquake Fault Zoning Act (prohibits siting of structures along active faults.) — Applies to the impact analysis.
- Seismic Hazards Mapping Act (requires identification of areas prone to earthquake hazards.) — Applies to the impact analysis.
- NPDES and SWPPPs (required to prevent the discharge of any unpermitted pollution and obtain a permit for pollutant discharge.) — Applies to the impact analysis.
- CVFPB Levee Standards (23 CCR, Division 1, Article 8, Sections 111–137) (standards for the design and construction of encroachments that can affect an authorized flood control project.) — Applies to project design and the impact analysis.

Regional and Local Regulations

- Tehama County General Plan (2009)
    - Goals and Policies Relevant to Soil Resources
        - Policy OS-12.1 (The County shall recognize the need to protect and conserve areas where soils have high resource values, especially in terms of potential agricultural productivity.) — Applies to impact analysis and planning.
        - Policy OS-12.2 (The County shall exercise an appropriate degree of regulation designed minimize soil erosion, including the administration of standards for grading and site clearance related to development projects.) — Applies to impact analysis and planning.
        - Policy OS-12.3 (The County shall continue to encourage sound soil management and erosion prevention and control programs and projects, including the use of windbreaks, minimum tillage practices, grazing management, and riparian area rehabilitation.) — Applies to impact analysis and planning.
- Society of Vertebrate Paleontology (SVP) Professional Paleontological Standards — Relevant to the paleontological sensitivity determination, significance thresholds, and impact analysis.

4.10.3 Impacts and Mitigation

4.10.3.1 Methodology

The evaluation of potential impacts relied on a review of published geological and paleontological literature and maps. The *Soil Survey of Tehama County, California* (United States Department of Agriculture 1967) and an online soil survey (California Soil Resource Lab 2018) were examined to determine soil type and mapping extent within the study area. The NRCS soil survey data and NRCS national hydric soils list were also reviewed.

In its standard guidelines for assessment and mitigation of adverse impacts on paleontological resources, the 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. Because a paleontological resource survey has not been conducted, and based on findings from the Deer Creek watershed assessment (Deer Creek Watershed Conservancy 1998) and the results from searches of the available online paleontological resources databases (University of California Museum of Paleontology 2021; Mindat.org 2021), the project area's sensitivity for paleontological resources is undetermined.

4.10.3.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines and professional judgment. Impacts on geology, soils, and paleontological resources would be significant if they would:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo earthquake fault zoning map, issued by the State geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42.).
  - Strong seismic ground shaking.
  - Seismic-related ground failure, including liquefaction.
  - Landslides.
- Result in substantial soil erosion or the loss of topsoil.
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of wastewater.
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

4.10.3.3 Topics Not Evaluated Further

During environmental analysis, the following topics were eliminated from detailed analysis because no impacts from project implementation are anticipated:

- Landslides — Because the project area and vicinity have flat topography, there would be no adverse impacts related to landslides.
- Expansive soil — Expansive soil is not present in the project area (Resource Conservation District of Tehama County 2006).
- Inadequate soils — The proposed project does not include the construction of septic tanks or alternative wastewater disposal systems.

4.10.4 Impact Analysis

Impact GEO-1: *Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:*

- Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo earthquake fault zoning map, issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42.).
- Strong seismic ground shaking.
- Seismic-related ground failure, including liquefaction.

No Project Alternative

Less than Significant. Under the no project alternative, no construction would occur. The levees would continue to be maintained and repaired to meet existing regulations and design requirements for levees. Continued maintenance would reduce the potential for substantial adverse effects, including the risk of loss, injury, or death involving rupture of an earthquake fault or seismic activity and impacts would be **less than significant**.

Alternatives A through F

<u>Construction-related Impacts</u>

Less than Significant. The proposed construction activities, including raising or setting back levees, would not cause substantial adverse effects including the risk of loss, injury, or death from seismic activity or seismic-related ground failure. There are two normal faults outside of the project area: the Chico Monocline fault, approximately 4 miles to the east, and the Corning fault, approximately 8 miles to the west. Both are classified as Quaternary "potentially active faults," with movement within the last 1.6 million years (Jennings and Bryant 2010). The most recent CGS Earthquake Shaking Potential for California map (Branum et al. 2016) indicates that the project area and surrounding region have a "low frequency shaking potential," meaning that the area is expected to have a very low relative intensity of ground shaking and damage from future earthquakes. Because of the low seismic activity of the Corning fault and the Chico Monocline fault, the potential for seismic hazards is very low. In addition, there are no Alquist-Priolo earthquake fault zones in the project vicinity, and no known faults mapped within the project area.

The soils in the proposed project area are classified as Site Class D. This class includes relatively stiff soil, including sand, silt, and silty clay (HDR 2020). The project area and surrounding region are not considered by CGS or the USGS to have significant potential for liquefaction, landslide, strong earth ground shaking, or other earthquake and geologic hazards (California Geological Survey 2021). In addition, a liquefaction assessment would be completed to inform final levee design, and new or setback levees would be constructed to comply with all design safety standards applicable to the proposed levee improvements and setbacks. Levee improvements and setbacks would be constructed in the same overall area as existing levees and would be subject to the same seismic and geologic hazards as under existing conditions. Impacts associated with the construction of all action alternatives would be **less than significant**.

<u>O&M-related Impacts</u>

Less than Significant. Levees within the project area would continue to be maintained and repaired to meet regulations and design requirements for levees. Continued maintenance would reduce the potential for substantial adverse effects, including the risk of loss, injury, or death involving rupture of an earthquake fault or seismic activity, and impacts would be **less than significant**.

Impact GEO-2: *Result in substantial soil erosion or the loss of topsoil. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site lateral spreading, subsidence, liquefaction or collapse.*

No Project Alternative

Less than Significant. Under existing conditions, the levee toes, channel banks, and certain floodplain areas experience erosion during high flow events. Under the no project alternative, no construction would occur, and these erosive processes would continue but would not be expected to differ substantially from existing conditions. The existing levees are not located on unstable soils, and continued maintenance of the levees and channel would not result in substantial erosion or the loss of topsoil. For these reasons, impacts would be **less than significant**.

Alternatives A through F

Construction-related impacts

Less than Significant with Mitigation Incorporated. The proposed project would involve earthmoving activities, particularly construction of the levee setbacks, new levees, and new embankments; floodplain lowering; road raising; channel excavation in China Slough; and realignment and expansion of Red Bridge would all involve substantial soil movement. A portion of this soil would be topsoil from existing farmland. Should this topsoil be lost as a result of construction, a **significant impact** would occur. But, this topsoil would be reused to the extent possible and proper best management practices (BMPs) to prevent soil erosion would be implemented to ensure this topsoil is not washed into Deer Creek. Implementation of the erosion control measures in Mitigation Measure GEO-1 and the reuse of excavated topsoil as outlined in Mitigation Measure Geo-2 would reduce impacts to **less than significant**.

Mitigation Measure GEO-1: *Acquire Appropriate Regulatory Permits, Prepare and Implement a Stormwater Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.*

Prior to the start of earth-moving activities, the project proponent will obtain from the SWRCB an 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 to discharge with the 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, BMPs that will be implemented to prevent contaminated stormwater discharges into waterways, and inspection and monitoring activities that will be conducted. Construction and post-construction monitoring shall be conducted to ensure that all erosion-control efforts are performing and being performed 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 non-stormwater discharges and hazardous spills), demonstration of compliance with all applicable CVRWQCB and other applicable water quality standards, and a BMP monitoring and maintenance schedule. BMPs will be applied to meet the maximum extent practicable and best conventional technology or best available technology requirements and to address compliance with water quality standards. A construction and post-construction monitoring program will be implemented to ensure compliance and effectiveness of BMPs.

Mitigation Measure GEO-2: Store and Reuse Topsoil.

During construction, topsoil identified as good quality for revegetation efforts, agricultural practices, or other similar uses will be stockpiled. Revegetation of disturbed soil areas will be facilitated by salvaging and storing existing topsoil and reusing it in restoration efforts. Topsoil storage must be for as short a time as possible to prevent loss of seed and root viability, loss of organic matter, and degradation of the soil microbial community. Salvaged topsoil should be piled no higher than 2 feet and no wider than 3 feet, and piles should be windrowed to retain viability of the microorganisms. Topsoil not used for revegetation will be offered to agricultural land users in the project vicinity. Land users would be notified of its presence and encouraged to obtain it for agricultural reuse.

<u>O&M-related Impacts</u>

Less than Significant. Continued maintenance activities, including vegetation management, could result in soil disturbance but would not have the potential to result in substantial soil erosion or the loss of topsoil. Impacts would be **less than significant**.

Impact GEO-3: *Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.*

No Project Alternative

Significant Impact. Under the no project alternative, no construction would occur, but maintenance activities, including emergency bank stabilization, would continue. Maintenance activities have the potential to damage paleontological resources and result in a **potentially significant impact**.

Alternatives A through F

<u>Construction-related Impacts</u>

Less than Significant with Mitigation Incorporated. The alluvium and basin deposits within the project area 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. So, these formations are considered to be of low paleontological sensitivity.

But, the discovery of numerous vertebrate fossil remains in sediments referable to the Riverbank Formation in Tehama County, 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 area. So, depending on the depth of excavation for floodplain lowering or other excavation construction activities, this paleontologically sensitive rock formation could be encountered. Because the same rock formations are present within the construction footprint for all of the project alternatives, there is a potential to encounter and possibly damage or destroy unique paleontological resources during construction-related excavation.

Alternative F is the only alternative that does not involve excavation for floodplain lowering. For this reason, construction of Alternatives A through E would have a **potentially significant impact** on paleontological resources. Implementation of the protective measures included in Mitigation Measure GEO-3 would reduce impacts to **less than significant**.

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, 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 (Society of Vertebrate Paleontology 1996). The recovery plan may include 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 the appointed paleontologist and the State historic preservation officer to be necessary and feasible will be implemented before construction activities can resume at the site where the paleontological resources were discovered.

<u>O&M-related Impacts</u>

Less than Significant with Mitigation Incorporated. Maintenance activities, including potential bank and levee repairs, may result in the excavation of a unique paleontological resource or site, or unique geologic feature. So, maintenance impacts would be **potentially significant**. Implementation of the topsoil protective measures included in Mitigation Measure GEO-2 would reduce these potential impacts to **less than significant**.

4.11 Greenhouse Gas Emissions and Climate Change

4.11.1 Environmental Setting

Climate change is caused, in part, by the accumulation in the atmosphere of greenhouse gas (GHGs), which are produced primarily by the burning of fossil fuels for energy. GHGs include carbon dioxide (CO_2), methane (CH_4), ozone, and N_2O. Because GHGs persist and mix in the atmosphere, emissions anywhere in the world affect the climate everywhere in the world. GHG emissions are typically reported in terms of carbon dioxide equivalents

(CO_2e), a measure that converts all GHGs to an equivalent basis taking into account their global warming potential compared to CO_2.

Global climate change is already affecting ecosystems and societies throughout the world. Climate change adaptation refers to the efforts undertaken by societies and ecosystems to adjust to and prepare for current and future climate change, thereby reducing vulnerability to those changes. Human adaptation has occurred naturally over history; people move to more suitable living locations, adjust food sources, and more recently, change energy sources. Similarly, plant and animal species also adapt over time to changing conditions; they migrate or alter behaviors in accordance with changing climates, food sources, and predators.

Many national, as well as local and regional, governments are implementing adaptive practices to address changes in climate, as well as planning for expected future impacts from climate change. Some examples of adaptations that are already in practice or under consideration include conserving water and minimizing runoff with climate-appropriate landscaping, capturing excess rainfall to minimize flooding, and maintain a constant water supply through dry spells and droughts, protecting valuable resources and infrastructure from flood damage and sea level rise, and using water-efficient appliances.

In 2018, total California GHG emissions from routine emitting activities were 425.3 million metric tons of carbon dioxide equivalents (MMT CO_2e) (California Air Resources Board 2020). This represents an increase from 2017 and a 13-percent reduction compared to peak levels reached in 2004. Declining emissions from the electricity sector were responsible for much of the reduction because of growing zero-GHG energy generation sources. In 2018, the transportation sector of the California economy was the largest source of emissions, accounting for approximately 39 percent of the total emissions.

4.11.1.1 GHG Emissions Sources in Tehama County

A baseline inventory of Tehama County's GHG emissions (Tehama County Planning Department and Tehama County Air Pollution Control District 2014), based on 2008 emissions data, indicates transportation (56 percent) is the greatest GHG emissions source in the county. Other GHG sources and their corresponding contributions to the total baseline emissions include residential built environment (16 percent), off-road equipment (8 percent), agriculture (8 percent), non-residential built environment (6 percent), water and wastewater (4 percent), solid waste (1 percent), and stationary sources (less than 1 percent). Of the off-road equipment emissions, the majority are from agricultural equipment (64 percent). Construction equipment only accounted for approximately 6 percent (4,150 MMT CO_2e). The total 2008 GHG emissions in Tehama County were 821,570 MMT CO_2e. It was estimated that under baseline as usual conditions, emissions in 2020 and 2028 would increase to approximately 959,000 and 1,061,000 MMT CO_2e, respectively (Tehama County Planning Department and Tehama County Air Pollution Control District 2014).

4.11.2 Regulatory Setting

The following plans, policies, regulations, or laws related to GHGs and climate change apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature. Although DWR may comply with these local regulations, it is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- Safe Affordable Fuel-Efficient Vehicles Rule (energy resources regulations to improve the efficiency of cars and light-, medium-, and heavy-duty vehicles.) — Applies to impact analysis.

State Regulations

- AB 32, the Global Warming Solutions Act (set the overall goals for reducing California's GHG emissions to 1990 levels by 2020.) — Applies to impact analysis, design, construction, and O&M.
- SB 32 (requires CARB to ensure the State's GHG emissions are reduced to 40 percent below the 1990 levels by 2030.) — Applies to impact analysis, design, construction, and O&M.
- SB 350 (established clean energy, clean air, and GHG reduction goals, including reducing GHG to 40 percent below 1990 levels by 2030 and to 80 percent below 1990 levels by 2050.) — Applies to impact analysis, design, construction, and O&M.

- SB 100 (requires renewable energy and zero-carbon resources supply 100 percent of electric retail sales to end-use customers by 2045.) — Applies to impact analysis, design, construction, and O&M.
- EO B-55-18 (commits California to total, economy-wide carbon neutrality by 2045.) — Applies to impact analysis, design, construction, and O&M.
- EO S-3-05 (establishes targets for GHG emission reduction.) — Applies to impact analysis, design, construction, and O&M.
- California's 2017 Climate Change Scoping Plan (strategy for achieving California's 2030 GHG target under SB 32.) — Applies to impact analysis, design, construction, and O&M.
- SB 1389 (requires the State Energy Resources Conservation and Development Commission to manage a data collection system for obtaining the information necessary to develop specified energy policy reports and analyses) - Applies to impact analysis, construction, and O&M.

Regional and Local Regulations

The Tehama County General Plan (2009), Policy OS-2.7, states that Tehama County shall work with the TCAPCD, CARB, or other agencies to prepare a climate action plan that would include specific targets for reductions of the current and projected 2020 GHG emissions inventory from those sources reasonably attributable to the County's discretionary land use decisions and the County's internal government operations and specific and general tools and strategies to reduce the current and projected 2020 GHG inventories and to meet the plan's target's for GHG reductions by 2020. Tehama County has not yet prepared a climate action plan or similar document to address GHG emissions or prepare for the effects of climate change.

4.11.3 Impacts and Mitigation

4.11.3.1 Methodology

Construction-related GHG emissions impacts were evaluated both quantitatively and qualitatively by considering the proposed project's potential sources of GHG emissions, including fossil-fueled or electric energy-consuming equipment and vehicles, and the potential frequency and duration of emissions. The proposed project's emissions were estimated using the

CalEEMod version 2016.3.2 (Appendix A). The quantitative analysis compared potential construction-related GHG emissions from the proposed project's range of alternatives to the TCAPCD GHG significance threshold. It should be noted that because DWR is not the project proponent, DWR's climate action plan and quantitative GHG threshold do not apply.

Projected changes in climate associated with global warming may have related effects on other resources in the future, including effects on the proposed project (such as changes in weather patterns). Anticipated potential worldwide climate change effects include coastal erosion, sea level rise, melting glaciers, atmospheric temperature warming, increased wildfire risk, ocean warming, food production issues (e.g., decreased crop yields), effects on terrestrial and marine ecosystems, flooding or drought conditions, and altered hydrologic patterns such as changes in river flows or lake levels (Intergovernmental Panel on Climate Change 2014). California-specific climate change effects and indicators of climate change are similar to those that may be experienced globally and are discussed in "Indicators of Climate Change in California", a report prepared by the California Office of Environmental Health Hazard Assessment (2018). The evaluation of such effects on the proposed project is beyond the scope of this GHG analysis.

4.11.3.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. The following criteria are based on Appendix G of the CEQA Guidelines. Impacts to GHG emissions and climate change would be significant if they would:

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

<u>Tehama County APCD Significance Thresholds</u>

The TCAPCD recommended CEQA thresholds of significance are outlined in its *Air Quality Planning and Permitting Handbook – Guidelines for Assessing Air Quality Impacts* (Tehama County Air Pollution Control District 2015). The TCAPCDs threshold for GHG emissions is 900 metric tons of carbon dioxide equivalents (MT CO_2e) per year.

4.11.4 Impact Analysis

Impact GHG-1: *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.*

No Project Alternative

Less than Significant. Under the no project alternative, no construction would occur, resulting in **no impact**.

O&M activities would involve the use of trucks or other construction equipment that would emit GHGs, but maintenance activities would be short-term and would not generate GHG emissions at a level that would have a significant impact on the environment. Impacts would be **less than significant**.

Alternatives A through F

Construction-related Impacts

Potentially Significant and Unavoidable. The proposed project would generate GHG emissions during construction. Construction-related GHG emissions would result from the combustion of fossil-fueled construction equipment, material hauling, and worker trips. Estimated GHG emissions for the construction of each of the project alternatives are provided in Table 4.11-1.

Table 4.11-1 Estimated Construction GHG Emissions for Alternatives A through E

Project Alternative	Estimated Construction-related CO2e (Metric tons/year)
Alternative A	6,494
Alternative B	5,986
Alternative C	5,595
Alternative D	4,845
Alternative E	4,435
Alternative F	1,972

Note:

CO_2e = carbon dioxide equivalent

Source: Appendix A

The proposed project's estimated annual construction-related GHG emissions would range from 1,972 MT CO_2e per year for Alterative F to 6,494 MT CO_2e per year for Alternative A. Because of these emission levels, the proposed project's emissions would exceed the TCAPCD significance threshold of 900 MT CO_2e per year and would result in a **significant impact**.

Implementation of the control measures to reduce construction emissions included in Mitigation Measure AQ-2 and further refinement of the project's anticipated construction activities as design details are further developed may reduce these GHG emissions to below the TCAPCD threshold by reducing the potential construction equipment use or hauling trips, and using cleaner equipment or trucks. But, because the feasibility and effectiveness of these reductions are unknown at this time, this impact is considered **potentially significant and unavoidable**.

O&M-related Impacts

Less than Significant. Following the completion of project-related construction activities, periodic levee inspections, levee repair, and vegetation management activities may be required. Maintenance activities would involve the use of trucks or other construction equipment that would emit GHGs, but maintenance activities would be short-term and would not generate GHG emissions at a level that would have a significant impact on the environment. Impacts would be **less than significant.**

Mitigation Measure AQ-2: *Implement Material Hauling NO_X Control Measures.*

Refer to Mitigation Measure AQ-2 in Section 4.4, "Air Quality," for the full text of this mitigation measure.

Impact GHG-2: *Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.*

No Project Alternative

No Impact. Under the no project alternative, no construction would occur. Continued maintenance activities would involve the use of trucks or other construction equipment that would emit GHGs, but maintenance activities would be short-term and would not generate GHG emissions at a level that would conflict with any plans, policies, or regulations adopted for the purpose of reducing the emissions of GHGs. Therefore, no impact would occur.

Alternatives A through F

<u>Construction-related Impacts</u>

Potentially Significant and Unavoidable. The State of California has implemented AB 32 to reduce GHG emissions. The proposed project does not pose any conflict with the most recent list of CARB's early action strategies, nor is it in one of the sectors at which these early strategies are targeted. "Water" and "Natural and Working Lands" are two of the sectors targeted in the AB 32 scoping plan (California Air Resources Board 2008), the first update to the AB 32 Scoping Plan (California Air Resources Board 2014), and the Final 2017 Scoping Plan (California Air Resources Board 2017). The Final 2017 Scoping Plan does not mention flood management-related projects as a specific target for additional strategies. The proposed project would be primarily located on natural lands and agricultural lands but would not involve the carbon sequestration activities or forest restoration activities discussed in the Final 2017 Scoping Plan. But, by addressing potential flooding issues and being implemented as efficiently as possible, the proposed project would comply with the overall goals of the AB 32 target sectors (to minimize energy use and adapt to climate change).

However, estimated emissions generated by the proposed project would exceed TCAPCD GHG significance threshold and contribute a potentially substantial GHG emissions. For this reason, the proposed project would potentially conflict with AB 32, SB 32, or the goals of EO-S-3-05 and would be **potentially significant**.

As described in the GHG-1 impact discussion, implementation of the control measures to reduce construction emissions included in Mitigation Measure AQ-2 and further refinement of the project's anticipated construction activities as design details are further developed may reduce these GHG emissions to below the TCAPCDs threshold by reducing the potential construction equipment use or hauling trips, and using cleaner equipment or trucks. But, because the feasibility and effectiveness of these reductions are unknown at this time, this impact is considered **potentially significant and unavoidable**.

<u>O&M-related Impacts</u>

No Impact. Following the completion of project-related construction activities, periodic levee inspections, levee repair, and vegetation management activities may be required. Maintenance activities would involve the use of trucks or other construction equipment that would emit GHGs, but maintenance activities would be short-term and would not generate GHG emissions at a level that would conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs. Therefore, **no impact** would occur.

4.12 Hazards and Hazardous Materials

The hazards evaluated in this section include safety risks associated with hazardous materials, proximity to an airport, wildland fires, and interference with adopted emergency response or emergency evacuation plans. Other hazards, such as air quality contaminants, flood risk, water quality contaminants, and seismic risks, are discussed in Section 4.4, "Air Quality"; Section 4.13, "Hydrology, Hydraulics, and Flood Risk Management"; Section 4.17, "Water Quality"; and Section 4.10, "Geology, Soils, and Paleontological Resources," respectively.

4.12.1 Environmental Setting

4.12.1.1 Hazardous Materials Sites

The GeoTracker database is a groundwater information management system maintained by the SWRCB. PRC Section 65962.5 requires SWRCB to maintain data related to leaking underground storage tanks and other cleanup activities. A GeoTracker database search confirmed that there are no existing or closed cleanup sites or permitted facilities in the project vicinity; the nearest closed cleanup sites are located in the City of Corning, approximately 5.5 miles to the west of the project area (State Water Resources Control Board 2021).

4.12.1.2 Sensitive Receptors — Schools

Vina Elementary School, in the Town of Vina, is located approximately 0.1 mile south of China Slough and 0.35 mile from the culvert located at the Abbey entrance. The school is located a minimum of 0.5 mile from Deer Creek. No other schools are located within 0.25 mile of the project area.

4.12.1.3 Public Airports and Private Airstrips

The project area is not located within 2 miles of a public-use airport. The closest public-use airport is the Red Bluff Municipal Airport, approximately 20 miles northwest of the project area.

The Deer Creek Ranch Airport is a private airport located approximately 1.7 miles southeast of Red Bridge and 3 miles northeast of the Town of Vina.

4.12.1.4 Wildland Fire Hazards

Lower Deer Creek primarily consists of agricultural land, predominantly used for orchards and pasture. The majority of the project area is within an LRA and is classified as a Non-Very High FHSZ. A small portion of the project area east of Leininger Road is designated as a Moderate FHSZ within a State responsibility area. This area includes the proposed levee setback north of Deer Creek and east of Leininger Road as well as the proposed USACE levee raising south of Deer Creek. Refer to Section 4.18, “Wildfires,” for a description of these zones and to Figures 4.18-1 and 4.18-2 for a map of the FHSZs in the project vicinity.

4.12.1.5 Tehama County Emergency Plans

Tehama County has an Emergency Operations Plan (EOP) (Tehama County 2017). It is an extension of the State of California Emergency Plan. The Tehama County EOP:

- Establishes a local emergency management program.
- Complies with local, State, and federal emergency management and homeland security program requirements.
- Completes a comprehensive emergency management plan.
- Specifies policies, roles, resources, and activities necessary to manage a local emergency.
- Adopts the National Incident Management System and Standardized Emergency Management System.
- Facilitates collaboration among organizations involved in emergency management.

4.12.2 Regulatory Setting

The following plans, policies, regulations, or laws related to hazards and hazardous materials apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- Resource Conservation and Recovery Act (law governing the disposal of solid and hazardous waste.) — Applies to project construction.
- Federal Emergency Planning and Community Right to Know Act of 1986 (reporting the storage, use, and release of hazardous substances.) — Applies to project construction, operation, and maintenance.

State Regulations

- California Hazardous Waste Control Act (regulates safe handling, treatment, recycling, and destruction of hazardous wastes prior to disposal.) — Applies to construction and maintenance.

- Hazardous Substances Account Act (provides compensation for damages caused by exposure to releases of hazardous substances.) — Applies to construction and maintenance.
- 14 CCR, Division 2, Chapter 4, Article 3, Section 1723.1 (Plugging of Oil or Gas Zones) (this would apply if any unknown oil or gas wells are discovered.) — Applies during project construction.
- California Government Code Sections 51175-51189 (Wildland-Urban Interface Fire Zones) (relates to designation of FHSZs.) — Applies to planning and impact analysis.
- California Government Code Section 65962.5 (Cortese List) (identifies hazardous waste sites.) — Applies to planning and impact analysis.
- California PRC Sections 4201-4204 (Fire Hazards) (relates to designation of FHSZs.) — Applies to planning and impact analysis.

Regional and Local Regulations

- Tehama County General Plan (2009) — The Open Space and Conservation Element (Chapter 6) of the plan includes policies regarding safety elements for hazardous materials.
    - Policy SAF-9.1 (The County shall ensure that the use, transport, and disposal of hazardous materials comply with all federal, State, and local regulations and requirements) — Applies to construction.
    - Policy SAF-9.2 (The County shall implement safety measures regarding the transport, use, storage, and disposal of hazardous materials within the County) — Applies to construction.
    - Policy SAF-9.3 (The County shall require the separation of hazardous or toxic materials from the public) — Applies to construction.

4.12.3 Impacts and Mitigation

4.12.3.1 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Impacts on hazards and hazardous materials would be significant if they would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- 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 Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment.
- For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area.
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires.

4.12.3.2 Topics Not Evaluated Further

During environmental analysis, the following topic was eliminated from detailed analysis because no impacts from project implementation are anticipated:

- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5.

The project area is not located on a site listed as a hazardous materials sites. Therefore, no impacts would occur.

4.12.4 Impact Analysis

Impact HAZ-1: *Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.*

Impact HAZ-2: *Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident condition involving the* *release of hazardous materials into the environment.*

Impact HAZ-3: *Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.*

No Project Alternative

Construction-related Impacts

No Impact. Under the no project alternative, no construction would occur. There would be no new hazards or hazardous materials introduced to the environment because there would be no O&M of new facilities under the no project alternative. O&M of Deer Creek for flood management would continue in a similar manner to existing conditions under the no project alternative. With no change to existing O&M practices, the no project alternative would have **no impact**. The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding, are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than Significant with Mitigation Incorporated. Construction equipment such as excavators, bulldozers, drilling rigs, or bobcats would be used during project implementation. 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. Transport of these hazardous materials would be minimized by importing construction equipment at the start of construction and leaving it on site until completion, and by keeping a fuel truck on site at a designated staging area(s) for refueling, as appropriate. The routine use of these materials during construction could, however, result in an accidental spill of hazardous materials. If an accidental spill occurred during construction, the impact would be **potentially significant**. Implementation of the spill prevention control and countermeasures plan included in Mitigation Measure HAZ-1 would reduce this potential impact to **less than significant.**

Vegetation removal and channel grading along China Slough would require the use of construction equipment within 0.25 mile of Vina Elementary School. These activities would be short-term but could result in the accidental release of fuel or other hazardous materials. If this release were to occur, impacts would be **potentially significant**. Implementation of the spill prevention control and countermeasures plan included in Mitigation Measure HAZ-1 would reduce this potential impact to **less than significant.**

Mitigation Measure HAZ-1: *Prepare and Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities*.

The contractor will prepare and implement a spill prevention control and countermeasures plan (SPCCP). 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 spill of fuel or other hazardous material. Employees and construction workers will be provided the necessary information from the SPCCP to prevent or reduce the discharge of pollutants from construction activities and to use the appropriate measures should a spill occur. In the event of a hazardous spill in Deer Creek, work will stop immediately and the CDFW, U.S. Fish and Wildlife Service, NMFS, CVRWQCB, and USACE will be notified within 24 hours. The SPCCP may include the following construction best management practices:

- All personnel involved in use of hazardous materials shall be trained in emergency response and spill control.
- 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.
- 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.
- 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 entering waters of the State or waters of the United States.

- Contractors shall provide spill containment for vehicles and the containment shall adhere to all required State and federal standards. 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.
- 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.
- All heavy equipment, vehicles, and supplies will be stored at the designated staging areas at the end of each work period.
- 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.
- Any fuel stored within the project area shall be stored in a double-walled contained vessel surrounded by a berm appropriately sized for the volume.
- 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.

O&M-related Impacts

Less than Significant. Maintenance activities, such as levee repair and vegetation management, would continue to occur but would be required less often. The risk of accidental spill or exposure to hazardous materials would be the same as under existing conditions and would be **less than significant.**

Impact HAZ-4: *For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area.*

No Project Alternative

No Impact. Under the no project alternative, no construction would occur. People residing in the project area would not be exposed to new safety hazards or excessive noise related to airports. O&M of Deer Creek for flood management would continue in a similar manner to existing conditions under the no project alternative. With no change to existing O&M practices, the no project alternative would have **no impact**. The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding, are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

No Impact. Although the private Deer Creek Ranch Airport is located within 2 miles of portions of the project area, the proposed project would not construct infrastructure that would create a safety hazard associated with air navigation. In addition, the proposed project would not construct residences or other buildings that would bring people into the project area and subject them to excessive airport noise. Therefore, **no impact** would occur.

O&M-related Impacts

No Impact. Continued maintenance activities would not create a safety hazard associated with air navigation or expose people to excessive airport noise. Therefore, **no impact** would occur.

Impact HAZ-5: *Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.*

No Project Alternative

No Impact. Under the no project alternative, no construction would occur.

No adopted emergency response plans or emergency evacuation plans would be impacted because there would be no O&M of new facilities under the no project alternative. O&M of Deer Creek for flood management would continue in a similar manner to existing conditions. With no change to existing O&M practices, the no project alternative would have **no impact.** The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

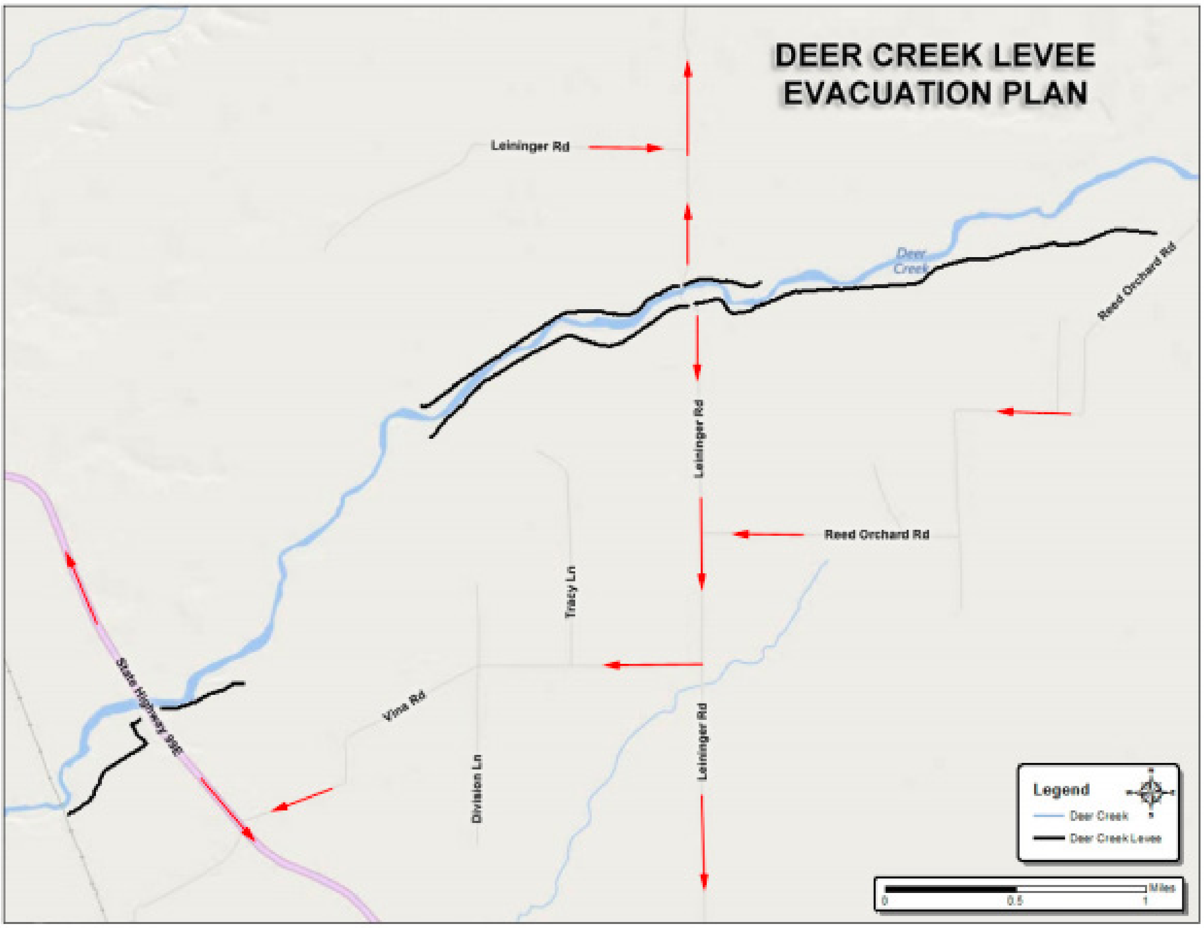
<u>Construction-related Impacts</u>

Less than Significant with Mitigation Incorporated. The main emergency plan for Tehama County is the EOP. The proposed project would conflict with the plan if it were to physically interfere with implementation of the plan. The EOP does not designate any routes or emergency evacuation plans. Therefore, the proposed project would not conflict with the EOP. However, the TCFCWCD has designated evacuation routes in the project area in the event of floods along Deer Creek (Figure 4.12-1) (Tehama County Flood and Water Conservation District 2021). These routes are designated for flood emergencies and proposed project construction would not occur during the rainy season, but it is possible that construction traffic associated with the proposed project could cause slowdowns along major roadways in the project vicinity and physically interfere with evacuations for other types of emergencies, such as wildfires. If this occurred, impacts would be **potentially significant**. Implementation of the construction traffic control plan (CTCP) included in Mitigation Measure TR-1 would reduce this potential impact to **less than significant.**

Mitigation Measure TR-1: *Implement a Construction Traffic Control Plan*

Refer to Section 4.15, "Transportation," for the full details of this mitigation measure.

Figure 4.12-1 Deer Creek Levee Evacuation Plan



Source: Tehama County Flood Control and Water Conservation District 2021

<u>O&M-related Impacts</u>

No Impact. Maintenance activities, such as levee repair and vegetation management, would continue to occur but would be required less often and would not conflict with an evacuation plan for the Deer Creek levee area. Therefore, **no impact** would occur.

Impact HAZ-6: *Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.*

No Project Alternative

No Impact. Under the no project alternative, no construction would occur. O&M of Deer Creek for flood management would continue in a similar manner to existing conditions. With no change to existing O&M practices, the no project alternative would have **no impact.** The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than significant with mitigation. Wildfire risks as they relate to very high fire severity zones are discussed in Section 4.18, "Wildfires." Construction activities would occur outside of the rainy season and would involve the use of fuels and other potentially flammable materials. Although designated staging areas access roads would be used, the potential for accidental ignition of a wildfire would exist during construction activities. If a project-related wildfire occurred, impacts would be potentially significant. Implementation of the fire protection and prevention plan included in Mitigation measure HAZ-2 would reduce this potential impact to **less than significant**.

Mitigation Measure HAZ-2: *Develop and Implement a Fire Protection and Prevention Plan.*

The project contractor shall be required to develop a fire protection and prevention plan. The plan shall include the following requirements: fire safety training for all construction employees; proper maintenance (e.g., working spark arresters) and operation (e.g., restrictions on the use of gasoline-powered tools around flammable vegetation) of construction equipment; mowing of the parking areas to keep vegetation from coming in contact with the hot undercarriage of employee and construction vehicles; fire suppression tools (e.g., shovels, fire extinguishers) on site for each construction vehicle; and proper disposal of flammable vegetative waste material during dry weather periods.

O&M-related Impacts

Less than Significant. Maintenance activities, such as levee repair and vegetation management, would continue to occur but would be required less often and would not increase the risk of wildland fires. Therefore, impacts would be **less than significant**.

4.13 Hydrology, Hydraulics, and Flood Risk Management

4.13.1 Environmental Setting

This section describes the environmental and regulatory setting, impacts, and minimization and mitigation measures associated with hydrology, hydraulics, and flood risk management.

Deer Creek is in southeast Tehama County and is a tributary of the Sacramento River. The proposed project would be located along the lower 8 miles of Deer Creek in Tehama County, Calif, from 2 miles upstream of Red Bridge to the confluence with the Sacramento River, and along the lower 2.6 miles of China Slough to its confluence with Deer Creek.

4.13.1.1 Surface Water Hydrology in the Deer Creek Watershed

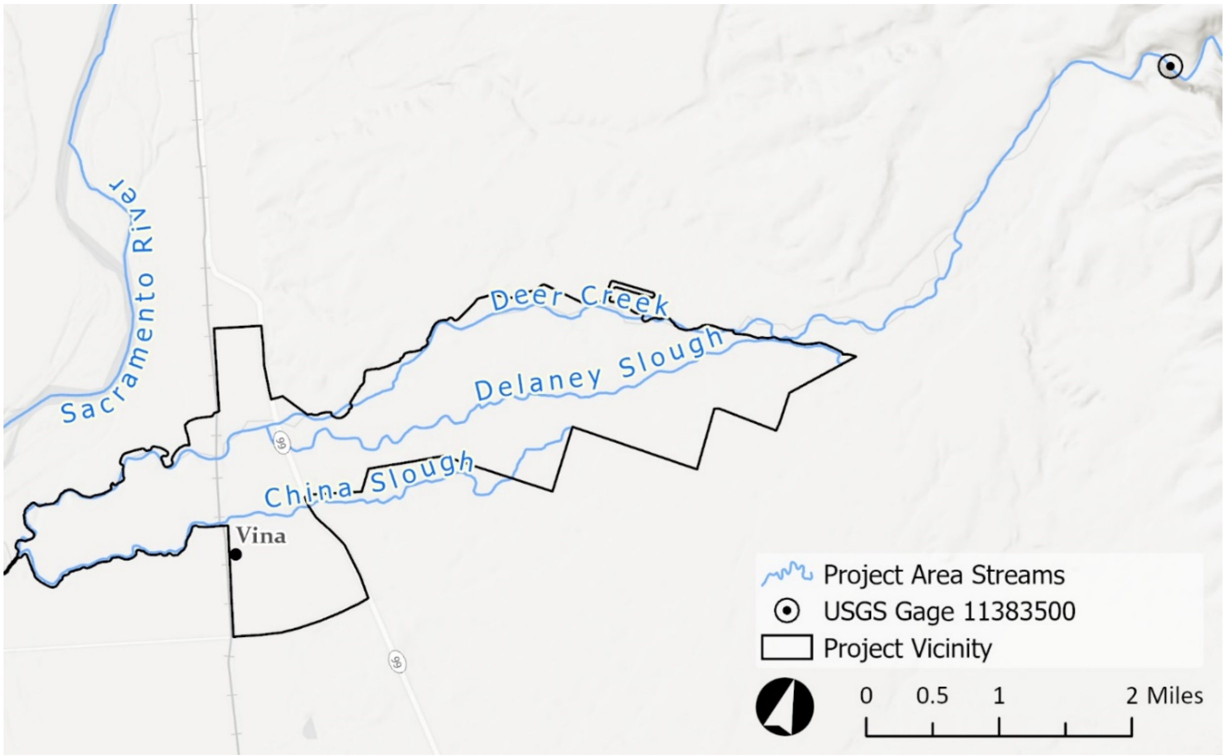
Deer Creek is a 62.5-mile-long stream with its headwaters in the southern Cascades near Butt Mountain at an elevation of 7,866 feet that flow to the Sacramento River at an approximate elevation of 340 feet (Sacramento River Watershed Program 2021). The watershed drains approximately 229 square miles and experiences a Mediterranean climate, which is characterized by cool wet winters, warm dry summers, and seasonal rainfall in winter and spring (Tompkins & Kondolf 2005). Average annual precipitation in the Deer Creek watershed ranges from 21 inches at the valley floor to 51 inches in the upper watershed (Deer Creek Watershed Conservancy 1998). Rainfall events typically occur between the months of November and March; peak rainfall usually occurs in December and January as 40 percent of the watershed is above 4,000 feet in elevation and snowmelt is a major component of surface water flow (Tompkins & Kondolf 2005). Beneficial uses of the Deer Creek watershed include municipal water supply, agriculture, and wildlife habitat.

The USGS streamflow gauge 11383500 has the longest record of flow measurements in the watershed (dating back to 1911) and is located approximately 3 miles upstream of the project vicinity (Figure 4.13-1). A USGS Bulletin 17B flow frequency analysis was conducted using the HEC-SPP statistical analysis program to calculate expected flows corresponding to the return periods summarized in Table 4.13-1. Return periods represent the statistical likelihood of a flow occurring in a year and are given as the inverse of the percent likelihood; for example, a 2-year return period flow has a 1 in 2 (or 50 percent) chance of occurring in any given year, whereas a 100-year flow has a 1 in 100 or (1 percent) chance of occurring in a given year. The design flow for the Deer Creek flood management system is based on the 50-year return period.

Table 4.13-1 Expected Deer Creek Flows Based on Return Periods

Return Period	Expected Flow (in cubic feet per second)
2-year	5,500
5-year	9,900
10-year	13,200
25-year	17,800
50-year (design)	21,000
100-year	25,300

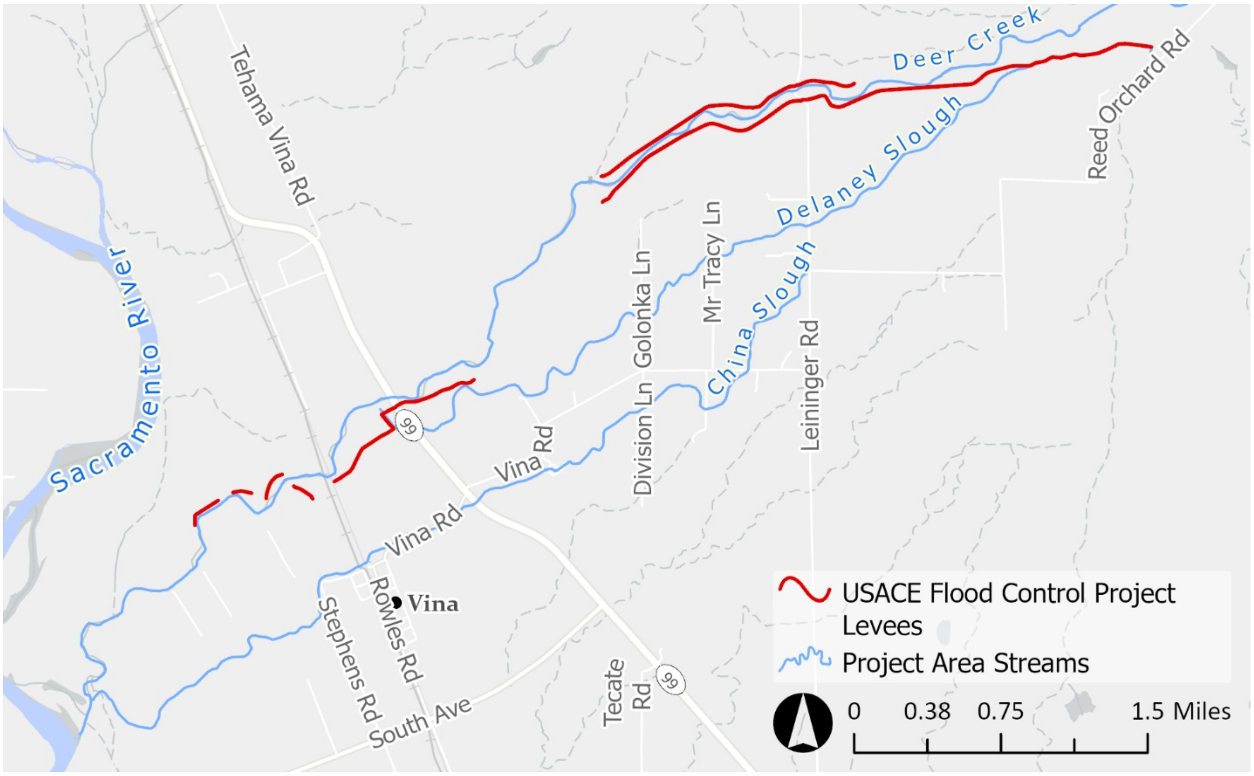
Figure 4.13-1 Project Vicinity and Location of USGS Streamflow Gauge with Representative Watershed Hydrology Date



4.13.1.2 Deer Creek Flood Control Project

The Deer Creek Flood Control Project was completed by USACE in 1956 as a component of the Sacramento River Flood Control Project and was designed to provide flood protection for the Town of Vina and lands adjacent to the channel for a 21,000 cfs flow. The Deer Creek Flood Control Project involved channel clearing and excavation in Deer Creek, levee construction, and rock bank protection (United States Army Corps of Engineers 1957). The USACE levee system extends approximately 7.4 miles in total length starting 0.7 miles above Delaney Slough and continuing to the Sacramento River (Figure 4.13-2). Although the flood control project originally had a 21,000-cfs design capacity with 3 feet of freeboard (i.e., the vertical distance from the water surface to the levee crown), periodic flooding occurs as a result of levee failures and overtopping during lesser flows. This flooding occurs in part because the flood control project relies on confining flood flows between levees set close to the channel margin.

Figure 4.13-2 Existing USACE Flood Control Project Levees on Deer Creek



4.13.1.3 Flood Control Project Maintenance

The capacity of the Deer Creek channel was historically (from the late 1950s to the late 1980s) maintained through regular sediment removal and vegetation clearing to maintain design specifications. Various O&M activities have been carried out to maintain the flood flow capacity of the system. One of the more significant activities was a sand and gravel removal project conducted by DWR between 1984 and 1987 (Deer Creek Watershed Conservancy 1998). Approximately 60,000 cubic yards of bed material (mostly gravel) were removed in 1984 from the reach between SR 99 and the Sacramento River, and this material was stockpiled on the north bank of the creek upstream of SR 99. A low-flow channel was excavated in summer 1985 and some levee reinforcement was completed downstream of Red Bridge in 1985 as well. Approximately 45,000 cubic yards of bed material were removed between the SVRIC Dam and SR 99 in summer 1986. A rock weir was also constructed downstream of the SVRIC Dam in 1986 to counter downstream channel degradation and to improve fish passage. A setback levee was constructed on the south bank downstream of Red Bridge after the original levee failed during the peak flow in February 1986 (Deer Creek

Watershed Conservancy 1998). In addition, approximately 30,000 cubic yards of channel bed material between SVRIC Dam and Red Bridge and another 8,000 cubic yards downstream of the dam were removed in 1986. Major maintenance actions have not been implemented since 1987 because of permitting constraints.

4.13.1.4 History of Deer Creek Flooding

Eight storm events caused significant flood damage along Deer Creek from 1964–1997; the flows for these storms ranged from 12,200 cfs to 24,000 cfs (Deer Creek Watershed Conservancy 2011). The January 1997 flood, which was the largest, caused "numerous levee breaches, damaged bank protection, and resulted in costly damages to infrastructure" (Deer Creek Watershed Conservancy 2011). The other seven flood events also resulted in damage to levees, bank protection, and other infrastructure. A 10,300 cfs flow event in 2005 also caused erosion damage to the USACE Flood Control Project levees (Deer Creek Watershed Conservancy 2011). Storms in December 2016 and January 2017 (streamflow peaks at 10,800 cfs and 12,000 cfs, respectively) caused erosion at four sites along Deer Creek as well as other damage (Tehama County Flood Control and Water Conservation District 2017).

4.13.2 Regulatory Setting

The following plans, policies, regulations, or laws related to water quality apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- Section 14 of the Rivers and Harbors Act of 1899 (33 USC 408) and Section 408 Permission (permission for the alteration of the federal levee system by a non-federal entity.) — Applies to the planning and design of the USACE levee raising and levee setback elements of the project.
- *USACE Design and Construction of Levees Manual* (provides a guide for designing and constructing levees) (United States Army Corps of

Engineers 2000) — Used to define general levee design criteria for impact analysis of levee elements of this project.

- NFIP (related to the adoption and enforcement of FEMA requirements.) — Applies to impact analyses.

State Regulations

- 2012 Central Valley Flood Protection Plan (CVFPP) and CVFPP 2017 Update (related to flood risk management in the Central Valley.) — Applies to impact analysis and project design.
- 23 CCR (Division 1, Article 8, Sections 111–137) (related to levee standards.) — Applies to impact analysis and project design.

Regional and Local Regulations

The TCFCWCD is the local agency responsible for levee maintenance. The TCFCWCD does not have any applicable policies related to levee maintenance; instead, the TCFCWCD follows the levee maintenance guidance from DWR and USACE. The *Deer Creek Levee Evacuation Plan*, developed by the TCFCWCD, is shown in Figure 4.12-1 (see Section 4.12, "Hazards and Hazardous Materials").

4.13.3 Impacts and Mitigation

4.13.3.1 Methodology

Potential impacts to hydrology, hydraulics, and flood risk management were assessed using a two-dimensional hydrodynamic model developed for the Deer Creek Flood and Ecosystem Improvement Project. DWR had previously performed a one-dimensional 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. The updated Hydraulic Analysis is provided as Appendix F, "Lower Deer Creek Flood and Ecosystem Improvement Project — 2D Hydrodynamic Model."

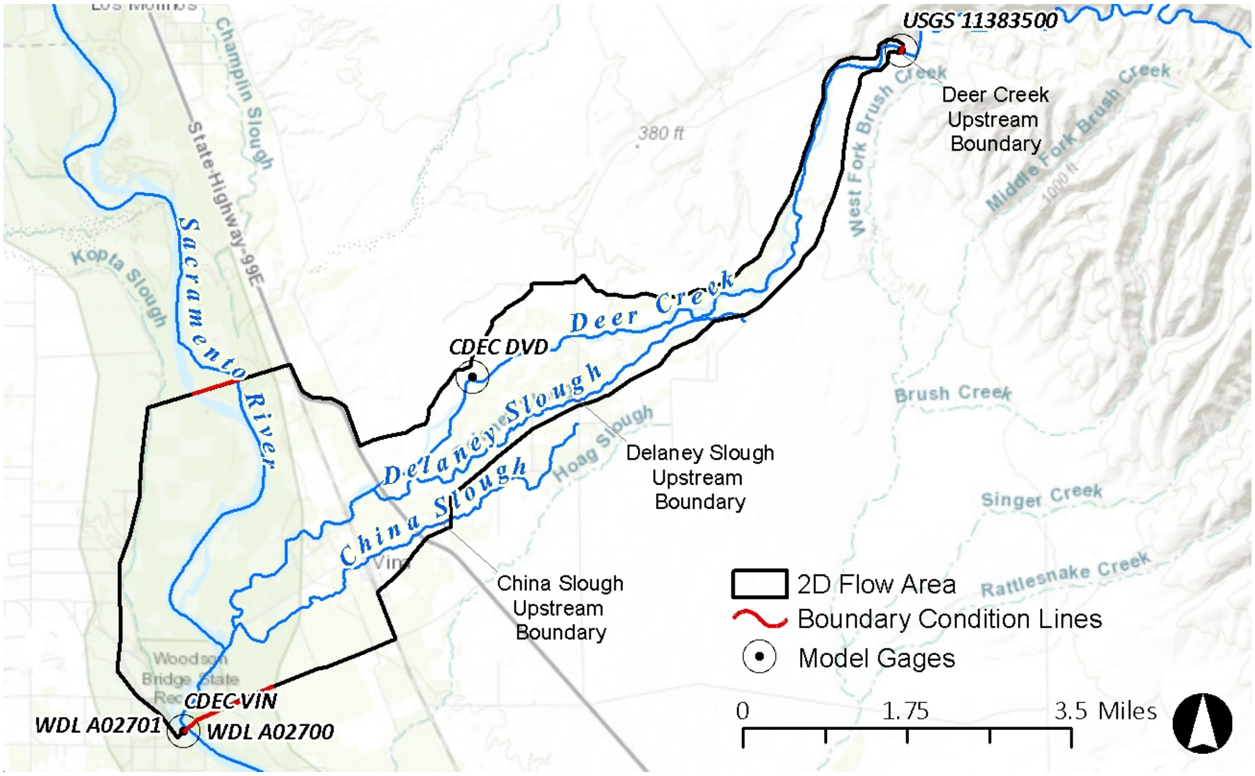
The purpose of the hydraulic impact analysis was to determine the potential hydrologic and hydraulic impacts of the proposed project within the Lower Deer Creek watershed. Factors considered included changes in water surface elevations (i.e., stage), water velocities, shear stresses, erosion and scour potential, and flow distribution upstream and downstream of the project area. The potential for aggradation or degradation was also analyzed.

4.13.3.2 Model Parameters and Assumptions

A HEC-RAS, version 6.0, two-dimensional hydrodynamic model (United States Army Corps of Engineers, Hydrologic Engineering Center 2021) was built to simulate existing hydrologic conditions (i.e., velocities, flood extents, and depths) and to quantify Deer Creek aquatic, riparian, and floodplain habitat conditions. This model was used to analyze the existing conditions and proposed project alternatives as part of the environmental planning efforts.

The model domain extends along 11 miles of Deer Creek from the Deer Creek Irrigation District (DCID) dam at the upstream end (near USGS stream gauge 11383500) to its confluence with the Sacramento River (Figure 4.13-3). The model domain also covers a portion of the Sacramento River extending approximately 3.5 miles upstream of the Deer Creek confluence to the downstream end at Woodson Bridge. The lateral extent of the model boundary was chosen to adequately capture the flooding extent of Deer Creek under different flow conditions while limiting the number of cells to a computationally manageable quantity. The model mesh has a 25-foot base cell size with smaller cells along some topographic features to provide higher-resolution output.

Figure 4.13-3 Extent of the Hydrodynamic Model Domain



Data types and sources used in the development of the two-dimensional hydrodynamic model are summarized in Table 4.13-2. Topographic and bathymetric data were used to create the model terrain, land cover data was used to represent the terrain surface (e.g., vegetated, pavement, open water, etc.), and hydraulic structures such as bridges and culverts were created in the model using data from previous modeling efforts as well as new survey data. The HEC-RAS software requires user input of upstream and downstream boundary conditions to perform model runs, and a total of five boundary conditions (four upstream and one downstream) were used. The downstream boundary was developed as a modified stream gauge rating curve at Woodson Bridge in the Sacramento River. The four upstream boundary conditions consisted of flow inputs for Deer Creek, the Sacramento River, China Slough, and Delaney Slough.

Table 4.13-2 Data Types and Sources Used in the Development of the Hydrodynamic Model

Input Data	Data Type	Date	Source
Topography and Channel Bathymetry	LiDAR Survey	2017	Geoterra
Topography and Channel Bathymetry	Deer Creek Bathymetric Survey	2018	FlowWest
Topography and Channel Bathymetry	Sacramento River Bathymetric Survey	2013	DWR Kopta Slough Study
Hydrology and Boundary Conditions	Annual Peak Flows	1912–2017	USGS Deer Creek at Vina (11383500)
Hydrology and Boundary Conditions	15-minute Flow Hydrograph	January 1997	USGS Deer Creek at Vina (11383500)
Hydrology and Boundary Conditions	15-minute Flow Hydrograph	January 1997	DWR WDL Sacramento River at Vina Bridge (A02700, channel only)
Hydrology and Boundary Conditions	15-minute Flow Hydrograph	January 1997	DWR WDL Sacramento River at Vina Bridge (A02701, overflow only)
Hydrology and Boundary Conditions	Mean Daily Flows	1912–2017	USGS Deer Creek at Vina (11383500)
Hydrology and Boundary Conditions	Mean Daily Flows	1945–2015	DWR WDL Sacramento River at Vina Bridge (A02700, channel only)
Hydrology and Boundary Conditions	Stream gauge Rating Curve	2017	DWR CDEC Sacramento River at Vina Bridge (VIN)
Hydrology and Boundary Conditions	Stream gauge Rating Curve	2017	DWR WDL Sacramento River at Vina Bridge (A02700, channel only)
Hydrology and Boundary Conditions	Stream gauge Rating Curve	2017	DWR WDL Sacramento River at Vina Bridge (A02701, overflow only)
Structures	1-D Hydrodynamic Model Geometry	2007/2010	Mussetter Engineering, Inc./ DWR Northern Region Office
Structures	Field survey	2018	FlowWest

Input Data	Data Type	Date	Source
Land Cover	Aerial Imagery	2017	Geoterra
Land Cover	Special-Status Species Survey	2018	WRA Environmental Consultants

DWR = California Department of Water Resources; WDL = water data library; CDEC = California Data Exchange Center; 1-D = one dimensional.

For a complete discussion of model inputs, parameters, and results, refer to Appendices F and G.

4.13.3.3 Levee Design Criteria

The proposed design would restore 50-year flood protection with a minimum of 3 feet of freeboard per the original USACE O&M manual for the lower Deer Creek levee system (United States Army Corps of Engineers 1957). The hydrodynamic analysis completed for the environmental planning effort informs the levee design primarily for determining the levee heights required to ensure adequate freeboard. Specific levee height adjustments to ensure adequate freeboard are described in Chapter 3, "Project Description," Figure 3-7.

4.13.3.4 Model Scenarios

Model runs were completed for existing conditions, Alternatives A through F, and another six alternatives that were ultimately screened out of the project (see Chapter 6, "Alternatives" for more detail on project alternatives). For a full discussion of the existing conditions results, see Appendix F. For a full discussion of the project alternatives results, see Appendix G, "Lower Deer Creek Flood and Ecosystem Improvement Project — 2D Hydrodynamic Model Proposed and Alternative Results Addendum."

4.13.3.5 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Impacts on hydrology, hydraulics, and flood risk management would be significant if they would:

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a matter which would:

  - Result in substantial erosion or siltation on or off site.
  - Result in flooding on or off site.
  - Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
  - Impede or redirect flood flows.
- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.

4.13.3.6 Topics Not Evaluated Further

During environmental analysis, the following topic was eliminated from detailed analysis because no impacts from project implementation are anticipated:

- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

There are no existing or planned stormwater drainage systems that the proposed project would contribute to. Therefore, no impact related to stormwater drainage systems would occur. Potential impacts from construction and operational runoff water are addressed in Section 4.17, "Water Quality."

- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.

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. Because the project area is more than 100 miles inland from the coast and San Francisco Bay, the project area is not exposed to flooding risks from tsunamis. Additionally, the project area and surrounding areas are relatively flat, which essentially eliminates the potential for mudflows. There would be no impacts from these events.

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 area. Because the potential for a seiche within the project area is negligible, no impact would occur.

4.13.4 Impact Analysis

Impact HH-1: *Result in substantial erosion or siltation on or off site.*

No Project Alternative

Less than Significant. Under the no project alternative, no construction associated with setback levees or other flood risk reduction measures would occur. High flows on Deer Creek and China Slough would continue to cause flood damage and may result in substantial erosion or siltation. However, this damage, erosion, or siltation would not be expected to differ substantially from existing conditions and would therefore be **less than significant**. Maintenance of China Slough does not occur under existing conditions and would not occur under the no project alternative. Maintenance of Deer Creek for flood management would continue in a similar manner to existing conditions under the no project alternative. Existing activities could include channel grading and sediment removal; levee inspection, maintenance, and repair for USACE and non-USACE levees; and vegetation removal and maintenance. These activities could result in erosion or siltation. But, these activities would comply with all relevant federal, State, and local laws and regulations and all relevant permits and approvals would be obtained. Therefore, maintenance of the no project alternative would have **a less-than-significant impact.**

Alternatives A though E

<u>Construction-related Impacts</u>

Less than Significant with Mitigation Incorporated. Construction-related ground disturbance and earthmoving activities, particularly construction of the levee setbacks, new levees, and new embankments; road raising; channel excavation in China Slough; and realignment and expansion of Red Bridge, have the potential to cause substantial erosion and siltation and result in a **significant impact**. As further discussed in Section 4.10, "Geology, Soils, and Paleontological Resources," and in Section 4.17, "Water Quality," implementation of the erosion minimization and control measures and adherence to the regulatory requirements included in Mitigation Measure GEO-1 would reduce these potential construction-related impacts to **less than significant**.

O&M-related Impacts

Erosion

Less than significant (potentially beneficial). The existing close proximity of the levees to the Deer Creek channel, especially between the SVRIC Dam and Red Bridge, has resulted in levee erosion and failure. The SVRIC Dam to Red Bridge reach of Deer Creek currently experiences point bar formation and lateral channel migration, likely related to the reduced channel slope controlled by the invert of the SVRIC Dam. Historically, regular excavation and channel realignment have been required to protect adjacent levees from channel migration and erosion in this reach of Deer Creek. Alternatives A through E would expand the existing flood conveyance capacity of Deer Creek in this reach by setting back the levees. Hydrodynamic modeling results show that under Alternatives A through E, project operation would result in reduced shear stresses along approximately 2,000 feet of the Deer Creek channel upstream of the SVRIC Dam. This reduction could change the frequency and rate of channel migration within this reach, but the setback levees would have additional capacity to accommodate channel migration and would be designed to resist erosion if channel migration resulted in relocation of the active channel along the setback levees. Erosion would not increase within this reach under Alternatives A through E and is anticipated to be reduced. The need for maintenance activities, including levee maintenance and repair, is also expected to be reduced, resulting in a **less than significant,** and **potentially beneficial, impact**.

Excavation of China Slough would restore capacity and reduce or eliminate flooding in areas adjacent to the slough, which in turn would reduce or eliminate erosion along the slough, resulting in a **less than significant,** and **potentially beneficial, impact**.

Siltation

Deer Creek

Less than significant (potentially beneficial). Sediment accumulation in the Deer Creek channel and floodplain was not directly modeled. However, shear stress modeling, past sediment transport studies, and data collection throughout Deer Creek have indicated the majority of the Deer Creek floodway is degradational (Northwest Hydraulic Consultants 2021), meaning that the long-term trend is toward erosion and scour in the channel. As described above, Alternatives A through E would expand the existing flood conveyance capacity of Deer Creek by setting back levees between the SVRIC Dam and Red Bridge and lowering the floodplain. Hydraulic modeling completed in support of this EIR (Appendix G) shows that shear stresses would be reduced along approximately 2,500 feet of the Deer Creek channel upstream of SVRIC Dam (this is also the length over which the dam reduces bed slope). Shear stress is the primary driver of sediment transport capacity. Once above the threshold at which sediment begins to mobilize, higher shear stress at a given flow results in higher sediment transport capacity for that flow. Reduced shear stress at a given flow could reduce the frequency of sediment mobilization in this reach. However, the bed elevation in this reach is controlled by the elevation of SVRIC Dam and both modeling and empirical studies of bed mobility show bed mobilization occurring very frequently (less than the two-year flow) with and without the levee setbacks. Because of this, the likely geomorphic outcomes of reduced shear in this reach are accelerated bar formation and meander migration rate, not excess deposition that changes the invert elevation of the channel. Hydraulic model results indicate that neither of these processes are expected to significantly increase water surface elevations during high flows as compared to existing conditions. It is also important to note that accelerated channel migration and change has been occurring upstream of SVRIC Dam for at least the past 23 years even though shear stress modeling shows a fully mobile bed under existing conditions confined between the levees. Therefore, while shear stresses and resulting sediment transport could change with levee setback alternatives, it is not expected that this will cause new maintenance issues. Additionally, it is expected that final design of setback levees will include sufficient factors of safety and bio-engineered toe protection techniques that would allow ongoing channel changes without threatening levee toe failure or impinging on minimum required freeboard. Moreover, creation of a larger, lower floodplain combined with a setback levee design would allow the channel to migrate naturally within the newly connected floodplain and achieve a dynamic equilibrium. The only risk to the setback levees would be from erosion by the active channel, not overtopping, as the overall conveyance capacity in this reach will not change as the channel migrates between the setback levees. Levee construction will include bioengineering and other protective measures designed to withstand the highest shear stresses expected where the active channel migrates immediately adjacent to the levee. This approach would also increase channel complexity and improve rearing habitat for protected juvenile salmonids. Relative to existing conditions, where required sediment removal and bank protection activities disturb the channel and impact riparian vegetation and cover, this would be a **less-than-significant and beneficial impact**.

One purpose of the proposed project is to improve the geomorphic function of Deer Creek to improve spawning and rearing habitat for salmonids. Natural geomorphic processes include erosion, deposition, and natural vegetation recruitment as the channel meanders within the newly created floodplain in the levee setback reach. Dynamic siltation in the Deer Creek channel and floodplain is an expected and desired outcome of the proposed project and a **beneficial impact** to protected species.

China Slough

Less than significant (potentially beneficial). The China Slough channel is filled with vegetation that obstructs flows and facilitates siltation. Excavation of China Slough would remove this vegetation and allow more natural sediment transport to occur, which would reduce siltation and result in a **less than significant,** and **potentially beneficial, impact**.

Alternative F

<u>Construction-related Impacts</u>

Less than Significant with Mitigation Incorporated. Refer to the construction-related impact discussion for Impact HH-1 for Alternatives A through E. That discussion also applies to Alternative F. Implementation of the erosion minimization and control measures and adherence to the regulatory requirements included in Mitigation Measure GEO-1 would reduce potential construction-related impacts to less than significant.

<u>O&M-related Impacts</u>

Less than significant. Erosion and siltation processes under Alternative F would differ from those under Alternatives A through E. Because the levees under Alternative F would be raised in their current alignment rather than set back, shear stresses would not be reduced and erosion and siltation processes would be similar to existing conditions, except at higher flows. Under existing conditions, levees overtop at flows greater than 14,000 cfs (between the 10-year and 25-year return interval flows), effectively capping streamflow energy. In contrast, Alterative F would contain the entire flow of Deer Creek up to the 21,000 cfs (50-year) design flow. At these higher flows, shear stresses and potential for erosion of the bed and banks would increase relative to existing conditions. The levee toes and water side slopes of the improved levees would be designed to withstand these higher shear stresses, protecting them from substantial erosion. In terms of channel bed scour, flows greater than 14,000 cfs are expected to occur on average once every 10 to 25 years; resulting erosion is expected to be temporary (during the high flow event) because the SVRIC Dam serves as grade control and mobilized bed sediment would refill to the level of the dam as high flows recede. In addition, lower sediment-mobilizing flows moving through Deer Creek would transport sediment from upstream and fill remaining scour holes created by high flow events. Therefore, this impact under Alternative F would be **less than significant**.

Although this alternative would maintain or increase the frequency of sediment mobilization that occurs under existing conditions, the restoration of natural geomorphic processes that would occur under Alternatives A through E in this reach of Deer Creek would not be achieved under Alternative F.

The impacts to China Slough related to erosion and siltation would be the same under Alternative F as Alternatives A through E. Refer to the O&M-related impact discussion for Impact HH-1 for Alternatives A through E.

Mitigation Measure GEO-1: *Acquire Appropriate Regulatory Permits, Prepare and Implement a Stormwater Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.*

Refer to Impact GEO-1 in Section 4.10, "Geology, Soils, and Paleontological Resources," for the full text of this mitigation measure.

Impact HH-2: *Result in flooding on or off site.*

No Project Alternative

Under the no project alternative, no construction or changes to hydrology would occur. Deer Creek levee overtopping and flooding would continue to occur at flows greater than 14,000 cfs (between the 10-year and 25-year flow), impacting adjacent farmlands and irrigation infrastructure. China Slough flooding would also continue to occur. Relative to existing conditions, **no impact** would occur.

Alternatives A through E

<u>Construction-related Impacts</u>

Less than Significant. Construction activities on Deer Creek would be sequenced in such a way that flood protection would be maintained throughout the construction period. See Chapter 3, "Project Description," for a description of construction sequencing. Construction activities that could affect flow in the channel include Red Bridge realignment, floodplain lowering, and levee setbacks. These activities would be temporary, would be constructed during low flow conditions, would be in compliance with SWPPP requirements, and would not contribute to flooding. The cofferdam to be installed during Red Bridge realignment would temporarily divert flow in the channel to maintain upstream and downstream flows and would not cause or contribute to flooding. Similarly, dewatering activities within the coffer dam area that would pump water back into the channel would not cause or contribute to flooding. Excavation of China Slough would occur when much of the slough would be dry; areas of standing water would be pumped from the slough onto adjacent fields at a rate that would not cause flooding. Therefore, construction impacts would be **less than significant.**

<u>O&M-related Impacts</u>

Beneficial. Under Alternatives A through E, floodway and channel migration easements in the levee set back reach would allow floodplain inundation to occur more frequently, and the combination of levee setbacks and improvements would eliminate flooding from Deer Creek to adjacent lands outside of the levees. China Slough excavation and culvert replacement would restore flood flow capacity and would reduce or eliminate flooding along China Slough. Therefore, impacts would be **beneficial**.

Alternative F

Construction-related Impacts

No Impact. Under Alternative F, no in-channel construction or dewatering activities would occur. Construction would occur during the dry season and would not require diversion of the channel. Therefore, there would be **no impact**.

O&M-related Impacts

Beneficial. Although Deer Creek's connection with its floodplain would not be restored under Alternative F, levee raises would be designed so that flooding from Deer Creek to adjacent lands outside of the levees would be eliminated. Therefore, the impact would be **beneficial**.

Impact HH-3: *Impede or redirect flood flows.*

No Project Alternative

No construction or changes to hydrology would occur under the No Project Alternative. Therefore, **no impact** would occur.

Alternatives A through F

Construction-related Impacts

No Impact. Construction activities on Deer Creek and China Slough would not occur during the flood season and would have a **no impact** on flood flows.

O&M-related Impacts

Conveyance Capacity

Beneficial. Flood flows in Deer Creek are conveyed between the levees up to 14,000 cfs (between the 10-year and 25-year flow)—well below the 21,000 cfs design flow. Alternatives A through F would restore the flood conveyance capacity of Deer Creek to the 21,000 cfs design flow (plus 3 feet of freeboard). China Slough excavation and culvert replacement would restore the flood capacity of the slough by removing flood flow impediments. On Deer Creek and China Slough, no flood flows would be impeded by project operation; flood flows would be redirected to remain in the designated floodway instead of spilling onto adjacent farmlands, diversions, drainages, or other infrastructure, resulting in a **beneficial impact**.

Sediment and Vegetation

Less than Significant. As described in the Impact HH-1 discussion, model results indicate that there would be reduced shear stresses along approximately 2,000 feet of the Deer Creek channel upstream of the SVRIC Dam within the levee setback reach that could reduce the frequency of sediment mobilization and the long-term average volume of sediment transport in this reach of Deer Creek and result sediment deposition. However, sediment deposition would not be substantial, and modeling and geomorphic analysis show that levee design would be able to incorporate sufficient freeboard to accommodate sediment deposition. Therefore, impacts on flood flows would be **less than significant**.

Similarly, natural recruitment of vegetation within the floodplain areas created by the levee setbacks could result in increased vegetation density over time that could also affect water surface elevations. However, potential impacts related to vegetation density were explored during hydrodynamic modeling by using Manning's roughness coefficients. For the proposed project, Manning's roughness was based on a relatively densely vegetated Deer Creek corridor as defined by aerial imagery and vegetation surveys conducted during the 2018 water year. In the years following the 1997 100-year flow event, vegetation in Deer Creek has increased by approximately 35 percent (see Appendix H, Geomorphic Assessment) as nothing larger than a 10-year event has moved through the system. This means results from the model (e.g., water surface elevation) represent a relatively densely vegetated condition. Additionally, model sensitivity to Manning's roughness coefficients showed all potential water surface elevation increases were well below the required 3 feet of levee freeboard — especially in the levee setback reach between the SVRIC Dam and Red Bridge. Under Alternatives A through E, dense vegetation recruitment on the floodplain was incorporated into the levee height requirements by modeling a high Manning's roughness coefficient corresponding to dense riparian vegetation in the setback floodplain (Appendix G). These model conditions show that the design levee elevations plus 3 feet of freeboard would completely convey the design flows of the proposed project, even in a highly vegetated condition. Therefore, impacts on flood flows would be **less than significant**.

Although hydraulic modeling of the proposed project alternatives indicates that flood conveyance-related maintenance would not be required to maintain flood system performance and freeboard under normal cycles of geomorphic and vegetation change, it is still possible that maintenance could be required to address local and acute issues caused by sediment, vegetation, or debris transported during extreme high-water events (e.g., the 10- to 25-year flood event). Flood conveyance-related maintenance activities could include maintenance and repair of USACE and non-USACE levees; clearing a path to a debris jam (including vegetation removal); cutting, excavating, and hauling away sediment, uprooted vegetation, and debris; and restoration of vegetation that may need to be removed for access, the details of which would be specified in any required permits for the activity. Channel maintenance for flood conveyance would not include general sediment removal in the channel. However, if flow is directed toward a levee that could threaten the levee, channel grading or sediment removal could be required to reduce that threat. If required, these activities would be conducted under permit conditions to maintain habitat functions and values post-maintenance. These potential maintenance activities would have a **beneficial impact** on flood conveyance.

China Slough channel vegetation, if allowed to reestablish with the high density of invasive species that exists today, would have the potential to impede conveyance of surface flows in the Deer Creek watershed. Although Deer Creek flood flows would no longer enter China Slough (i.e. the amount of water being conveyed by China Slough would be greatly reduced), vegetation management, including trimming and removal of invasive vegetation, likely would be required to maintain the proposed project’s conveyance benefits and protect areas adjacent to the slough from localized flooding. Maintenance activities would not impede or redirect flood flows and would have a beneficial effect on the hydrology of China Slough. Maintenance impacts would be **beneficial**.

4.14 Noise and Vibration

4.14.1 Environmental Setting

This section presents an evaluation of potential noise resulting from construction of the proposed project. The proposed project involves the following actions that could generate noise and vibration: construction activities related to USACE levee raising and USACE levee setbacks, bridge improvements, non-USACE levee and berm removal, installation of new non-USACE levee, floodplain lowering, channel and slough grading, bank stabilization and vegetation management, the installation of a cut-off structure in a canal, and culvert improvements and replacement. An essential part of this assessment is a comparison of expected noise levels for the construction of the proposed project with acceptable noise levels established in applicable regulations.

4.14.1.1 Fundamentals of Noise

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Noise can be measured in several ways depending on the source of the noise, the receiver, and the reason for the noise measurement. Table 4.14-1 summarizes the technical noise terms used in this section.

Table 4.14-1 Definition of Acoustical Terms

Term	Definitions
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, and tonal or informational content, as well as the prevailing ambient noise level.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the reference pressure to the sound pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency (hertz)	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-weighted sound level (dBA)	The sound pressure level in decibels as measured on a sound-level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.

Term	Definitions
C-weighted sound level (dBC)	The sound pressure level in decibels as measured on a sound-level meter using the C-weighted filter network. The C-weighted filter does not de-emphasize the very low or very high frequency components of the sound. It is a flatter weighting where each frequency has an almost equal weighting and is more sensitive to low frequencies than the A-weighting.
Equivalent noise level (L_{eq})	The energy average A-weighted noise level during the measurement period.
Percentile noise level (L_n)	The A-weighted noise level exceeded during "n" percent of the measurement period, where "n" is a number between 0 and 100 (e.g., L_{90}). The L_{90} measurement represents the noise level exceeded during 90 percent of the measurement period. Similarly, L_{10} represents the noise level exceeded for 10 percent of the measurement period.
Community noise equivalent level	The average A-weighted noise level during a 24-hour day, obtained after the addition of five decibels to sound levels from 7 p.m. to 10 p.m. and after the addition of 10 decibels to sound levels between 10 p.m. and 7 a.m.
Day-night noise level (L_{dn} or DNL)	The average A-weighted noise level during a 24-hour day, obtained after the addition of 10 decibels from 10 p.m. to 7 a.m.

Sources: Beranek 1988; California Department of Health Services 1976.

In this section, some statistical noise levels are stated in terms of dB on the A-weighted scale (dBA). Noise levels stated in terms of dBA reflect the response of the human ear by filtering out some of the noise in the low- and high-frequency ranges that the ear does not detect well. The A-weighted scale is used in most sound ordinances and standards.

The effects of noise on people fall into three general categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction.
- Interference with such activities as speech, sleep, and learning.
- Physiological effects such as startling and hearing loss.

In most cases, environmental noise produces effects in the first two categories only. Noise effects in the third category may occur to workers in an industrial plant or at a construction site. No completely satisfactory way exists to measure the subjective effects of noise or to measure the corresponding reactions to annoyance and dissatisfaction. This lack of a common standard for noise effects is because of the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way to determine a person's subjective reaction to a new noise is to compare the noise with the existing or "ambient" environment to which that person has adapted. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise would be, as judged by the exposed individual (California Energy Commission 2001).

With regard to the effects of increases in A-weighted noise level, knowledge of the following relationships is helpful:

- Except in carefully controlled laboratory experiments, the human ear cannot perceive a change of 1 dB.
- Outside the laboratory, a 3-dB change is considered a just-perceivable difference.
- A change in level of at least 5 dB is required before any noticeable change in community response can be expected.
- A 10-dB change is subjectively heard as approximately a doubling in loudness and would almost certainly cause an adverse community response (Kryter 1970).

Table 4.14-2 lists the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

Table 4.14-2 Typical A-Weighted Sound-level Measurements

Noise Source or Environment	A-Weighted Sound Level in Decibels	Subjective Impression
Fireworks	140	Deafening
Civil defense siren (from 100 feet)	130	Deafening
Commercial Jet takeoff (from 200 feet)	120	Deafening (pain threshold)

Noise Source or Environment	A-Weighted Sound Level in Decibels	Subjective Impression
Rock music concert	110	Very loud
Pile driver (from 50 feet)	100	Very loud
Ambulance siren (from 100 feet)	100	Very loud
Boiler Room	90	Very loud
Freight cars (from 50 feet)	90	Very Loud
Printing press plant	90	Very loud
Pneumatic drill (from 50 feet)	80	Moderately loud
Kitchen with garbage disposal running	80	Moderately loud
Freeway (from 100 feet)	80	Moderately loud
Vacuum cleaner (from 10 feet)	70	Moderately loud
Data processing center	60	Quiet
Department store	60	Quiet
Light Traffic (from 100 feet)	50	Quiet
Private business office	50	Quiet
Large transformer (from 200 feet)	50	Quiet
Light rain	40	Faint
Soft whisper (from 5-feet)	30	Faint
Quiet bedroom	30	Faint
Broadcast and Recording studio	20	Very Faint
Rustling leaves	10	Very Faint (hearing threshold)

Source: Adapted from Peterson and Gross 1974 and Egan 1988

4.14.1.2 Fundamentals of Ground-borne Vibration and Noise

Operation of construction equipment and certain construction techniques (such as pile driving) generate ground vibration. Construction traffic traveling on roadways can also be a source of vibration. If vibration amplitudes are high enough, ground vibration has the potential to damage structures or cause cosmetic damage (e.g., crack plaster). Traffic, including heavy trucks traveling on a highway, rarely generates vibration amplitudes high enough to cause structural or cosmetic damage. In most cases, vibration induced by typical construction equipment does not result in adverse effects on people or structures. Noise from the equipment typically overshadows any meaningful ground vibration effects on people, with people registering the noise impacts more than the ground vibration during construction (California Department of Transportation 2013). The secondary effects of ground-borne vibration, such as the movement of building floors, rattling of windows, and shaking of items on shelves or hanging on walls, can create rumbling sounds. The rumbling sound is caused by vibration of room surfaces and is called ground-borne noise. Ground-borne noise can also be a source of annoyance to individuals who live or work close to vibration-generating activities.

4.14.1.3 Ambient Noise in the Project Area

Land adjacent to the north and south banks of Deer Creek consists primarily of agricultural uses. The predominant sources of noise in the project area include general traffic in and out of the area, SR 99 traffic, agricultural equipment, and train traffic.

4.14.1.4 Sensitive Receptors

Although predominantly agricultural land, the project vicinity includes several sensitive receptors as shown on Figure 4.4-1 in Section 4.4, "Air Quality." Sensitive receptors are those segments of the population most susceptible to noise impacts: children, the elderly, and individuals with serious preexisting health problems. Examples of locations that contain sensitive receptors are residences, schools and school yards, parks and playgrounds, daycare centers, nursing homes, and medical facilities. Residences include houses, apartments, and senior living complexes.

Nearest receptors include residences in Vina, residences along Leininger Road, two recreational areas (Woodson Bridge State Recreation Area and Tehama County River Park), a religious facility (Abbey of New Clairvaux), and Vina Elementary School. The sensitive receptors and their distances from the proposed stockpile and hauling areas are shown on Figure 4.4-2 in Section 4.4, "Air Quality." Additional sensitive receptors (middle and high schools, dependent care, medical care facilities [hospital], and preschools) are located a minimum of 1.5 miles from the project area in and near the cities of Red Bluff and Corning. A list of each of these sensitive receptors is presented in Table 4.4-5 in Section 4.4, "Air Quality."

4.14.2 Regulatory Setting

The following plans, policies, regulations, or laws related to noise and vibration apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature. Although DWR may comply with these local regulations, it is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- Federal Noise Control Act of 1972 (recommended noise level standards addressing the effects of noise on public health and welfare and the environment.) — Applies to impact analysis and project construction.
- *Federal Transit Administration Guidelines for Assessing Groundborne Vibration* (guidelines for assessing the significance of vibration produced by transportation sources and construction activity.) — Applies to impact analysis and project construction.

State Regulations

- *Caltrans Transportation and Construction Vibration Guidance Manual* (California Department of Transportation 2013) (Guidelines for assessing the significance of vibration produced by transportation and construction sources.) — Applies to the impact analysis and project construction.

Regional and Local Regulations

- Tehama County General Plan (2009) **—** Noise Element
    - Policy N-2.4: (The County shall restrict construction activities to the hours as determined in the Countywide Noise Control Ordinance, if such an Ordinance is adopted.) — Applies to construction and maintenance.
        - Implementation Measure N-2.4a: (Restrict construction activities to the hours as determined by Tehama County's Noise Control Ordinance unless an exemption is received from Tehama County to cover special circumstances. Special circumstances may include emergency operations, short-

duration construction, among others.) — Applies to construction and maintenance.

- Implementation Measure N-2.4b: (Require all internal combustion engines used in conjunction with construction activities be muffled according to the equipment manufacturer's requirements.) — Applies to construction and maintenance.

4.14.3 Impacts and Mitigation

4.14.3.1 Methodology

The area of assessment for both noise and vibration includes the proposed project vicinity, plus an additional 1,000 feet beyond the location of proposed project activities.

4.14.3.2 Noise

Because the proposed project is located within the County of Tehama, County noise standards should be used for this analysis. But, the County of Tehama does not set standards for construction noise. For reference, the City of Red Bluff Zoning Ordinance, Article XXII, Prohibited Uses (H), provides that noise from construction or mechanical excavation in a residential district or within 100 feet of an occupied dwelling is prohibited between the hours of 7 p.m. and 7 a.m.

Construction noise levels were estimated using the EPA's *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances* (1971). These noise levels are estimated because the amount and type of construction equipment to be used, the location and duration of use, and the exact noise characteristics of each piece of equipment cannot be predicted with certainty. Table 4.14-3 summarizes EPA's recommended guidelines for noise levels considered safe for community exposure (Environmental Protection Agency 1974). The yearly average L_{eq} (equivalent noise level) 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.

In lieu of standards from Tehama County, the EPA standards described above and presented below in Table 4.14-3 were used for this analysis.

Table 4.14-3 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.
	$L_{eq}(24) \leq 70$ 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 = decibel

$L_{eq}(24)$ = equivalent noise level averaged over 24 hours

L_{dn} = day-night noise level

≤ = less than or equal to

Temporary construction noise associated with construction equipment was evaluated using guidance from documents from the Federal Highway Administration (Federal Highway Administration 2006).

4.14.3.3 Ground-borne Vibration

The Caltrans Transportation and Construction Vibration Guidance Manual (2013) was used to estimate ground-borne vibration and ground-borne noise levels associated with construction, operation, and maintenance of the proposed project. Table 4.14-4 provides the human response to transient vibration (California Department of Transportation 2013). Though the guidance is non-enforceable, it provides a basis for evaluating the effects of potential vibration from the proposed project.

Table 4.14-4 Human Response to Transient Vibration

Human Response	Peak Particle Velocity
Severe	2.0 inches per second
Strongly perceptible	0.9 inch per second
Distinctly perceptible	0.24 inch per second
Barely perceptible	0.035 inch per second

4.14.3.4 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Noise and vibration impacts would be significant if they would:

- Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Generate excessive ground-borne vibration or ground-borne noise levels.
- For a project located in the vicinity of a private airstrip or 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, expose people residing or working in the project area to excessive noise levels.

4.14.3.5 Topics Not Evaluated Further

During environmental analysis, the following topic was eliminated from detailed evaluation because no impacts from project implementation are anticipated:

- Operational-related effects: Because the proposed project is a flood management and restoration project, project operation would have **no impact** on ambient noise levels in the project area or vicinity.

4.14.4 Impact Analysis

Impact NOI-1: *Generate a substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.*

No Project Alternative

No Impact. No construction would occur under the no project alternative, and no changes to operation or maintenance activities would occur. Therefore, the no project alternative would have **no impact** on ambient noise levels.

Alternatives A through F

Construction-related Impacts

Significant and Unavoidable. Ambient noise levels would be expected to temporarily increase during the construction of Alternatives A through F. Noise emissions from construction equipment at a distance of 50 feet from noise sources would range from between 75 to 80 dBA. Table 4.14-5 lists the estimated noise emissions of the construction equipment likely to be used for project construction (United States Environmental Protection Agency 1971; Federal Highway Administration 2006).

Table 4.14-5 Measured Noise Levels of Anticipated Project Construction Equipment at a 50-foot Distance

Equipment	Actual Measured L_{max} at 50 feet (dBA)	L_{max} at 50 feet with feasible noise control
Earthmoving		
Front loader	79	75
Backhoe	78	75
Rubber-tired dozer	82	75
Tractor	NA	75
Excavator	81	80
Grader	NA	75
Truck	74	75
Materials Handling		
Concrete mixer	79	75
Concrete pump	81	75
Crane	81	75
Stationary		
Pump	81	75
Generator	81	75
Air compressor	78	75
Other		

Notes: L_{max} = maximum sound level; dBA = A-weighted decibels.

All nearby sensitive receptors are shown on Figure 4.14-1 in Section 4.4, “Air Quality.” Construction is proposed to occur primarily during daytime hours (7 a.m. to 7 p.m.), Monday through Friday. The majority of construction activities would be sufficiently far enough away from sensitive receptors and attenuated (minimized) by vegetation such that ambient noise levels would not be substantial. Construction-related noise impacts from just west of SR 99 to the downstream end of the levee setback reach, including USACE levee raising, bank protection, private levee and berm removal, and the south canal cutoff structure installation, would occur at a distance of more than 1,000 feet from the nearest sensitive receptors and would be **less than significant**.

Construction activities along China Slough would include excavating and removing vegetation along 2.6 miles of the slough. Sensitive receptors in the vicinity of China Slough, including the Woodson Bridge State Recreation Area (185 feet away), Vina Elementary School (690 feet), and the Abbey of New Clairvaux (760 feet), are sufficiently far enough away from these proposed activities such that ambient noise levels would not be substantial and would be **less than significant**. But, sensitive receptors located along the slough could experience substantial, temporary increases in ambient noise levels. The nearest sensitive receptor is a residence 15 feet from the slough. Because construction activities would progress along the length of the slough and not be localized at one location, the construction impact would be temporary for the sensitive receptor that is 15 feet away. Construction noise impacts likely would be present at the sensitive receptor for less than one week. As a residential area, the noise standard for new development is 60 to 65 L_{dn}, and the level at which hearing loss would occur would be an $L_{eq}(24)$ (equivalent noise level averaged over 24 hours) ≤ 70 dB (U.S. Environmental Protection Agency 1974). The loudest piece of equipment would be a rubber-tired dozer, which would have a maximum sound level (L_{max}) of 82 dBA at a distance of 50 feet. Even with feasible noise control, the noise levels would still be 75 dBA. Although temporary, the substantial increase in ambient noise levels would result in a **significant** impact.

Along Deer Creek adjacent to Leininger Road, construction activities would include USACE levee raising, USACE levee removal and levee setbacks, and the Red Bridge realignment and expansion. Several residences along Deer Creek adjacent to Leininger Road are sensitive receptors, including one residence on the north side of Deer Creek that is within 90 feet of project activities. Although construction of project elements in this area would be temporary, the likely use of Leininger Road for hauling and the duration of construction from March to October for Alternatives A through E and from June to October for Alternative F would make this temporary construction impact **significant**. The level of significance would be the same regardless of the alternative being evaluated because the sensitive receptors are located closest to common project elements rather than to a specific levee setback alignment.

Implementation of the noise reduction measures included in Mitigation Measure NOI-1 would reduce project-related noise impacts, but would not reduce the impacts to a less-than-significant level. Temporary construction-related noise impacts would remain **significant and unavoidable**.

Maintenance-related Impacts

Less than Significant. Maintenance activities, including potential levee inspections, levee repairs, and vegetation management, may occur in areas that are in close proximity to existing sensitive receptors, but these activities would be short-term in nature, would not require the use of a dozer, and would not require hauling for an extended duration along local roads. Maintenance activities would not result in a substantial increase in ambient noise levels and would be **less than significant**.

Mitigation Measure NOI-1: *Implement Feasible Measures to Reduce Construction Noise.*

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 the following.

- No construction will be performed within 1,000 feet of an occupied dwelling unit on Sundays, legal holidays, between the hours of 7 p.m. and 7 a.m. on Monday through Friday, or between 5:00 p.m. and 8:00 a.m. on Saturdays, to the extent feasible. Construction outside of normal construction hours shall be minimized or avoided completely when located adjacent to sensitive receptors. The contractor shall notify Tehama County and immediate residents when work is scheduled to extend outside of normal construction times.
- 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 the EPA and the State of California.
- All construction equipment shall be stored in a designated staging area during the construction phase to eliminate daily heavy-duty truck trips on local roadways.
- 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.

Impact NOI-2: *Exposure of person to or generation of excessive ground-borne vibration or ground-borne noise levels.*

No Project Alternative

No Impact. No construction would occur under the no project alternative, and no changes to operation or maintenance activities would occur. Therefore, the no project alternative would have **no impact** on ground-borne vibration or ground borne noise levels.

Alternatives A through F

<u>Construction-related Impacts</u>

Less than significant. Construction-related traffic, including haul truck trips, has the potential to result in ground-borne vibration. But, as described above, truck traffic rarely generates vibration amplitudes high enough to cause structural or cosmetic damage, and the rubber tires and suspension systems of the trucks provide vibration minimization or isolation. Unless there are substantial discontinuities in local roads, ground-borne vibration generated by traffic traveling on roadways is usually below the threshold of human perception. Project-generated traffic would use established roadways and is not expected to generate excessive ground-borne vibration or ground-borne noise. Impacts from ground-borne vibration and ground-borne noise would be **less than significant.**

As described above, construction activities in areas from just west of SR 99 to the downstream end of the levee setback reach, including USACE levee raising, bank protection, private levee and berm removal, and the south canal cutoff structure installation, would occur at a distance of more than 1,000 feet from the nearest sensitive receptors. Any potential ground-borne vibration or ground-borne noise would be attenuated by this distance and would be **less than significant**.

Excavation and vegetation removal along China Slough would require the use of construction equipment within close proximity to several residences, but the excavator(s) would be located within the agricultural field on the opposite side of the slough and would reach into the slough. The nature of the activity and the distance of the actual equipment from the residences would not be expected to generate excessive ground-borne vibration or ground-borne noise at the residences. Impacts from ground-borne vibration and ground-borne noise along China Slough would be **less than significant.**

Construction activities associated with the realignment of Red Bridge would include the installation of coffer dams and bridge piers. The method of coffer dam installation will be determined by the contractor, but as required by Mitigation Measure FISH-3 (see section 4.5, "Biological Resources — Fish and Aquatic Habitat"), if installation of the coffer dams requires use of a pile driver, a vibratory pile driver will be used. Similarly, a vibratory hammer on an excavator likely would likely be used for bridge pier installation. Vibratory hammers transfer energy into the surrounding soils, which generates vibration. Typical vibrations associated with the use of a vibratory pile driver would reach the residential damage threshold approximately 6.5 feet from the source, but would be attenuated to the threshold of perception approximately 328 feet from the source (Amick and Gendreau 2000). Red Bridge is located approximately 300 feet from the nearest residence. At this distance, ground-borne vibration and ground-borne noise would not be expected to be substantial and would be **less than significant**.

Maintenance-related Impacts

Less than Significant. Maintenance activities, including potential levee inspections, levee repairs, and vegetation management, may occur in areas that are in close proximity to existing sensitive receptors, but these activities would be short-term in nature and would require the use of equipment already described for construction activities. Maintenance activities would not generate excessive ground-borne vibration or ground-borne noise and would be **less than significant**.

4.15 Transportation

4.15.1 Environmental Setting

4.15.1.1 Regional Access

Regional access to the project area is provided by I-5 and SR 99. I-5 is the principle north-south arterial along the west side of the Central Valley. SR 99 is also a main north-south arterial for California, extending from Red Bluff south along the east side of the Central Valley. For major transportation access and haul routes near the project area, see Figure 3-8 in the Chapter 3, "Project Description."

4.15.1.2 Local Access

The project area is accessed via SR 99 from the Red Bluff and Chico areas. South Avenue, which intersects with SR 99 roughly 0.4 mile south of the project area, connects SR 99 with I-5 in Corning. Numerous local roads are used to access different portions of the project area. These roadways are described below.

State Route 99

In the vicinity of the proposed project, SR 99 is generally a two-lane highway with auxiliary left turn lanes at major intersections. The posted speed limit on SR 99 in the vicinity of the project area is 65 mph.

Caltrans provides annual average daily traffic (AADT) counts for SR 99. The most recent (2019) daily traffic volumes on SR 99 are 16,400 AADT at the Butte County line, 16,800 AADT south of South Avenue, 9,700 AADT north of South Avenue, and 9,300 AADT through Vina. Caltrans (2019) data indicates that trucks comprise 12 percent of the daily traffic at the Butte County line, 15 percent north of South Avenue, and 12 percent north of Vina.

South Avenue

South Avenue is a two-lane facility classified as an arterial in the Tehama County General Plan (2009). The posted speed limit on South Avenue is 55 mph. The General Plan Update EIR (Tehama County 2008) indicates that South Avenue carried 6,472 vehicles per day (vpd) in 2006, and the 2019 volume was estimated at 8,372.

Vina Road

Vina Road is a local road that generally runs east-west in the area south of the Lower Deer Creek. Vina Road parallels China Slough and connects the unincorporated Town of Vina with SR 99 and continues east of SR 99 for approximately 2 miles. Vina Road is a two-lane paved road approximately 20 feet wide that is in fair to good condition. Traffic counts conducted for this analysis in January 2019 indicated that the daily traffic volume on Vina Road was approximately 563 vpd west of SR 99 and 244 vpd east of SR 99 (Appendix C). The speed limit on Vina Road is 35 mph west of SR 99 in Vina, but east of SR 99 the speed limit is 55 mph because no speed limit is posted (i.e., the prima facie speed limit).

Rowles Road

Rowles Road is a north-south local road that extends south from the town of Vina to South Avenue before extending for approximately 2.5 miles toward the Butte County line and ending at its intersection with SR 99. Rowles Road is approximately 20 feet wide and is in fair to good condition. January 2019 traffic counts indicated that the daily traffic volume was 763 vpd between Vina Road and South Avenue (Appendix C). The speed limit on Rowles Road is 35 mph within the town of Vina.

7th Street

7th Street is the westerly continuation of Vina Road through the town of Vina across the Union Pacific Railroad tracks to the Abbey. 7th Street is approximately 20 feet wide and is in fair to good condition. January 2019 traffic counts indicated that the daily traffic volume was 158 vpd west of Rowles Road. The posted speed limit is 35 mph on 7th Street (Appendix C).

Golonka Lane

Golonka Lane is a north-south local street that extends northerly from the eastern portion of Vina Road toward Lower Deer Creek and provides access to adjoining agricultural properties. Golonka Lane is approximately 18 feet wide and the pavement is in fair condition. Traffic counts were not conducted on this low-volume road, but the daily traffic volume was estimated to be approximately 40 vpd based on the number of residences that it serves.

Leininger Road

Leininger Road is a north-south local street that extends northerly from Vina Road across Lower Deer Creek into rural Tehama County. The road is approximately 20 feet wide, with the exception of Red Bridge which accommodates travel in only one direction at a time. The road is in fair to good condition. January 2019 traffic counts indicated that the daily traffic volume was 215 vpd (Appendix C). The 55-mph prima facie speed limit applies to this road.

Reed Orchard Road

Reed Orchard Road is an east-west local road that extends east from an intersection on Leininger Road and roughly parallels Lower Deer Creek. Reed Orchard Road ranges in width from 16 feet to 20 feet. The condition of the road varies, but it is generally in fair condition. January 2019 traffic counts indicated that the daily traffic volume was 74 vpd east of Leininger Road (Appendix C). The 55-mph prima facie speed limit applies to this road.

Bicycle Facilities

Currently, there are no designated bicycle facilities on the rural roads in the immediate vicinity of the project area.

Pedestrian Facilities

In Tehama County, dedicated facilities for pedestrians (i.e., sidewalks or improved trails) have been developed in urban areas as development has occurred but are not generally available in rural areas. So, streets in the community of Vina and other roads in the study area do not have sidewalks. The occasional pedestrians use available shoulders. But, because of the distances involved, few pedestrians use the rural roads in the vicinity of the project area.

Existing Transit Facilities

The Tehama Rural Area eXpress (TRAX) provides regional transit services to the residents of Tehama County. The TRAX service area includes the cities of Corning, Red Bluff, and Tehama, as well as the unincorporated communities along SR 99 East and SR 99 West. None of the service routes serve the town of Vina.

Rail Service

Union Pacific Railroad provides passenger rail service through Tehama County but does not have any stops within the county. The single-track main line runs parallel to I-5 and carries both passengers and freight. The railroad also operates a freight rail corridor that runs parallel to SR 99 and passes through the project area within the town of Vina. There are existing at-grade rail crossings on South Avenue and in the Town of Vina at 5th Street and 7th Street. These crossings are equipped with crossing gates with arms. Two private crossings exist north of Lower Deer Creek. These crossings are not equipped with gates.

4.15.1.3 Existing Traffic Conditions

To assess existing traffic conditions, KD Anderson & Associates made a.m. and p.m. peak-hour turning movement counts at study intersections within the town of Vina and at SR 99 intersections in the project vicinity. This study occurred during January 2019 when area schools would have been in session (Appendix C). The study assessed observed peak-hour traffic volumes and identified the number of heavy trucks included in the peak-hour observations. Traffic volumes were reported as level of service (LOS), which represents the quality of existing traffic conditions. Letters from A to F designate each level, with A, B, and C representing free-flowing conditions and F representing stop-and-go traffic (Table 4.15-1).

Table 4.15-1 Roadway Level of Service Definitions

Level of Service	Signalized Intersection	Unsignalized Intersection	Roadway (Daily)
"A"	Uncongested operations, all queues clear in a single-signal cycle (delay less than 10 seconds).	Little or no delay (delay less than 10 seconds per vehicle).	Completely free flow.
"B"	Uncongested operations, all queues clear in a single cycle (delay greater than 10 seconds and less than 20 seconds).	Short traffic delays (delay greater than 10 seconds per vehicle and less than 15 seconds per vehicle).	Free flow, presence of other vehicles noticeable.
"C"	Light congestion, occasional backups on critical approaches (delay greater than 20 seconds and less than 35 seconds.	Average traffic delays (delay greater than15 seconds per vehicle and less than 25 seconds per vehicle).	Ability to maneuver and select operating speed affected.
"D"	Significant congestions of critical approaches but intersection functional. Cars required to wait through more than one cycle during short peaks. No long queues formed (delay greater than 35 seconds and less than 55 seconds.	Long traffic delays (delay greater than 25 seconds per vehicle and less than 35 seconds per vehicle).	Unstable flow, speeds and ability to maneuver restricted.
"E"	Severe congestion with some long standing queues on critical approaches. Blockage of intersection may occur if traffic signal does not provide for protected turning movements. Traffic queue may block nearby intersection(s) upstream of critical approach(es) (delay greater than 55 seconds and less than 80 seconds).	Very long traffic delays, failure, extreme congestion (delay greater than 35 seconds per vehicle and less than 50 seconds per vehicle).	At or near capacity, flow quite unstable.
"F"	Total breakdown, stop-and-go operation (delay greater than 80 seconds).	Intersection blocked by external causes (delay greater than 50 seconds per vehicle).	Forced flow, breakdown.

Source: Elefteriadou 2016

The results of the peak-hour traffic study are presented in Table 4.15-2.

Table 4.15-2 Existing Intersection Level of Service within the Project Vicinity

Intersection	A.M. Peak Hour LOS	P.M. Peak Hour LOS
Rowles Road and 7th Street	A	A
D Street and Vina Road (West)	A	A
State Route 99 and Vina Road (East)	B	C
State Route 99 and Vina Road (West)	C	C
State Route 99 and South Avenue[1]	C	E

LOS = level of service

[1]Represents eastbound left turns only.

4.15.2 Regulatory Setting

The following plans, policies, regulations, or laws related to transportation apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature. Although DWR may comply with these local regulations, it is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

No federal plans, policies, regulations, or laws related to transportation apply to the alternatives under consideration.

State Regulations

- *California Department of Transportation Guide for the Preparation of Traffic Impact Studies* (identifies when a traffic impact study is required.) — Applies to impact analysis, design, and construction.
- California Public Utilities Commission (oversees railroad crossing safety.) — Applies to impact analysis, construction, and O&M.

Regional and Local Regulations

- Tehama County General Plan (2009)
    - Implementation Measure CIR-1.2a (In conjunction with the preparation of traffic studies to determine potential LOS impacts to existing County roadways from proposed projects, additional analysis may be required irrespective of LOS impacts to determine if structural and/or safety hazards exist. Structural deficiencies and safety hazards shall be identified and appropriate measures shall be determined to mitigate and/or enhance the structural capacity and/or safety of the roadway.) — Applies to impact analysis, construction, and maintenance.
    - Implementation Measure CIR-1.2c (Traffic studies shall address on- and off-site roadway conditions for both local and state routes and mitigation measures that are proposed to address all identified issues.) — Applies to impact analysis, construction, and maintenance.

4.15.3 Impacts and Mitigation

4.15.3.1 Methodology

Refer to Appendix C for detailed assumptions and methods associated with this impact analysis. The potential effects of the project on transportation were considered based on CEQA guidelines criteria relating to regional vehicle miles traveled (VMT), alternative transportation modes, and safety. Safety was evaluated within the context of a traffic operational analysis that considered weekday peak-hour traffic conditions that would cover a future (2024) construction season. The traffic operational analysis considered three scenarios:

1. Existing Year 2019 traffic conditions (i.e., conditions at the time the traffic study was conducted).
4. Background Year 2024 traffic conditions (i.e., estimated year of construction at the time the traffic study was conducted) without the project.
5. Year 2024 conditions with project-related construction traffic.

Existing traffic conditions were evaluated through observation of weekday a.m. and p.m. peak-hour and daily traffic volumes, and current operating

LOS were calculated at key intersections in January 2019 on the roads that would be used to access the project area. It was assumed that construction would occur in late summer and early fall; traffic volumes observed in January were adjusted accordingly based on Caltrans Performance Measurement System data to reflect September conditions (California Department of Transportation 2019). Traffic volumes observed in January 2019 were also modified to reflect background conditions in 2024 when the project could be constructed. To assess potential project effects, probable project automobile and truck trip generation was estimated based on the anticipated construction haul distance, length of construction season, and length of construction day. The volume of traffic occurring and anticipated to occur during peak hours was identified, and truck traffic was converted to passenger car equivalents. Utilizing the project’s expected trip distribution, trucks carrying materials transported to and from the project area and employee trips were assigned to the project area street system based on recognizable least time travel paths. Resulting Year 2024 (construction year) plus project passenger car equivalent traffic volumes were employed to calculate LOS and determine the anticipated effects of proposed construction traffic on background traffic conditions.

Tehama County has not yet developed or adopted methods for estimating regional VMT or significance criteria for evaluating impacts based on VMT. As a result, this analysis makes use of methods for initial project screening based on guidance from the California Governor’s Office of Planning and Research (OPR) used to identify those projects that are exempt from VMT analysis.

While LOS may no longer be the focus of CEQA impact analysis, it remains within the purview of Tehama County to consider LOS with regards to consistency with its General Plan goals and policies. Caltrans also considers LOS as a measure of the effects of a project on the safety of the state highway system. The Tehama County General Plan (2009) identifies LOS D as the minimum standard on County streets. The Caltrans minimum standard is LOS C, although the *State Route 99 Transportation Concept Report* (California Department of Transportation 2003) indicates that this area of the highway may operate at LOS D in the future. For this analysis, LOS C was used as the minimum standard for locations on the state highway.

4.15.3.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Impacts on transportation would be considered significant if they would:

- Conflict with program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.
- Conflict or be inconsistent with CEQA Guidelines Section 15064.3(b).
- Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).
- Result in inadequate emergency access.

Under OPR guidance, a VMT impact is significant if a project's regular automobile traffic interferes with the ability of Tehama County to satisfy the goals for regional VMT reduction adopted under SB 743 (i.e., a 15-percent reduction). Although DWR is not subject to local regulations, inconsistency with the Tehama County General Plan (2009) was evaluated to disclose all potential project-related impacts. The evaluation assumed that project-related traffic would not be consistent with the plan's adopted policies if it would:

- Cause the existing LOS to deteriorate from LOS C or better to LOS D or worse.
- Increases the traffic volume by 10 percent or more at a location already operating at LOS D or worse.
- Create a traffic safety hazard or appreciably add to an existing hazard.
- Cause an appreciable increase in truck loading based on consideration of the Traffic Index over an applicable maintenance period.

4.15.3.3 Topics Not Evaluated Further

During environmental analysis, the following topics were eliminated from detailed analysis because no impacts from project implementation are anticipated:

Bicycle and pedestrian facilities. There are no designated bicycle facilities on the rural roads in the immediate vicinity of the project area and streets in the community of Vina and other roads in the project area do not have sidewalks. The proposed project would not conflict with programs, plans, ordinances, or policies addressing these facilities; no impact would occur.

4.15.4 Impact Analysis

Impact TR-1: *Conflict with program, plan, ordinance or policy addressing the circulation system, including transit and roadway facilities.*

No Project Alternative

No Impact. Under the no project alternative, there would be no impact to transit or roadway facilities because no construction or changes in maintenance activity would occur. Impacts that would continue to occur under the no project alternative are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than Significant with Mitigation Incorporated. Project construction would require numerous haul truck trips to and from the project area and vicinity and the construction crews would travel to and from the project area daily. Construction is anticipated to occur over a 240-day construction schedule for Alternatives A through E and over a 150-day schedule for Alternative F.

As presented in Table 4.15-3, the truck trips generated by the proposed project would incrementally increase the length of delays experienced at study area intersections. Under existing conditions, two intersections (i.e., SR 99 at South Avenue and SR 99 at Vina Road [west]) are expected to continue to operate in excess of the General Plan's LOS C threshold. The proposed project would increase the length of delays at these intersections, but the associated truck trips would represent an increase of less than 10 percent above projected background volume. So, the project's effect would be **less than significant** at these locations.

Table 4.15-3 Estimated September 2024 Intersection Levels of Service with and without the Proposed Project

Intersection	AM Peak Hour No Project LOS	AM Peak Hour No Project Average Delay (sec)	AM Peak Hour Plus Project LOS	AM Peak Hour Plus Project Average Delay (sec)	PM Peak Hour No Project LOS	PM Peak Hour No Project Average Delay (sec)	PM Peak Hour Plus Project LOS	PM Peak Hour Plus Project Average Delay (sec)
SR 99 at North Staging Area	NA	NA	C	20	NA	NA	C	19
SR 99 at North River Staging Area	NA	NA	C	19	NA	NA	C	21
SR 99 at South River Staging Areas	NA	NA	C	20	NA	NA	C	21
Rowles Road at 7th Street	A	9	A	9	A	9	A	9
D Street at Vina Road (west)	A	9	A	9	A	9	A	9
SR 99 at Vina Road (east)	C	16	D[1]	32[1]	C	22	F[1]	53[1]

Intersection	AM Peak Hour No Project LOS	AM Peak Hour No Project Average Delay (sec)	AM Peak Hour Plus Project LOS	AM Peak Hour Plus Project Average Delay (sec)	PM Peak Hour No Project LOS	PM Peak Hour No Project Average Delay (sec)	PM Peak Hour Plus Project LOS	PM Peak Hour Plus Project Average Delay (sec)
SR 99 at Vina Road (west)	C	23	D	28	D	33	E	43
SR 99 at South Avenue	E	41	F	78	F	257	F	>300

Notes:

LOS = level of service

NA = not applicable

sec = seconds

SR = State Route

[1] Level of Service exceeds the adopted minimum standard.

The addition of project-related traffic would, however, have the potential to increase delays at the SR 99 at Vina Road (east) intersection, and would cause the LOS to deteriorate from LOS C to LOS D in the a.m. peak hour and to LOS F in the p.m. peak hour. So, the effects of the proposed project on intersection LOS would be inconsistent with adopted policies and would be **potentially significant**. Although DWR is not subject to these adopted policies, a construction traffic control plan would be prepared and implemented as described in Mitigation Measure TR-1 to minimize impacts to LOS during the construction period to **less-than-significant** levels.

Mitigation Measure TR-1: *Prepare and Implement a Construction Traffic Control Plan.*

The contractor shall prepare and implement a CTCP that includes appropriate manual controls to facilitate truck access on and off of SR 99. A Caltrans encroachment permit would be required to implement a CTCP on the state highway. The CTCP shall be prepared to ensure that traffic flow and daily activities would not be substantially disrupted by an increase in construction traffic. Under this plan, construction signs and flaggers would be employed, when necessary, to inform commuters of large trucks and equipment in the area. Signs, equipment, and traffic control measures shall conform to the provisions in the Caltrans Traffic Manual. The plan may include the following measures:

- Contractor employee orientation shall be provided to all employees on the designated construction traffic access route and construction site parking areas. Contractors involved in hauling excavated material shall be provided maps of haul routes to and from the project area to offload locations and shall be instructed to adhere to the mapped route.
- Measures shall be taken to ensure adequate sight distances during construction. Traffic control devices or signs shall not be allowed to interfere with sight distances at road intersections along the proposed project construction traffic access route.
- During construction, access to adjacent properties shall be maintained and shall not be restricted.

Table 4.15-4 identifies Year 2024 daily volumes with and without the effect of the proposed project traffic. As indicated, the proposed project would not result in any location changing from an acceptable LOS to an unacceptable condition. The proposed project would add truck traffic to SR 99 south of South Avenue, which is shown to operate at LOS F with and without the project. But, because the incremental traffic increase would be less than the 10 percent threshold permitted under the Tehama County General Plan (2009), the effect of the proposed project traffic would be **less than significant**. All local roads would continue to carry fewer than 2,000 vpd with the project.

Table 4.15-4 Estimated September 2024 Roadway Segment Traffic Volumes and Level of Service with and without the Proposed Project

Roadway	Location	No Project Daily Traffic Volume	No Project Level of Service	Plus Project Daily Traffic Volume (passenger car equivalents)	Plus Project Daily Traffic Volume Total	Plus Project Level of Service
State Route 99	South Avenue to Butte County Line	21,000[1]	F[1]	92[1]	21, 092[1]	F[1]
State Route 99	Vina Road to South Avenue	12,125[1]	B	660	12,875	B
State Route 99	Sherman Street to Vina Road	11,625[1]	B	616	12,241	B
South Avenue	Rowles Road to State Route 99	9,210[2]	C	572	9,782	C
Vina Road	Rowles Road to State Route 99	790	C	114	904	C
Vina Road	State Route 99 to Golonka Lane	345	C	1,178	1,523	C
Vina Road	Golonka Lane to Leininger Road	255	C	632	887	C
Golonka Lane	North of Vina Road (East)	50±	C	546	596	C
Leininger Road	Vina Road to Reed Orchard Road	315	C	632	947	C
Reed Orchard Road	East of Leininger Road	105	C	32	137	C
Rowles Road	Vina Road to South Avenue	1,070	C	84	1,154	C

Roadway	Location	No Project Daily Traffic Volume	No Project Level of Service	Plus Project Daily Traffic Volume (passenger car equivalents)	Plus Project Daily Traffic Volume Total	Plus Project Level of Service
7th Street	West of Rowles Road	220	C	68	288	C

Note: [1]Exceeds the level of service C standard.

O&M-related Impacts

Less than Significant. No traffic would be associated with project operation. Project maintenance would include vehicles traveling to and from the site to perform inspections and maintenance-related repairs. These trips would occur intermittently, would be short term, and would involve a limited number of vehicles. Maintenance activities would not conflict with a program, plan, ordinance, or policy addressing the circulation system and would be **less than significant**.

Impact TR-2: *Be inconsistent with CEQA Guidelines Section 15064.3 subdivision (b) Vehicle Miles Traveled (VMT).*

No Project Alternative

No Impact. Under the no project alternative, there would be no impact on VMT because no construction or changes in maintenance activity would occur. Impacts that would continue to occur under the no project alternative are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than Significant. Construction-related travel to and from the project area would result in VMT increases, a (Table 4.15-5). The majority of project-related VMT would be associated with heavy-duty trucks transporting materials from the project area to the landfill, as this analysis assumed that all excavated material would be disposed of.

The proposed project's impact on regional VMT would be **less than significant** for the following reasons:

- Temporary nature of project construction. Although construction-related VMT has been estimated in this analysis, it is not considered to be a **significant impact** because of its temporary nature.
- Truck VMT. For this analysis, project VMT was estimated for both heavy-duty trucks and automobiles. Truck VMT represents 86 percent of the total estimated project VMT. CEQA Guidelines section 15064.3 subdivision (b) and Tehama County's VMT reduction goals and are

based on regular automobile traffic. Because no policy has been adopted regarding the significance of temporary heavy-duty truck VMT, the impact would be **less than significant**.

- Screening threshold for small projects. After construction of the proposed project, the project would not generate regular traffic and, therefore, qualifies as a "small project," resulting in a **less-than-significant** impact on VMT.
- Effects of transportation projects on vehicle travel. The proposed project is a flood control and ecosystem improvement project that does not include transportation-related elements or infrastructure that would affect transportation post-project. The proposed project would not induce growth and, therefore, would have a **less-than-significant impact** on regional VMT.

Table 4.15-5 Estimate of Vehicle Miles Traveled During Proposed Project Construction

Description	Average Distance (miles)	Alt A Trips	Alt A VMT	Alt B Trips	Alt B VMT	Alt C Trips	Alt C VMT	Alt D Trips	Alt D VMT	Alt E Trips	Alt E VMT	Alt F Trips	Alt F VMT
Trucks – Export	33[1]	373	12,309	340	11,220	313	10,329	261	8,613	233	7,689	90	2,970
Trucks – Import	10[2]	46	460	42	420	46	460	46	460	51	510	62	620
Trucks – Other	170[3]	4	680	4	680	4	680	4	680	4	680	4	680
Trucks – Subtotal		423	13,449	386	12,320	363	11,469	311	9,753	288	8,879	156	4,270
Automobiles – Employees	30[4]	60	1,800	60	1,800	60	1,800	60	1,800	60	1,800	60	1,800
Automobiles – Miscellaneous	22[5]	20	440	20	440	20	440	20	440	20	440	20	440
Automobiles – Subtotal		80	2,220	80	2,220	80	2,220	80	2,220	80	2,220	80	2,220
All Vehicles – Total		503	15,689	466	14,560	443	13,709	391	11,993	368	11,119	236	6,510

Notes: Alt = alternate; VMT = vehicle miles traveled

[1] Average distance to Red Bluff-Tehama County Landfill.

[2] Average distance to local material sources.

[3] Distance to Port of Oakland.

[4] Average distance to Oroville, Corning, Red Bluff, Redding, and Chico.

[5] Average distance to Chico and Red Bluff.

O&M-related Impacts

Less than Significant. No vehicle trips would be associated with project operation. Project maintenance include vehicles traveling to and from the site to perform inspections and maintenance-related repairs. These trips would occur intermittently, would be short term, and would involve a limited number of vehicles. Therefore, the impact to operational VMT would be **less than significant.**

Impact TR-3: *Substantially increase hazards due to a geometric design feature or incompatible uses.*

No Project Alternative

No Impact. Under the no project alternative, there would be no increase in hazards or incompatible uses because no construction or changes in maintenance activity would occur. Therefore, there would be no impact. Impacts that would continue to occur under the no project alternative are further discussed in Chapter 6, under "No Project Alternative," in Section 6.3.2.1, "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than Significant with Mitigation Incorporated. The proposed project would not substantially increase hazards due to a geometric design feature. Project-related road design features, including the proposed Red Bridge realignment and SVRIC dam access road raising, would substantially decrease flood hazards in those locations, resulting in a beneficial effect.

The presence of construction vehicles and equipment on the project area access roads would not represent an incompatible use of those roads. Project-related increased traffic at the 7th Street railroad crossing in the town of Vina would not be expected to create hazardous conditions because the crossing is gated and the capacity of 7th Street would not be exceeded.

Although construction traffic would be a compatible use of SR 99, the existing sight distance from various locations onto SR 99 does not appear to satisfy corner sight distance requirements for heavy trucks. Uncontrolled truck access onto SR 99, therefore, could result in conflicts between construction vehicles and through traffic on SR 99, resulting in an increase in hazardous conditions that would be **potentially significant**. Implementation of the sight distance safety measures that would be included in the CTCP (Mitigation Measure TR-1) would minimize this potential hazard to **less-than-significant** levels.

Although the Traffic Impact Analysis (Appendix C) identified intersections where turning radiuses may not be adequate for large construction vehicles and equipment, additional on-site review of the haul route access points resulted in the finding that these roads are currently used by large agricultural vehicles and equipment that do not encounter turning issues and that project area roads would be able to accommodate truck turning requirements such that no hazards would be created. Implementation of the traffic control measure included in Mitigation Measure TR-1 would further reduce the risk of hazardous conditions at these intersections.

The proposed construction access roads were engineered to sustain the number and frequency of construction vehicle trips, but the substantial increase in traffic would likely result in the degradation of local road conditions. The potential degradation of these roads may create hazardous conditions, resulting in a **potentially significant** impact. Implementation of the road repair measures included in Mitigation Measure TR-2 would reduce this potential impact to **less than significant**.

Mitigation Measure TR-2: *Enter into a Road Repair Agreement with Tehama County.*

The contractor shall enter into a road repair agreement with Tehama County Public Works. The agreement shall include post-construction road repair measures to return county roads adversely affected by project-related traffic to pre-project conditions. Pre-project conditions shall be documented by the project proponent and contractor prior to the start of construction. Road repair measures may include chip sealing and reconstruction of any disturbed road shoulders.

O&M-related Impacts

Less than Significant. O&M activities would not include and changes or improvements to existing roads and would not represent an incompatible use. Maintenance-related traffic would be minimal, short term, and intermittent. Therefore, the impact would be **less than significant.**

Impact TR-4: *Result in inadequate emergency access.*

No Project Alternative

No Impact. Under the no project alternative, no construction would occur. O&M-related traffic would be minimal, short term, and intermittent, and would not impede emergency access, resulting in **no impact**.

Alternatives A through F

Construction-related Impacts

Less than Significant with Mitigation Incorporated. Emergency access to the project area could be affected by project-related construction activities, particularly on-road movement of vehicles. Construction-related traffic could result in road closures or could delay or temporarily obstruct the movement of emergency vehicles, thereby creating inadequate emergency vehicle access and resulting in a potentially **significant impact**. Implementation of the traffic control measures included in Mitigation Measure TR-1 would reduce this impact to **less-than-significant** levels.

O&M-related Impacts

Less than Significant. O&M-related traffic would be minimal, short term, and intermittent, and would not result in inadequate emergency access. The impact would be **less than significant.**

4.16 Utilities and Service Systems

4.16.1 Affected Environment

Utilities and service systems include water supply, wastewater and stormwater drainage facilities, landfills, electric power, natural gas, and telecommunications facilities.

4.16.1.1 Water Supply

There are 26 water agencies operating throughout Tehama County. During an average year, approximately 59 percent of the total water used by Tehama County comes from groundwater sources (Tehama County 2009). Local surface water sources supply 28 percent of the County’s demand. The Sacramento River-Central Valley Project provides 10 percent, and surface water reuse accounts for approximately 3 percent. Most wells are located in a north-south swath along both sides of the Sacramento River. More than 10,000 wells exist throughout the County; approximately 78 percent are classified as domestic. Within the project area, domestic water is supplied by groundwater wells, and agricultural irrigation water is supplied by groundwater wells or surface water deliveries from Deer Creek diversions in the SVRIC, DCID, and Cone Kimball service areas. Agricultural water supply is conveyed by canals, irrigation ditches, and irrigation pipelines.

Wastewater

There are no wastewater treatment plants in the town of Vina. The closest wastewater treatment plant is the City of Corning Wastewater Treatment Plant in Corning, approximately 3 miles from Vina's town center. The unincorporated areas of Tehama County, including Vina, are heavily reliant upon on-site septic tank sewage treatment systems. Community wastewater disposal in the unincorporated areas of Tehama County is handled primarily by septic tank and leach field systems or by seepage pits.

Stormwater Drainage

Storm drainage within unincorporated Tehama County generally consists of culverts and drainages adjacent to roadways, as well as natural swales and topographic features. Tehama County Public Works is responsible for drainage maintenance, which includes the cleaning and shaping of roadside ditches (Tehama County Public Works 2021).

Solid Waste

The Tehama County-Red Bluff Landfill, which is located in the City of Red Bluff, serves the cities of Red Bluff, Corning, and Tehama, and unincorporated Tehama County. The landfill has a maximum permitted capacity of 5,097,000 cubic yards and requires advance notice if a project will result in more than 50 tons or 20 vehicle trips per day (Tehama County 2014, 2021).

4.16.1.2 Electrical and Natural Gas Service

The Pacific Gas and Electric Company (PG&E) provides both electrical and natural gas services to the project area.

4.16.1.3 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 area by a variety of private companies, including AT&T.

Field research is necessary to determine the location of all existing utilities. Above-ground distribution lines adjacent to proposed project elements are located along Vina Road adjacent to China Slough.

4.16.2 Regulatory Setting

The following plans, policies, regulations, or laws related to utilities and service systems apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the Legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information.

Federal Regulations

No federal plans, policies, regulations, or laws that regulate utilities or service systems would apply to the proposed project.

State Regulations

- California Integrated Waste Management Act (mandates a reduction of waste being disposed of in landfills.) — Applies to project planning and permitting, construction, and operation.
- CalOSHA Title 8, Section 1541 (requires the identification of the approximate location of subsurface installations that may be encountered during excavation work prior to excavation.) — Applies to pre-construction and construction activities.
- California Government Code, Section 4216 (related to the protection of underground infrastructure.) — Applies to project design and construction.

Regional and Local Regulations

- Tehama County General Plan (2009), Implementation Measure PS-6.3d (Develop guidelines and standards for all construction and demolition projects to reuse or recycle 50 percent of construction waste.) — Applies to project construction.

4.16.3 Impacts and Mitigation

4.16.3.1 Methodology

Effects to utilities and service systems were identified by comparing existing facilities and capacity with the anticipated project needs during construction and operation and maintenance, the duration and extent to which the utilities and service systems would be affected, and the ability of a service provider to continue to provide a LOS that would meet the needs within the project area.

4.16.3.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines, professional judgment, and regulatory and administrative precedent. Impacts on utilities and service systems would be significant if they would:

- Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.
- Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.
- Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.
- Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.
- Comply with federal, State, and local management and reduction statutes and regulations related to solid waste.

4.16.3.3 Topics Not Evaluated Further

During environmental analysis, the following topics were eliminated from detailed analysis because no impacts from project implementation are anticipated:

- Wastewater treatment facilities. The closest wastewater treatment facility is approximately 3 miles from Vina. The residents of Vina are heavily reliant upon on-site septic tanks for sewage. The proposed project would not facilitate population growth that could increase the need for a wastewater treatment facility or strain septic tanks in the area. Also, continued maintenance activities would not result in the need for additional wastewater treatment services and would not result in a determination by the wastewater treatment provider that additional facilities may be required. Therefore, **no impact** would occur.
- Comply with federal, State, and local management and reduction, statutes and regulations related to solid waste. Construction activities would be required to comply with all adopted programs and regulations pertaining to solid waste. Therefore, **no impact** would occur.

4.16.4 Impact Analysis

Impact UTL-1: *Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities.*

No Project Alternative

No Impact. Under the no project alternative, there would be no construction activities that would require new utilities or service systems to be constructed. Maintenance activities, including levee repair, would continue, but would not require new utilities or service systems to be constructed.

Alternatives A through F

<u>Construction-related Impacts</u>

Less than Significant with Mitigation Incorporated. The proposed project would not require or result in the construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunication facilities. However, construction activities would require the relocation of irrigation pipelines within the levee setback areas, and because utility location efforts have not yet been undertaken, the relocation of any one of the other listed utilities may be required during the raising of Leininger Road and setting back levees upstream of Red Bridge. Other project construction activities, including grading and excavation, may also require utility relocation. In addition, although steps would be taken to minimize potential impacts to utilities, construction activities could inadvertently damage identified and unidentified utilities equipment and facilities. If relocation of existing utilities is required or utilities are inadvertently damaged, service interruptions could occur. In addition, the extent and intensity of project construction activities could affect a service providers' ability to quickly repair damage or restore interrupted service. Therefore, construction activities would have a **potentially significant impact** on utilities. Implementation of the verification and protective measures included in Mitigation Measure UTL-1 would allow the contractor to avoid utilities, where feasible, and would reduce the potential for accidental damage to utilities to **less-than-significant** levels. Service to irrigation pipelines, as described in the project description, would be restored through relocation and would be coordinated with the affected landowners to ensure no interruption in service during the irrigation season, resulting in a **less-than-significant** impact. If necessary, relocation activities would result in temporary ground disturbance. The potential environmental impacts of ground disturbance within the project area are addressed in Sections 4.2, "Aesthetics"; 4.3, "Agricultural Resources and Land Use"; 4.5, "Biological Resources — Fish and Aquatic Habitat"; 4.6, "Biological Resources - Wetlands and Other Waters", 4.7, "Biological Resources — Vegetation", 4.8, "Biological Resources — Wildlife", 4.9, "Cultural and Tribal Cultural Resources", 4.10, "Geology, Soils, and Paleontological Resources", and 4.13, "Hydrology, Hydraulics, and Flood Risk Management."

<u>O&M-related Impacts</u>

No Impact. Maintenance activities would not require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunication facilities. Maintenance activities would require minimal earthwork and would not require the construction of new utilities or service systems. Therefore, **no impact** would occur, and mitigation is not required.

Mitigation Measure UTL-1: *Verify Utility Locations, Coordinate with Affected Utility Providers, Prepare and Implement a Damage Response Plan, and Conduct Worker Training with Respect to Accidental Utility Damage.*

The project proponent will implement the following measures before construction begins to avoid and minimize potential damage to utilities, infrastructure, and service disruptions during construction.

- Verify through field surveys and the use of the Underground Service Alert services the locations of buried utilities within 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.
- Provide notification of any potential interruptions in service to the appropriate agencies and affected landowners.
- Coordinate with PG&E to relocate electrical and natural gas transmission lines and associated infrastructure such as power poles.
- Coordinate with applicable utility and service providers to implement orderly relocation of utilities.

Impact UTL-2: *Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.*

No Project Alternative

Under the no project alternative, no construction activities would require a water supply. Maintenance activities, including levee repair, would continue, and may require a temporary water supply for dust control, but would not require a long-term water supply to serve existing or future development.

Alternatives A through F

Construction-related Impacts

Less than significant. Construction activities may require the use of water for dust control, but the need for a water supply would be minimal and temporary. Following completion of construction, no further project-related water supplies would be needed. Therefore, impacts to water supply would be **less than significant**.

O&M-related Impacts

Less than Significant. Maintenance activities, including levee repair, would continue and may require a temporary water supply for dust control but would not require a long-term water supply to serve existing or future development. Therefore, impacts to water supply would be **less than significant**.

Impact UTL-3: Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.

No Project Alternative

No Impact. Under the no action alternative, there would be no construction activities that would produce solid waste. Maintenance activities, such as levee repair and vegetation management, may generate solid waste. But, solid waste would be disposed of in compliance with solid waste statutes and regulations and would be within the permitted capacity of the local landfill.

Alternatives A through F

Construction-related Impacts

Less than Significant. Construction of the proposed project would generate differing amounts of solid waste depending on the project alternative (Table 4.16-1).

Table 4.16-1 Solid Waste Generated by Project Alternative

Alternative	Solid Waste Generated (Cut in Cubic Yards)
A	889,706
B	811,267
C	746,287
D	621,163
E	554,214
F	129,546

Sources of solid waste would include soils from degrading the existing levees in the setback reach, cleared vegetation, roadway pavement, fencing, landscape irrigation systems, and gravel. Excavated soil material would be reused for construction of the setback levees and raising the levees to reach the minimum freeboard if the material is determined to be suitable. Vegetation may be chipped or burned on site, as appropriate. The remaining solid waste generated during proposed project construction would be disposed of in compliance with solid waste statutes and regulations and would not exceed the posted daily limit of 35.7 cubic yards or 20 vehicle trips per day at the Tehama County-Red Bluff Landfill. Therefore, the impact to solid waste management would be **less than significant**, and mitigation is not required.

O&M-related Impacts

Less than Significant. Maintenance activities would not result in the generation of solid waste in excess of any standards. Minor earthwork may be necessary to maintain levees and vegetation, but that earthwork would not generate solid waste in excess of the remaining capacity at the Tehama County-Red Bluff Landfill. Therefore, impacts would be **less than significant**.

4.17 Water Quality

4.17.1 Environmental Setting

4.17.1.1 Groundwater

Groundwater Subbasin

The project area is located in the Los Molinos Subbasin of the Sacramento Valley Groundwater Basin (California Department of Water Resources 2018). The Los Molinos Subbasin is bounded to the north and northwest by Antelope Creek, to the west by the Sacramento River, and to the east by the Chico Monocline fault (California Department of Water Resources 2004). The southern boundary of the subbasin is located approximately 5 miles south of the Sacramento River and Deer Creek confluence.

Groundwater Quality

There are 18 public supply wells in the Los Molinos Subbasin, representing a density of 0.11 public supply wells per square mile (California Department of Water Resources 2021). Available groundwater quality data indicates past cases of contaminants at undesirable levels in the subbasin's groundwater, but currently all groundwater cleanup sites within the subbasin are inactive or closed (Tehama County Flood Control and Water Conservation District 2021). An evaluation of groundwater quality data from the SWRCB Geotracker and Geotracker GAMA databases for the subbasin's groundwater sustainability plan development indicates that total dissolved solids (TDS) and nitrate concentrations are not a concern in the subbasin (Tehama County Flood Control and Water Conservation District 2021). Occurrences of heightened levels of arsenic exceeding the maximum containment level (MCL) of 10 micrograms per liter have been documented in the subbasin. Arsenic is the most commonly occurring groundwater contaminant in Tehama County, and is a naturally occurring element originating from volcanic rocks in the area (Tehama County Flood Control and Water Conservation District 2012).

4.17.1.2 Surface Water

Beneficial Uses

Beneficial uses are designated for waters of the state by the CVRWQCB as mandated by California Water Code, Section 13240, and the CWA, Section 303. Once designations are determined, surface water quality must be monitored, and the quality maintained to protect those beneficial uses. The main surface waters in the project area are Deer Creek, Delaney Slough, China Slough, and the Sacramento River. The CVRWQCB has designated beneficial uses for Deer Creek and the Sacramento River as listed in Table 4.17-1. Although China Slough and Delaney Slough do not have beneficial uses specifically identified, the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (Central Valley Regional Water Quality Control Board 2018) states that such tributaries adopt the beneficial uses of their parent streams (i.e., Sacramento River and Deer Creek, respectively).

Table 4.17-1 Designated Beneficial Uses for Deer Creek and the Sacramento River

Beneficial Use	Deer Creek	Sacramento River (Red Bluff to Knights Landing)
Municipal and domestic supply	E	E
Irrigation	E	E
Stock watering	E	E
Contact recreation	E	E
Noncontact recreation	E	E
Warm freshwater habitat	E	E
Cold freshwater habitat	E	E
Warm migration habitat	NA	E
Cold migration habitat	E	E
Warm spawning habitat	E	E
Cold spawning habitat	E	E
Wildlife habitat	E	E
Navigation	NA	E

Notes:

E = existing use

NA = not applicable

Source: Central Valley Regional Water Quality Control Board 2018

Surface Water Quality

Surface water quality is affected by turbidity and pollutants. Turbidity levels in the project area and vicinity are typically highest during the winter and early spring because of tributary runoff and bank erosion from higher flows.

The SWRCB is required under CWA Section 303(d) to prepare a list of water bodies 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 related to their respective beneficial uses. 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.

Table 4.17-2 shows the 2014 and 2016 303(d) listings for the water bodies in the project area (California State Water Resources Control Board 2018). Water quality on Deer Creek was assessed and not recommended for listing under Section 303(d). China Slough (from Leininger Road to Sacramento River, Tehama County) is listed as “Category 5A for Unknown Toxicity” based on water quality sampling of toxicity in vertebrates, plants, and invertebrates in the slough; a TMDL is expected in 2021 (California State Water Resources Control Board 2018). The Sacramento River (Red Bluff to Knights Landing) is listed for toxicity, DDT (dichlorodiphenyltrichloroethane), dieldrin, mercury, and PCBs (polychlorinated biphenyls); TMDLs are expected by 2027 (California State Water Resources Control Board 2018). Water quality in Delaney Slough was not assessed as part of the 2014 and 2016 integrated report.

Table 4.17-2 Clean Water Act Section 303(d) List of Water Quality Limited Water Bodies

Pollutant	Deer Creek (Tehama County)	China Slough (from Leininger Road to Sacramento River, Tehama County)	Sacramento River (Red Bluff to Knights Landing)
Toxicity	NA	✓	✓
DDT	NA	NA	✓
Dieldrin	NA	NA	✓
Mercury	NA	NA	✓
PCBs	NA	NA	✓

Notes:

DDT = dichlorodiphenyltrichloroethane

PCB = polychlorinated biphenyls

NA = not applicable

4.17.2 Regulatory Setting

The following plans, policies, regulations, or laws related to water quality apply to the alternatives under consideration. It should be noted that DWR is not subject to local ordinances unless expressly authorized by the legislature. DWR may comply with these local regulations, but is not required to comply. See Chapter 2, "Consistency with Applicable Laws, Regulations, Policies, and Plans," for additional information on the laws, regulations, policies, and plans listed below.

Federal Regulations

- CWA, Section 404 (regulates discharge of dredged or fill material into waters of the United States, including wetlands.) — Applies to impact analysis and planning.
- CWA, Section 401 (State Certification of Water Quality, regulates construction that may result in a pollutant discharge to navigable waters.) — Applies to impact analysis and planning.
- CWA, Section 402 (NPDES permit, required permit for pollutant discharge.) — Applies to impact analysis and planning.
- CWA, Section 303(d) (Surface Water Quality Assessment and

Section 303(d) List of Water Quality Limited Segments, determines the beneficial uses and describes impairments of water bodies.) — Applies to impact analysis and planning.

State Regulations

- Porter-Cologne Water Quality Control Act (relates to protection of water quality from construction and operation activities.) — Applies to impact analysis, planning, construction, and maintenance activities.
- California Toxics Rule and State Implementation Policy (applies to discharges of toxic pollutants into inland surface waters.) — Applies to impact analysis and planning.
- CFGC, Section 1602 (Notification of Lake or Streambed Alteration, requires notification of the CDFW for any activity that would substantially change or use any material from bed, channel, or bank of a stream.) — Applies to impact analysis and planning.
- Statement of Policy with Respect to Maintaining High Quality of Waters in California (Antidegradation Policy) (applies to the disposal of waste to high-quality surface water and groundwater.) — Applies to impact analysis, planning, and construction.
- *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (regulates water quality in Sacramento River and its tributaries.) — Applies to impact analysis and planning.
- General WDRs/NPDES Permit for Limited Threat Discharges to Surface Waters (Order R5-2016-0076-01) (specific NPDES relevant to temporary construction impacts.) — Applies to impact analysis, planning, and construction.

Regional and Local Regulations

- Tehama County General Plan (2009)
    - Policy OS-1.3 (Surface water quality and stream flows for water supply, water recharge, recreation, and aquatic ecosystem maintenance shall be protected while respecting adjudicated and appropriated [California recognized water rights] rights of use.) — Applies to impact analysis, construction, and maintenance.
    - Policy OS-1.5 (The County shall ensure the high quality of groundwater by emphasizing programs that minimize erosion

and prevent the intrusion of municipal and agricultural wastes into water supplies.) — Applies to impact analysis, construction, and maintenance.

4.17.3 Environmental Impacts

4.17.3.1 Methodology

Water quality impacts that could result from project construction, operation, and maintenance activities were evaluated based on the methods and materials that would be used, the location and duration of the activities, and the potential for degradation of groundwater or surface water quality or beneficial uses of the waterways in the project area and vicinity.

4.17.3.2 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of the CEQA Guidelines and professional judgment. Impacts on water quality would be significant if they would:

- Violate any water quality standards or WDRs or otherwise substantially degrade surface or groundwater quality.
- 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.

Water quality impacts are further discussed in Section 4.5, "Biological Resources — Fish and Aquatic Habitat" and Section 4.6, "Biological Resources — Wetlands and Other Waters."

4.17.3.3 Topics Not Evaluated Further

During environmental analysis, the following topics were eliminated from detailed analysis because no impacts from project implementation are anticipated:

- Stormwater drainage systems — There are no existing or planned stormwater drainage systems that the proposed project would contribute to.

4.17.4 Impact Analysis

Impact WQ-1: *Violate any water quality standards or waste discharge requirements or create or contribute runoff water that would provide substantial additional sources of polluted runoff.*

No Project Alternative

Less than Significant. Under the no project alternative, there would be no impact on water quality because no construction would occur. Levee maintenance activities, such as emergency bank stabilization would continue to be implemented using construction best management practice (BMPs) and in compliance with regulatory requirements to protect water quality. Impacts would be less than significant.

Alternatives A through F

<u>Construction-related impacts</u>

Less than Significant with Mitigation Incorporated. Potential groundwater quality impacts would largely be related to potential discharge of harmful substances. Implementation of the proposed project is not anticipated to adversely affect arsenic levels in the Los Molinos Subbasin. Construction activities could bring construction-related contaminants, such as oil and grease, bentonite, and hazardous materials, in contact with the water table. Excavation could extend to a depth that would expose the water table, creating a potential path to groundwater that could allow contaminants to enter the groundwater system and indirectly affect water quality throughout the basin. If contaminants were introduced into the water table during construction, the impact on water quality would be potentially significant. Implementation of the protective measures and adherence to the regulatory requirements included in Mitigation Measure WQ-1 and Mitigation Measure HAZ-1, respectively, would reduce this potential impact to less than significant.

Potential surface water quality impacts would largely be related to potential discharge of harmful substances and increased turbidity during construction. Implementation of the proposed project is not anticipated to adversely affect the levels of CWA Section 303(d) pollutants in the Sacramento River or Deer Creek, with the exception of toxicity. Construction activities associated with levee setbacks, levee removal, bank protection, replacement of Red Bridge, raising levees, channel improvements, and new levee construction could involve storage and use of toxic and other harmful substances near Deer Creek and other agricultural ditches near Deer Creek. These activities could result in discharge of substances to Deer Creek or other water bodies. Construction activities would involve the use of heavy equipment that potentially use 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 any equipment could directly affect the water quality of Deer Creek or other water bodies in the project area and vicinity, and indirectly affect regional water quality of the river or other water bodies. Dewatering activities, if not implemented correctly, could contribute to polluted runoff that could enter Deer Creek or other waterways in the vicinity. Should any of these impacts were to occur during construction, they would have a potentially significant impact on water quality. Implementation of the protective measures and adherence to the regulatory requirements included in Mitigation Measure HAZ-1 would reduce this potential impact to less than significant.

Construction-related ground disturbance, including channel improvements, bridge replacement, as well as levee construction, setbacks, and improvements, has the potential to result in erosion that could increase turbidity in Deer Creek or other water bodies in the project area or vicinity. Improper stabilization of spoil areas could also result in erosion that could increase turbidity. Increased turbidity in these water bodies would have a potentially significant impact on water quality. Implementation of the erosion minimization and control measures and adherence to the regulatory requirements included in Mitigation Measure GEO-1 would reduce these impacts to less than significant.

<u>O&M-related impacts</u>

Less than Significant. Levee and channel maintenance activities, such as emergency bank stabilization, would continue to be implemented using construction BMPs and would comply with regulatory requirements to protect water quality. Impacts would be less than significant. Therefore, the impact would less than significant.

Mitigation Measure WQ-1: *Obtain Appropriate Discharge and Dewatering Permit and Implementation Provisions for Dewatering.*

Before discharging any dewatered effluent to surface water, a low-threat discharge and dewatering NPDES permit will be obtained, or an individual permit from the CVRWQCB will be obtained 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 PM 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 the CVRWQCB. The permittee will verify that coverage under the appropriate NPDES permit has been obtained before allowing dewatering activities to begin. The project proponent or its authorized agent will perform routine inspection of the construction area to verify that the water quality control measures are properly implemented and maintained. Contractors will be notified immediately if there is a non-compliance issue and shall be required to comply.

Mitigation Measure GEO-1: *Acquire Appropriate Regulatory Permits, Prepare and Implement a Storm Water Pollution Prevention Plan and Associated Best Management Practices for Grading and Erosion Control.*

Refer to Impact GEO-2 in Section 4.10, "Geology, Soils, and Paleontological Resources," for the full text of this mitigation measure.

Mitigation Measure HAZ-1: *Implement a Spill Prevention Control and Countermeasures Plan to Reduce the Potential for Environmental Contamination during Construction Activities.*

Refer to Impact HAZ-1 in Section 4.12, "Hazards and Hazardous Materials," for the full text of this mitigation measure.

4.18 Wildfires

4.18.1 Affected Environment

The project area consists of agricultural land, including orchards, row crops, and grazing land, as well as riparian vegetation, and small areas of oak woodland savannah. A few rural residences are located adjacent to Deer Creek. The majority of China Slough is surrounded by agricultural land, but a portion is bordered by residences. At its confluence with Deer Creek, China Slough is bordered by riparian vegetation.

4.18.1.1 Surrounding Infrastructure

The main roads in the project area include Vina Road, Golonka Lane, Leininger Road at Red Bridge, and 7th Street. Pacific Gas and Electric Company provides both electrical and natural gas services to the project area.

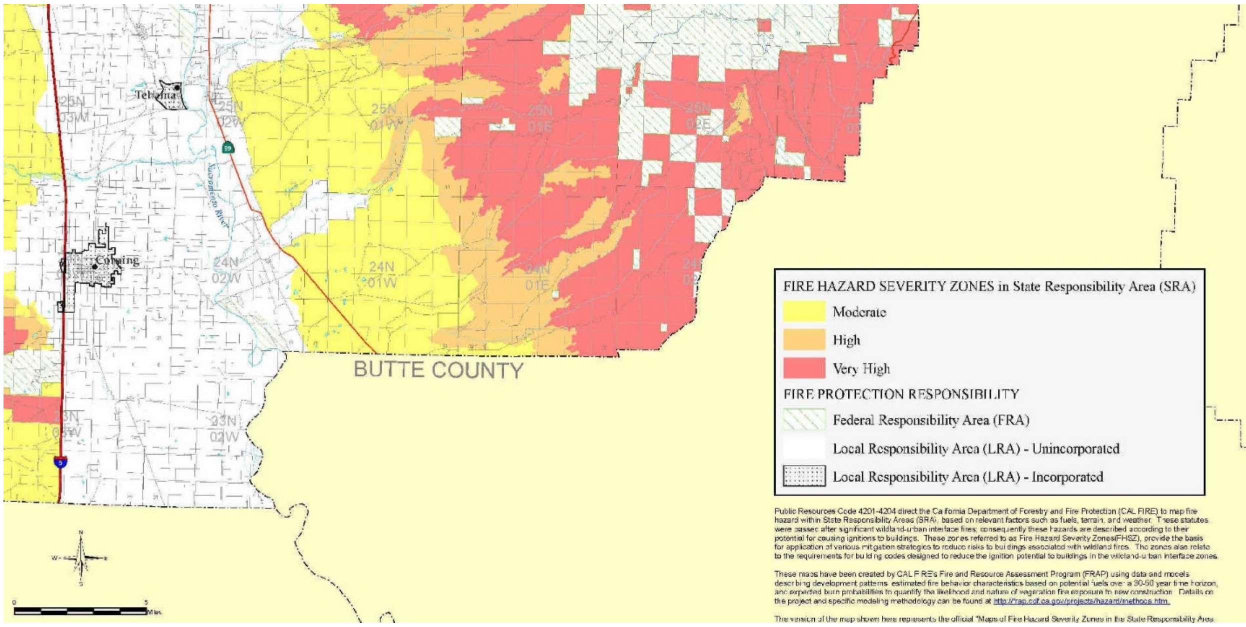
4.18.1.2 Fire Hazard Severity Zones

Tehama County is vulnerable to wildfires. Hot summers, limited rainfall, and rural land use contribute to increased risk of wildland/urban interface fires.

The California Department of Forestry and Fire Protection (CAL FIRE) assigns FHSZ classifications based on anticipated fire-related hazards to buildings within State responsibility areas (SRAs) and LRAs. The classifications include moderate, high, and very high. Fire hazard classifications take into account relevant factors such as vegetation, topography, and weather (California Department of Forestry and Fire Protection 2007).

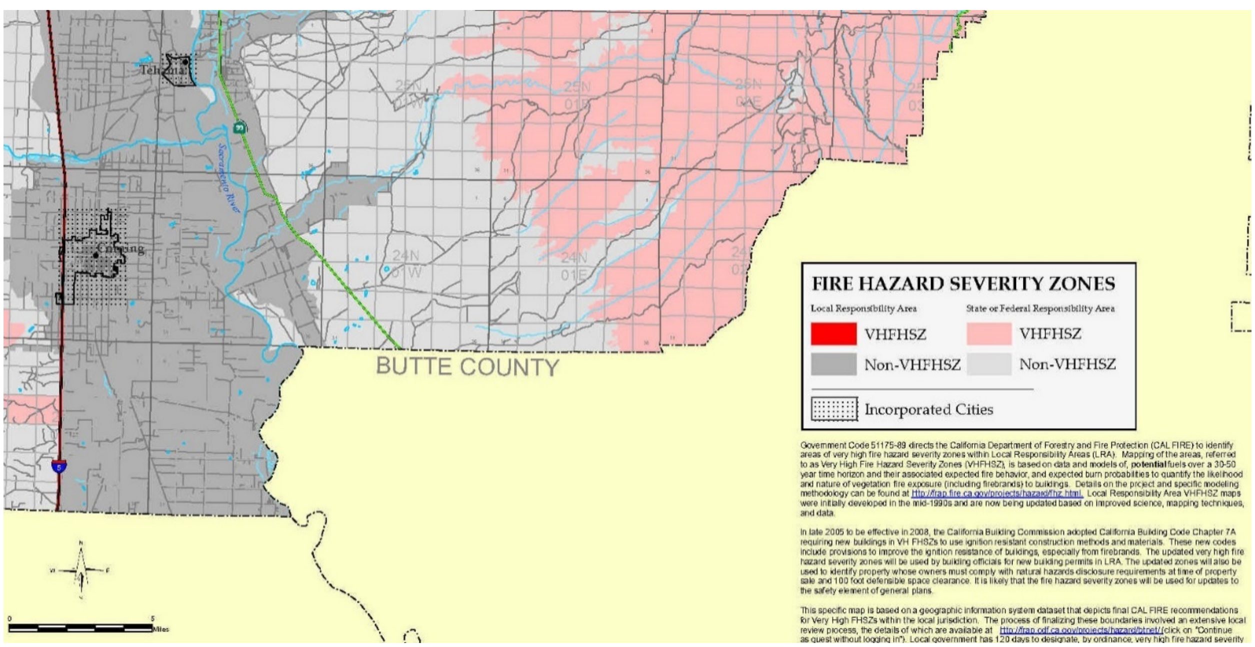
As indicated in Figures 4.18-1 and 4.18-2, the majority of the project area is located in an LRA. The area northeast of Deer Creek and east of Leininger Road is located in an SRA classified as a Moderate FHSZ (California Department of Forestry and Fire Protection 2007). Areas west of Leininger Road are located in an LRA classified as a Non-Very High FHSZ (California Department of Forestry and Fire Protection 2008).

Figure 4.18-1 Fire Hazard Severity Zone Classifications for State Responsibility Areas in Tehama County, California



Source: California Department of Forestry and Fire Protection 2007

Figure 4.18-2 Fire Hazard Severity Zone Classifications for Local Responsibility Areas in Tehama County, California



Source: California Department of Forestry and Fire Protection 2008

4.18.2 Regulatory Setting

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

4.18.3 Impacts and Mitigation

4.18.3.1 Significance Criteria

Significance criteria represent the thresholds used to identify whether an impact would be potentially significant. These criteria are based on Appendix G of CEQA Guidelines, professional judgment, and regulatory and administrative precedent. If located in or near SRAs or lands classified as Very High FHSZs, wildfire risks would be significant if they would:

- Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.
- Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.
- Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

The project's potential to substantially impair an adopted emergency response plan or emergency evacuation plan is discussed in Section 4.12, "Hazards and Hazardous Materials."

Impact Analysis

Impact WF-1: *Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.*

No Project Alternative

Construction-related Impacts

No Impact. There would be no impact resulting from exacerbated wildfire risks because there would be no construction under the no project alternative. Maintenance activity would be limited to any emergency bank stabilization needed to maintain the levees. No other changes to O&M would occur. Maintenance activities would comply with all fire safety protocol to reduce the potential for a wildfire. Therefore, the impact would be **less than significant.** The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding are described in Chapter 6, "No Project Alternative," under "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than significant with Mitigation Incorporated. The project area is not located in or near an SRA or LRA classified as a Very High FHSZ. The project area is located in a gently sloping valley with no steep slopes; steep areas are in the upper watershed, well outside of project boundaries (Deer Creek Watershed Conservancy 2011). Existing and proposed project levees have steeper slopes than the surrounding land, but all would be built to the 3H:1V levee slope standard and would not be expected to exacerbate wildfire risks.

Trucks transporting construction-related material on and off site, including to staging and stockpiling areas, would bring fuels and vehicles to the project area. The presence of fuels on site, as well as the presence of vehicles adjacent to dry grass areas or other flammable vegetation, could exacerbate fire risk. Although the project area is not located in or near an SRA or LRA classified as a Very High FHSZ, if a wildfire were to occur as a result of construction activities impacts would be potentially significant. Development and implementation of the fire protection and prevention plan included in Mitigation Measure HAZ-2 would reduce this potential impact to **less than significant.**

Mitigation Measure HAZ-2: *Develop and Implement a Fire Protection and Prevention Plan.*

Refer to Mitigation Measure HAZ-2 in Section 4.12, "Hazards and Hazardous Materials," for the full text of this mitigation measure.

O&M-related Impacts

Less than significant. Maintenance activities would be similar to existing conditions, but would be required less frequently than under existing conditions. Continued levee repair, channel maintenance, and vegetation management would not be expected to exacerbate wildfire risk. Therefore, the impact would be **less than significant.**

Impact WF-2: *Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.*

No Project Alternative

Construction-related Impacts

No Impact. No construction or associated maintenance of infrastructure would occur under the no project alternative, so no impact would occur. The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding are described in Chapter 6, "No Project Alternative," under "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than significant. During construction, existing roads would be used for access and designated staging areas would be graded to minimize the risk of wildfire. The environmental impacts of these activities are addressed in the appropriate resource sections of this EIR. These activities would not exacerbate fire risk; impacts would be **less than significant**.

O&M-related Impacts

Less than significant. The proposed project would install new setback levees and raise levees. Levees are not considered infrastructure that could exacerbate fire risk. In addition, levee maintenance activities would be similar to existing conditions but would be required less frequently than under existing conditions. Continued levee repair would not be expected to exacerbate wildfire risk. Impacts would be **less than significant.**

Impact WF-3: *Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.*

No Project Alternative

Construction-related Impacts

No Impact. Under the no project alternative, no construction or change in operation or maintenance would occur. With no change to existing conditions, the no project alternative would have no impact. The consequences and environmental effects of continued O&M, as well as potential levee failure and flooding are described in Chapter 6, "No Project Alternative," under "Consequences of No Action."

Alternatives A through F

Construction-related Impacts

Less than Significant. The relatively flat topography of the project area and vicinity does not provide conditions that would pose a landslide risk. In addition, construction would occur during the dry season, slopes would be stabilized, and disturbed areas would be replanted. Therefore, project-related risks of landslide would be **less than significant**.

As described in Chapter 4.13, "Hydrology, Hydraulics and Flood Risk," construction activities on Deer Creek would be sequenced in such a way that flood protection would be maintained throughout the construction period. Construction activities would be temporary, would be constructed during low flow conditions, would be in compliance with SWPPP requirements, and would not contribute to flooding. Excavation of China Slough would occur when much of the slough would be dry; areas of standing water would be pumped from the slough onto adjacent fields with flat topography. Therefore, construction impacts would be **less than significant.**

O&M-related Impacts

Beneficial. As described in Chapter 3, "Project Description" and Chapter 4.13, "Hydrology, Hydraulics, and Flood Risk," once completed the project would provide the design level of protection from downslope or downstream flooding. The project would reduce the exposure of people or structures to significant risks such as downstream flooding, resulting in a beneficial effect.

Chapter 5. Other CEQA Considerations

Section 15126 of the CEQA Guidelines requires that all aspects of a project—planning, acquisition, development, and operation—be considered when evaluating impacts on the environment. As part of this analysis, the EIR must also identify all of the following:

- Significant environmental effects of the proposed project.
- Significant environmental effects that cannot be avoided if the proposed project is implemented.
- Significant irreversible environmental changes that would result from implementation of the proposed project.
- Population growth-inducing impacts of the proposed project.

Section 15130(a) of the CEQA Guidelines requires that an EIR assess the cumulative impacts potentially associated with implementation of the proposed project. Section 5.1, "Cumulative Impacts," below, presents the cumulative impact assessment for this project.

Section 15126.2(c) of the CEQA Guidelines requires a discussion of any significant and irreversible environmental changes that would be caused by the project. This analysis is presented in Section 5.2, Significant Irreversible Environmental Changes."

Section 15126.2(b) of the CEQA Guidelines requires that an EIR describe any significant impacts that cannot be avoided, even with implementation of feasible mitigation measures. Chapter 4, "Environmental Setting, Impacts, and Mitigation Measures." of this EIR presents the effects of the proposed project on various aspects of the environment. Section 5.3, "Significant and Unavoidable Impacts," identifies any significant and unavoidable impacts identified in Chapter 4.

Section 15126.2(d) of the CEQA Guidelines requires that an EIR evaluate the growth-inducing impacts of the project. This analysis is presented in Section 5.4, "Growth-inducing Impacts."

5.1 Cumulative Impacts

5.1.1 Introduction

As defined in CEQA Guidelines Section 15355, a cumulative impact is an environmental impact resulting from the combination of the proposed project's impacts and impacts from other projects, as defined below per CEQA Guidelines Section 15130(b)(1). CEQA Guidelines Section 15130 requires the consideration of cumulative impacts within an EIR when the incremental effects of a project are cumulatively considerable. As defined in Section 15130, "cumulatively considerable" means that "...the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects."

CEQA Guidelines Section 15130(b)(1) identifies two basic methods for establishing the cumulative environment in which the proposed project is to be considered:

6. The use of a list of past, present, and probable future projects.
7. The use of projections contained in adopted relevant planning documents (projections) that describe or evaluate conditions contributing to the cumulative effect.

The first approach evaluates past, present, and probable future projects, producing related or cumulative impacts, including those outside of the control of the lead agency. The second approach uses a summary of projections in adopted planning documents that describe or evaluate regional conditions contributing to cumulative impacts. The first approach is used in this analysis because of the readily available information about existing and proposed projects and lack of applicable projections for this type of project.

5.1.2 Method of Analysis

This cumulative impact analysis involved three steps:

- Define and present the geographic scope of potential cumulative impacts.
- List and summarize past, present, and probable future (reasonably foreseeable) projects to include in the cumulative analysis.
- Conduct cumulative impact analyses (Section 5.1.3.2, "Cumulative Impacts by Resource Topic").

Each step is described in more detail below.

5.1.2.1 Geographic Scope

CEQA Guidelines indicate that lead agencies "should define the geographic scope of the area affected by the cumulative effect" (CCR 15130[b][3]). Although the geographic scope affected by cumulative impact varies by resource topic, it can consist of the following four geographic areas:

- Local — The defined Lower Deer Creek project area (see Figure 1-1, "Lower Deer Creek Flood and Ecosystem Improvement Project Location"), where all new and setback USACE levees and other project elements would be located, constructed, and operated.
- Regional — The project vicinity and region shown in the right-side inset image of Figure 1-1, where some project effects would occur when considered in a cumulative context such as to air quality and GHG emissions (see topic-specific geographic areas below).
- Regional Transportation Network — The linear transportation corridors used for truck haul routes during construction.
- Global — The entire planet, specific to air quality and GHG emissions.

Impact analysis in this draft EIR considers the following geographic areas as appropriate for each resource topic.

- Aesthetics — Local (individual improvement sites) and immediate vicinity.
- Agricultural Resources and Land Use — Local (project area) and regional.
- 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 Habitat) — Local (individual improvement sites) and regional.
- Biological Resources (Wetlands and Other Waters — Local (individual improvement sites) and regional.
- Biological Resources (Vegetation) — Local (individual improvement sites) and regional.
- Biological Resources (Wildlife) — Local (individual improvement sites), and regional.

- Cultural Resources (Archaeological, Historical, and Tribal Cultural) — Local (individual improvement sites) and regional.
- Geology, Soils, and Paleontological Resources — Local (individual improvement sites) and regional (Sacramento Valley for paleontological resources).
- Greenhouse Gas Emissions and Climate Change — Local (individual improvement sites), regional, and global.
- 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.
- Noise — Local (immediate vicinity of the local improvement sites and along access routes to SR 99 during construction activities) and regional transport network for truck haul routes during construction (up to 50 miles from the project area, primarily along portions of SR 99 and I-5).
- Transportation — Local (roadways in immediate vicinity of the project area and along access routes to SR 99 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 SR 99 and I-5).
- Utilities and Service Systems — Local service areas.
- Water Quality and Groundwater Resources — Local and regional.
- Wildfires — Local (individual improvement sites) and immediate vicinity.

5.1.2.2 List of Plans and Projects Included in the Cumulative Analysis

Table 5-1 lists the related (cumulative) plans and projects identified for the proposed project. The related projects comprise a list of approved, proposed, or in-progress projects in Tehama County in the vicinity of the proposed project. The list includes projects of various purposes, including transportation, flood protection, and water infrastructure.

Table 5-1 List of Plans and Projects included in the Cumulative Analysis

Name	Type	Location	Lead Agency/ Proponent	Description	Status
Jelly's Ferry Road over the Sacramento River Bridge Replacement Project	Transportation	Tehama County	Tehama County Public Works	Replace bridge.	Estimated project completion: Fall 2022.
Stanford Avenue, Los Molinos, sidewalk construction	Transportation	Tehama County	Tehama County Public Works	Construct and repair sidewalk	Estimated project completion: Summer 2021.
Five Intersections: South Avenue and SR 99 (W)	Transportation	Tehama County (South Avenue and Rowles Road, South Avenue and Marguerite Avenue, South Avenue and Woodson Avenue, Finnell Avenue and SR 99 [W], and Capay Road and SR 99 [W].)	Tehama County Public Works	Install splitter-islands on minor road approaches. Remove pavement markings and upgrade intersection pavement markings (include a slurry seal); install flashing beacons as advanced warning on major road approaches.	Estimated project completion: 2022 (not yet started).

Name	Type	Location	Lead Agency/ Proponent	Description	Status
SR 99 (W): Gyle Road to South Main-I-5 overcrossing	Transportation	Tehama County (from Gyle Road intersection of SR 99 [W] (formerly old SR 99] extending north to Red Bluff ending at I-5 over-crossing.)	Tehama County Public Works	Resurface, reconfigure pavement delineation and reflective markers, and improve and add signalization at I-5 interchange.	Estimated project completion: 2022 (not yet started).
SR- 99 (W) Gap Closure	Transportation	Tehama County	Tehama County Public Works	7.2 miles of improvements, including pavement rehabilitation, shoulder widening (8-foot-wide shoulders), and intersection improvements.	Estimated project completion: 2023 (not started).
Champlin Slough Bridge Replacement SR 99	Bridge Replacement	Tehama County	Tehama County Public Works	Replace bridge over Champlin Slough in Tehama County.	MND adopted May 2020; Estimated project completion: 2022 (not started).
Corning Road at Squaw Hollow Creek storm damage repair	Transportation	Tehama County	Tehama County Public Works	Repair and maintain storm-damaged bridge.	Estimated project completion: 2021 (not started).

Name	Type	Location	Lead Agency/ Proponent	Description	Status
Gallagher Avenue intersections	Transportation	Tehama County	Tehama County Public Works	Improvements to two intersections on Gallagher Avenue: the intersection of Gallagher Avenue and Houghton Avenue, and the intersection of Gallagher Avenue and Edith Avenue. Improvements include flashing beacons, all-way stop, and rumble strips.	Estimated project completion: 2022 (not started).
Kirkwood Road and Columbia Avenue bridge replacement projects	Transportation	Tehama County	Tehama County Public Works	Replace two bridges at Jewett Creek in Corning.	Estimated project completion: Fall 2021 (not started).
Stanford-Vina Dam Fish Passage Planning and Design Project	Water Infrastructure	Tehama County	Trout Unlimited and SVRIC	Replace existing dam with a roughened ramp to improve fish passage over the SVRIC Diversion Dam.	Estimated project completion: Fall 2024 (not started).
Central Valley Flood Protection Plan – Mid & Upper Sacramento Regional Flood Management Plan	Flood Protection	Tehama County	Tehama County Flood Control and Water Conservation District	Regional plan to address flood management priorities and challenges. The relevant area for the project area is the Mid & Upper Sacramento River Regional Flood	Ongoing.

Name	Type	Location	Lead Agency/ Proponent	Description	Status
				Management Plan.	
2017 Storm Damage Rehabilitation Site 80: Deer Creek Levee Erosion Repair (near Vina)	Flood Protection	Tehama County	DWR	Repair waterside erosion of a 175-foot section of levee along Deer Creek.	Completed: August 2021.
Debris removal on Deer Creek	Flood Protection	Tehama County	Tehama County and DWR	Remove debris (obstruction) and manage invasive vegetation within specific Deer Creek channel reaches.	Ongoing.
Recovery Plan for the Evolutionarily Significant Units of Sacramento River Winter-run Chinook Salmon and Central Valley spring-run Chinook salmon and the distinct population segment of California Central Valley steelhead	Habitat Restoration	Northern California, including Tehama County	NMFS and NOAA	Recovery plan goal to remove Sacramento River winter-run Chinook salmon ESU, Central Valley spring-run Chinook salmon ESU, and California Central Valley steelhead DPS from the federal list of endangered and threatened wildlife.	Ongoing.

Name	Type	Location	Lead Agency/ Proponent	Description	Status
DCID water-use efficiency project/near-term improvements	Water Efficiency	Tehama County	Trout Unlimited	Project plan goal to improve fish passage at the DCID dam and ensure water supply reliability for DCID.	Ongoing.
Deer Creek DCID Dam Fish Passage Project	Fish Passage	Tehama County	DCID	Construct roughened channel downstream of the existing dam; other associated improvements to improve adult and juvenile fish passage.	Design complete.
Cone-Kimball Fish Ladder Installation Project	Fish Passage	Tehama County	UFSWS and CDFW	Construct a new fish ladder to improve fish passage.	Planning stage.
Lower Tuscan aquifer monitoring, recharge	Groundwater Recharge	Tehama County	DWR	Field investigation to improve the scientific understanding of the properties of the Lower Tuscan Aquifer system.	Complete, but monitoring continues.
Lower Deer Creek Falls Fish Passage Improvement Project	Fish Passage	Tehama County	USFWS and CDFW	Installed a new fish ladder to remove the passage barrier in Lower Deer Creek for spring-run Chinook salmon and Central Valley steelhead.	Completed: December 2017.

Name	Type	Location	Lead Agency/ Proponent	Description	Status
Upper Deer Creek Meadow Restoration Project	Restoration	Tehama County	RCD of TC	This planning project involves baseline monitoring, geo-technical site analysis, development of restoration designs, and environmental analysis and permitting for future meadow restoration work within Deer Creek Meadows and the removal of two unstable bridges spanning Deer and Gurnsey creeks that are no longer used.	Early planning stage.
Abbey of New Clairvaux Improvements	Building Repair and Construction	Tehama County	Tehama County	Improvements to the Abbey including expanded turnaround area, road rerouting and repaving, and aesthetic improvements.	Early planning stage. Estimated Construction Completion: Fall 2022.

Notes:

CDFW = California Department of Fish and Wildlife; DCID = Deer Creek Irrigation District; DPS = distinct population segment; DWR = Department of Water Resources; ESU = evolutionary significant unit; I-5 = Interstate 5; MND = mitigated negative declaration; NMFS = National Marine Fisheries Service; NOAA = National Oceanic and Atmospheric Administration; SR 99 = State Route 99; SVRIC = Stanford-Vina Ranch Irrigation Company; UFSWS = United States Fish and Wildlife Service; W = West

5.1.3 Cumulative Impact Analysis

The cumulative impact analysis below is guided by the requirements of CEQA Guidelines Section 15130. Key principles established by this section include:

- A cumulative impact only occurs from impacts caused by the proposed project and other projects. An EIR should not discuss impacts that do not result from the proposed project.
- When the combined cumulative impact from the increment associated with the proposed project and other projects is not significant, an EIR need only briefly explain why the impact is not significant; detailed explanation is not required.
- An EIR may determine that a project's contribution to a cumulative effect impact would be rendered less than cumulatively considerable if a project is required to implement or fund its fair share of mitigation intended to alleviate the cumulative impact.
- Impacts that were screened out from analysis are not included in this list.

5.1.3.1 Cumulative Impact Significance Criteria

For the purposes of this draft EIR, the proposed project would have a significant cumulative effect if:

- The cumulative effects of related projects (past, present, and probable future projects) are not significant and the incremental impact of implementing the proposed project would be substantial enough, when added to the cumulative effects of related projects, to result in a new cumulatively significant impact.
- The cumulative effects of related projects (past, current, and probable future projects) are already significant, and implementation of the proposed project would make a considerable contribution to the effect.

The standards used to determine whether a contribution is considerable are that the impact must be substantial or must exceed an established threshold of significance.

In the cumulative impact analysis below, the proposed project was found to make a cumulatively considerable incremental contribution to a significant cumulative impact related to the following resource topics:

- Air Quality — Increases in emissions above established thresholds.

- Agricultural Resources and Land Use — Permanent loss of agricultural land.
- Greenhouse Gas Emissions — Increases in emissions above established thresholds.

There are no feasible mitigation measures to further reduce the cumulatively considerable incremental contribution to these significant cumulative impacts. For all other resource topics and impacts, the proposed project would not make a cumulatively considerable incremental contribution to a significant cumulative impact.

5.1.3.2 Cumulative Impacts by Resource Topic

Resource topics that were eliminated from further discussion, as described in Chapter 4.13, are not included in this analysis because they would not contribute a cumulatively considerable impact. The following discussions evaluate cumulative impacts by resource topic.

5.1.3.3 Aesthetics

The geographic scope for the cumulative analysis of aesthetic impacts includes the project area and immediate vicinity, including views from SR 99 and Leininger Road. As described in Section 4.2, "Aesthetics," project impacts to aesthetics generally would be related to temporary construction activities and would be less than significant.

Additional levee and channel O&M activities along Deer Creek, proposed as part of the Mid & Upper Sacramento River Regional Flood Management Plan (RFMP), could result in additional aesthetic impacts. The temporary impacts of the RFMP activities and other cumulative projects would include temporary visual degradation from construction. If temporary construction impacts were not coordinated with the proposed project and resulted in long-term temporary impacts, the aesthetic impacts potentially could be significant. But, because of the limited public views along Deer Creek and the distance from viewsheds to the proposed locations of the Mid & Upper Sacramento River RFMP O&M activities, impacts likely would not be significant, and the proposed project would not generate a cumulatively considerable incremental contribution that would result in a new cumulatively significant impact.

5.1.3.4 Agricultural Resources and Land Use

The cumulative geographic scope for agricultural resources and land use includes the lower Deer Creek agricultural land, Tehama County, and the northern Central Valley region. For the purposes of this analysis, Important Farmland is considered to be "agricultural land" as defined in California Public Resources Code Section 21060.1 and CEQA Guidelines. Thus, Important Farmland encompasses the designations of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance. Between 2012 and 2014, Tehama County reported a net loss of 551 acres of Important Farmland, representing a 0.2 percent loss of the County's total of 232,564 acres. The net loss represents a loss of 1,907 acres of Farmland of Local Importance and a combined gain of 1,356 acres of Prime Farmland, Unique Farmland, and Farmland of Statewide Importance (California Department of Conservation 2014).

As detailed in Section 4.3, "Agricultural Resources and Land Use," the proposed project would directly and permanently convert Important Farmland to nonagricultural uses for the purpose of flood management and conservation to allow for channel migration. In addition, implementation of these facilities may cause Williamson Act contracts to be cancelled (refer to Tables 4.3-1 and 4.3-2 in Section 4.3, "Agricultural Resources and Land Use," for acreages of agricultural land and land held under Williamson Act contracts that would be converted under each project alternative). Significant impacts would occur under each project alternative.

While none of the cumulative projects under consideration would result in conversion of Important Farmland to nonagricultural uses, the proposed project would contribute to the loss of agricultural land and the impact would be significant. Implementation of Mitigation Measure AG-1 and Mitigation Measure GEO-2 would reduce impacts to less than significant, with the exception of a conflict with existing zoning or Williamson Act contracts, which may remain significant and unavoidable. Consequently, the proposed project could result in a cumulatively considerable incremental contribution that would represent a new cumulatively significant impact to agricultural lands.

5.1.3.5 Air Quality

As presented in Table 4.4-4 in Section 4.4, "Air Quality," Tehama County is designated as nonattainment for the State ozone and PM_{10} standards. Any project activities that would individually have a significant air quality impact over a significance threshold for ROGs, nitrogen oxide (NO_x), or PM_{10} would be considered cumulatively significant. As shown in Table 4.4-7 in Section 4.4, "Air Quality," the proposed project would generate construction-related emissions that exceed the TCAPCD significance threshold for NO_x. Implementation of Mitigation Measures AQ-1 and AQ-2 would reduce the proposed project's construction-related emissions, but emissions would still exceed the Tehama County Level B threshold and remain potentially significant and unavoidable. Consequently, the proposed project could result in a cumulatively considerable incremental contribution to an existing cumulatively significant impact on air quality.

Project construction vehicles and equipment would potentially emit substantial quantities of DPM within 500 feet of sensitive receptors along the haul routes. The Stanford-Vina Dam Fish Passage Project may also emit DPM along haul routes. If constructed at the same time, impacts would be cumulatively considerable. Although no environmental document has been created yet for the fish passage project, the project is not anticipated to result in significant air quality impacts. Although this other project would not contribute cumulatively considerable emissions, after implementation of Mitigation Measures AQ-1 and AQ-2, the proposed project may still expose sensitive receptors to substantial temporary quantities of DPM and would remain potentially significant and unavoidable. Consequently, the proposed project could result in a cumulatively considerable incremental contribution that would represent a new cumulatively significant impact to air quality.

5.1.3.6 Biological Resources: Fish and Aquatic Habitat

The geographic scope for fish and aquatic habitat includes the project vicinity and region, in particular the streams that support spring-run Chinook salmon as described in the NMFS Recovery Plan (National Marine Fisheries Service 2014).

As discussed in Section 4.5, "Biological Resources — Fish and Aquatic Habitat," implementation of the proposed project could result in temporary impacts on fish and aquatic habitat. Construction activities could temporarily degrade water quality, remove riparian vegetation, and interfere with fish passage. Implementation of mitigation measures FISH-1 through FISH-3, GEO-1, HAZ-1, and WQ-1 would reduce these potential impacts to less-than-significant levels.

Proposed project activities, and reasonably foreseeable future projects and programs, would affect aquatic biological resources, but those that are known, including the Deer Creek DCID Dam Fish Passage Project and the proposed Stanford-Vina Dam Fish Passage Planning and Design Project, are anticipated to benefit fish and aquatic habitat. The net effect of new and ongoing programs, projects, and restoration efforts in the Deer Creek watershed is difficult to predict; but, over time, these projects would be expected to maintain and likely benefit fish populations and available aquatic habitats. Likewise, the proposed project would result in an overall long-term benefit to fish and aquatic habitat through a substantial increase in seasonal floodplain habitat, and implementing mitigation measures to protect water quality would minimize the potential for project-related adverse impacts on aquatic biological resources. Therefore, the proposed project would not result in a cumulatively considerable incremental contribution to an existing cumulatively significant impact on special-status fish species, fish passage, designated critical habitat, or EFH.

5.1.3.7 Biological Resources: Wetlands and Other Waters

The geographic scope for impacts on wetlands and other waters includes the project vicinity and region. Although other projects listed in Table 5-1 could have significant impacts on wetlands and other waters and be cumulatively considerable, these projects would be required to comply with environmental laws and regulations, including obtaining regulatory permits from agencies such as the CDFW, CVRWQCB, and USACE. These related projects also would need to compensate for loss of wetlands and other waters on a no-net-loss basis, at a minimum. As discussed in Section 4.6, "Biological Resources — Wetlands and Other Waters," the proposed project could result in temporary impacts to jurisdictional wetlands and other waters through water quality degradation, fill, or hydrologic interruption. With implementation of the protective and compensatory measures included in Mitigation Measure WETLAND-1, WETLAND-2, WQ-1, GEO-1, and HAZ-1, and compliance with environmental laws and regulations, impacts on jurisdictional wetlands and other waters through direct removal, filling, or hydrological interruption would be less than significant. Therefore, the project would not result in a cumulatively considerable incremental contribution to existing cumulatively significant impacts related to the loss or degradation of wetlands or other waters.

5.1.3.8 Biological Resources: Vegetation

The geographic scope for vegetation impacts includes the project vicinity and region. Construction, as described in Section 4.7, "Biological Resources — Vegetation," could result in impacts on special-status plant species and sensitive habitat. Implementation of Mitigation Measures VEG-1 through VEG-4, GEO-1, and HAZ-1 would reduce potential construction-related impacts to less-than-significant levels. Therefore, it is not anticipated that the proposed project would result in a cumulatively considerable incremental contribution to impacts related to the loss or degradation of sensitive habitats or adverse impacts on special-status plant species.

5.1.3.9 Biological Resources: Wildlife

The geographic scope for wildlife impacts includes the project vicinity and region. Construction, as described in Section 4.8, "Biological Resources — Wildlife," could have impacts on special-status wildlife species and designated critical habitat. Implementation of Mitigation Measures WILDLIFE 1 through WILDLIFE 10, GEO-1, HAZ-1, VEG-3, and WETLAND-2 would reduce potential construction-related impacts to less-than-significant levels. Therefore, it is not anticipated that the proposed project would result in a cumulatively considerable incremental contribution to impacts related to the loss or degradation of wildlife habitats or adverse impacts on special-status wildlife species.

5.1.3.10 Cultural and Tribal Cultural Resources

The geographic scope for cultural and tribal cultural resources includes the project vicinity and region. However, a project's impacts with respect to cultural resources are generally site specific and would not affect or be affected by other development in the region; an impact to one cultural resource would be considered significant, regardless of other cumulative cultural resource impacts. As described in Section 4.9, "Cultural and Tribal Cultural Resources," given past investigations in the region, cultural and tribal cultural resources are likely to be present within the project area and could be adversely affected by construction-related activities. Implementation of Mitigation Measures CR-1 through CR-5 would reduce potential project impacts to less than significant.

Similar to the proposed project, cultural and tribal cultural resources are likely to be present within the project areas of other projects under consideration. But, these projects would implement mitigation as needed on an individual project basis by examining specific project circumstances, in accordance with State and local requirements and other environmental analyses. Therefore, the proposed project's incremental effects would not be cumulatively considerable when viewed in connection with the effects of other projects evaluated.

5.1.3.11 Geology, Soils, and Paleontological Resources

The cumulative geographic scope for geology, soils, and paleontological resources is defined as the proposed project area and the immediate project vicinity.

As discussed in Section 4.10, "Geology, Soils, and Paleontological Resources," strong seismic ground shaking and associated hazards such as liquefaction, fault rupture, and landslides generally do not pose a hazard in the project area or vicinity, which is not located in a seismically active area or an area with steep slopes. All flood risk reduction facility construction or modification (e.g., new setback levees, bank protection) as well as the Red Bridge realignment conducted as part of the project proposed improvements 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. This design, along with implementation of Mitigation Measures GEO-1 and GEO-2, would reduce potential impacts to less than significant. Similarly, other projects under consideration would comply with industry standards for construction, would not be located in a seismically active area or an area with steep slopes, , and would not be expected to result in significant impacts.

The formations within the project area and vicinity are considered to be of low paleontological sensitivity. Implementation of Mitigation Measure GEO-3 would reduce potential impacts to less than significant. Similarly, other projects under consideration would be located in an area with low paleontological sensitivity and would not be expected to result in significant impacts. Consequently, the proposed project would not generate a cumulatively considerable incremental contribution that would result in a new cumulatively significant impact to geology, soils, or paleontological resources.

5.1.3.12 Greenhouse Gas Emissions and Climate Change

The geographic scope for GHG emissions includes the entire planet; however, the cumulatively significant threshold is determined by the Tehama County APCD. As described in Section 4.11, "Greenhouse Gas Emissions and Climate Change," after implementation of Mitigation Measure AQ-2 and further project design development, the project would still potentially generate a significant amount of GHG emissions and impacts would remain significant and unavoidable. Consequently, the proposed project, with or without the combined effects of other projects under consideration, could result in a cumulatively considerable incremental contribution that would represent a new cumulatively significant impact on global climate change through GHG emissions.

5.1.3.13 Hazards and Hazardous Materials

The geographic scope for hazards varies by hazard, but generally includes the project vicinity and region, including Tehama County as a unit for planning hazard mitigation and response. As analyzed in Section 4.12, "Hazards and Hazardous Materials," the proposed project could result in significant impacts related to the transportation, use, storage, and disposal of hazardous materials. With implementation of Mitigation Measures HAZ-1, HAZ-2, and TR-1, these impacts would be reduced to less than significant.

Implementation of projects identified in Table 5-1 would also require the handling of hazardous materials and, to a minor extent, would result in a temporary increase in hazardous materials transport, use, and disposal. Although some potential for accidental release of hazardous materials exists, the risk would be minimized for those projects through compliance with federal, State, and local regulations, inclusive of project-specific SWPPP and best management practices where applicable. If an accidental release of hazardous materials were to occur, the applicable measures and best management practices for those projects would be implemented. In addition, such a release likely would be a short-term event, and would not be expected to have a cumulatively considerable impact. Adherence to regulations would preclude activities that could lead to long-term, cumulative impacts related to the handling or use of hazardous materials. Therefore, the proposed project's incremental effects would not be cumulatively considerable when viewed in connection with the effects of other projects evaluated.

5.1.3.14 Hydrology, Hydraulics, and Flood Risk Management

The geographic scope for hydrology includes the Deer Creek watershed. The lower watershed at the confluence with the Sacramento River is understood to be a backwater to the Sacramento River under flood conditions (see Appendix I, Geomorphic Assessment). Because of these hydrologic conditions, the larger Sacramento River system would not be affected by the proposed project and is not considered part of the geographic scope of the project.

As described in Section 4.13, "Hydrology, Hydraulics, and Flood Risk Management," the proposed project is expected to have a beneficial impact on hydraulics and flood risk reduction in the area by restoring the design freeboard criteria of the levees. Cumulatively considerable projects related to hydrology include the Deer Creek DCID Dam Fish Passage Project and the Stanford-Vina Dam Fish Passage Planning and Design Project. These projects are expected to improve erosion and sedimentation issues in the channel, and, consequently, will have a beneficial impact on hydraulics. With implementation of the proposed project and other projects under consideration, the proposed project would not result in a cumulatively considerable incremental contribution that would create a new cumulatively significant impact and is anticipated to improve existing hydraulic conditions and flood protection in the Deer Creek watershed.

5.1.3.15 Noise and Vibration

The geographic scope for noise and vibration is site specific; ambient noise levels adjacent to specific project areas and in the project vicinity are generated by local and distant traffic, rail operations, agricultural activities, and natural sources (e.g., wind and birds). As described in Section 4.14, "Noise and Vibration," project-generated construction traffic and equipment noise would exceed the applicable 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. Implementation of Mitigation Measure NOI-1 would reduce project-related noise impacts but would not reduce the impacts to less-than-significant levels; they would remain significant and unavoidable. Consequently, the proposed project, with or without the combined effects of other projects under consideration, would result in a cumulatively considerable incremental contribution that would represent a new cumulatively significant impact on noise levels.

5.1.3.16 Transportation

The geographic scope of effects on transportation consists of the publicly available roadways connecting the project area to the region.

There are no known projects that would affect the local haul routes shown in Figure 3-8 of Chapter 3, "Description of Project Alternatives." Because construction-related traffic impacts are expected to occur for eight to nine months during each of the one to two construction years, it is difficult to predict if other specific projects would generate traffic that would have a cumulative effect on traffic at the same time. As described in Section 4.15, "Transportation," the proposed project would adversely affect LOS at certain intersections in the project area, but those impacts would be reduced to less-than-significant levels with implementation of the CTCP included in Mitigation Measure TR-1. Because other major construction projects would also implement traffic control plans specifically designed to provide appropriate emergency access and avoid road hazards, the proposed project would not result in a cumulatively considerable incremental contribution that would represent a new cumulatively significant impact related to transportation, emergency vehicle access or response times, or hazards related to incompatible uses.

5.1.3.17 Utilities and Service Systems

The geographic scope for utilities includes the project vicinity and region, particularly the areas served by utilities that could be affected by the proposed project. The appropriate service providers are responsible for ensuring adequate provision of public utilities within their service boundaries. Within the project area, these include Pacific Gas and Electric Company (PG&E) and multiple communications service providers. Construction activities could result in damage to, temporary disruptions of, or the need to relocate utility services including PG&E gas pipelines and overhead electrical transmission lines, and coaxial communication cables. However, implementation of Mitigation Measure UTL-1 would reduce the project's potentially significant impact to a less-than-significant level. Simultaneous construction of some of the other related projects that are 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. All potential utility and service system impacts from the proposed project, as well as the related projects, would be geographically isolated and short in duration. Therefore, the proposed project would not generate a cumulatively considerable incremental contribution that would result in a new cumulatively significant impact to utility services.

As described in Section 4.16, "Utilities and Service Systems," project construction would generate debris and solid waste. The Tehama County-Red Bluff Landfill would be used for disposal of project-related construction waste. The other projects under consideration vary in size and would generate different amounts of solid waste; disposal of this solid waste likely would also occur at the Tehama County-Red Bluff Landfill. All projects would comply with solid waste-related laws and regulations. As a result, a significant cumulative impact related to generation and disposal of construction waste would not be expected to occur, and implementation of the proposed project would not result in a cumulatively considerable incremental contribution that would represent a cumulatively significant impact from disposal of construction-generated debris and solid waste.

5.1.3.18 Water Quality and Groundwater Resources

The geographic scope for water quality and groundwater is considered on a local and a regional basis for both temporary, short-term, and potential long-term impacts. As described in Section 4.17, "Water Quality and Groundwater Resources," ground-disturbing activities associated with project construction throughout the project area could cause soil erosion and sedimentation that could adversely affect Deer Creek and China Slough water quality. Construction activities would also involve the use of hazardous construction-related substances that could enter these waterways through runoff, or enter groundwater through floodplain lowering activities. Excavation, grading, and shaping of the project area could increase turbidity, sedimentation, and contaminants above ambient levels identified in the Basin Plan for the Sacramento River and result in a significant impact. Implementation of Mitigation Measures WQ-1, HAZ-1, and GEO-1, which include the preparation and implementation of a SWPPP, would reduce these potential impacts to less-than-significant levels. The other projects under consideration along Deer Creek and its levees proposed by the TCFCWCD would also be required to prepare a SWPPP and comply with all relevant laws and regulations, including obtaining a NPDES permit. Therefore, the proposed project would not generate a cumulatively considerable incremental contribution that would result in a new cumulatively significant impact related to water quality or groundwater impacts.

5.1.3.19 Wildfires

The geographic scope for wildfires includes the project vicinity and region. As described in Section 4.18, “Wildfires,” the majority of the project area is located in area LRA classified as a Non-Very High FHSZ. Portions of the project area are located in an SRA classified as a Moderate FHSZ. Construction activities, as well as ongoing O&M of proposed project elements, could provide a source of ignition for a fire (e.g. from diesel and fuel-powered vehicles) and have the potential to increase the risk of wildland fire in the project area and vicinity. Depending on the location of the projects listed in Table 5-1 within Tehama County and the respective project area’s potential for wildland fire, other projects may increase the risk of wildfire during construction if protection and prevention measures are not implemented. Environmental review has been or is expected to be conducted for each of the projects identified in Table 5-1, as was done for the proposed project. Projects identified in Table 5-1 also would be evaluated for the potential to increase wildfire risk. With proper mitigation measures incorporated for this project and others, the risk of wildfire would remain moderate. Therefore, with implementation of Mitigation Measure HAZ-2, the proposed project would not generate a cumulatively considerable incremental contribution that would result in a new cumulatively significant impact related to wildfires.

5.2 Significant Irreversible Environmental Changes

Section 15126.2(d) of the CEQA Guidelines states that an EIR must discuss significant irreversible environmental changes associated with a proposed project, including large commitments of non-renewable resources, impacts which commit future generations to similar uses (such as construction of roadways to previously uninhabited areas), and irreversible damage that could result from environmental accidents associated with the project.

Proposed project construction, maintenance, and monitoring would require the use of equipment and vehicles that use non-renewable fuels such as gasoline and diesel. Most non-renewable resource consumption would occur during the construction period through the daily use of fossil fuels to power heavy equipment such as excavators and haul trucks, as well as other pieces of construction equipment. Following construction, which is scheduled to last approximately eight months, use of non-renewable resources would be limited. Ecosystem maintenance and monitoring, levee and channel inspections, and levee maintenance activities would require fossil fuel use, but these activities generally would use lighter-duty vehicles than those used for construction activities, would be short-term in duration, and would occur intermittently. Because the use of these non-renewable 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, the proposed project would not make significant, irretrievable commitments of non-renewable resources.

Setting back the existing levees and placing the setback areas in floodway and channel migration easements would irreversibly convert the area from its present use (i.e., agriculture) to habitat, conservation, and flood management uses. Although this change would result in the permanent loss of agricultural land (including prime farmland) within the project area, the flood management benefits of the proposed project would create more sustainable conditions for agricultural activities to persist in Lower Deer Creek and, if necessary, Mitigation Measure AG-1 would be implemented to compensate for the loss of prime farmland.

5.3 Significant and Unavoidable Impacts

Section 21100, subdivision (b)(2)(A) of CEQA provides that an EIR shall include a detailed statement setting forth "any significant effect on the environment that cannot be avoided if the project is implemented." Sections 4.2 through 4.18 provide a detailed analysis of all potentially significant environmental impacts that could result from implementation of the proposed project, list feasible mitigation measures that could reduce or avoid those significant impacts, and evaluate whether the mitigation measures would reduce significant impacts to less-than-significant levels. Where a specific impact cannot be certain to reduce significant impacts to less-than-significant levels, it is considered to be potentially significant and unavoidable.

Implementation of the proposed project would result in potentially significant and unavoidable impacts related to the following resources: agricultural resources, air quality, GHG emissions, and noise. The potentially significant and unavoidable impacts are described below by resource topic.

Impact AG-2: *Conflict with existing zoning for agricultural use, or a Williamson Act contract.*

Under all project alternatives, construction of the common project elements would result in the conversion of approximately 55 acres of Williamson Act lands to nonagricultural uses. Within the levee setback reach, Alternatives A through E would convert additional agricultural lands along the south bank of Deer Creek and in some areas of the north bank to nonagricultural uses and likely would be inconsistent with allowable land uses under existing Williamson Act contracts. This conversion to nonagricultural use would result in the permanent loss of use of land for agricultural purposes. Mitigation Measures AG-1 and AG-2 would be implemented but may not be sufficient to reduce impacts to less-than-significant levels, and impacts could remain significant and unavoidable.

Impact AQ-2*: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or State ambient air quality standard.*

Implementation of the project alternatives would result in a considerable net increase of NO_x and would exceed the Tehama County APCD significance threshold. Implementation of Mitigation Measures AQ-1 and AQ-2 would mitigate fugitive dust and minimize NO_x emissions to the greatest extent possible, but it is unknown if NO_x emissions could be reduced below the threshold. Because these emissions may violate air quality standards by making a cumulatively considerable contribution to the existing ozone nonattainment status, the impact would remain significant and unavoidable.

Impact AQ-3*: Expose sensitive receptors to substantial pollutant concentrations.*

Implementation of the project alternatives would expose sensitive receptors within 500 feet of the hauling routes to substantial quantities of DPM. Implementation of Mitigation Measures AQ-1 and AQ-2 would minimize these emissions to the greatest extent possible, but it is conservatively assumed that proposed project construction may still expose sensitive receptors to substantial temporary quantities of DPM and the impact would remain potentially significant and unavoidable.

Impact GHG-1: *Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.*

Construction of the project alternatives would generate GHG emissions. Construction-related GHG emissions would result from construction equipment, material hauling, and worker trips. Proposed project GHG emissions would exceed Tehama County APCDs construction significance threshold. Implementation of Mitigation Measure AQ-2 and further refinement of the proposed project's design details would reduce GHG emissions to the greatest extent possible. But, because the feasibility and effectiveness of these reductions are unknown at this time, the impact would remain potentially significant and unavoidable.

Impact GHG-2: *Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs.*

Construction of the project alternatives would result in the generation of GHG emissions that would exceed the Tehama County APCD's GHG significance threshold. This exceedance would also contribute to ongoing impacts on global climate change. For this reason, the proposed project would potentially conflict with AB 32, SB 32, or the goals of EO-S-3-05. Implementation of Mitigation Measure AQ-2 and further refinement of the proposed project's design details would reduce GHG emissions to the greatest extent possible. But, because the feasibility and effectiveness of these reductions are unknown at this time, the impact would remain potentially significant and unavoidable.

Impact NOI-1: *Generate a substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.*

Under all project alternatives, construction would result in a substantial increase in ambient noise levels along China Slough and along Deer Creek adjacent to and near to Leininger Road. Implementation of Mitigation Measure NOI-1 would reduce noise levels during construction, but noise levels would still exceed established noise standards and the impact would remain significant and unavoidable.

5.4 Growth-inducing Impacts

The proposed project consists of flood management and ecosystem improvements to reduce flood risk and expand riparian habitat along Deer Creek. Because the proposed project would not involve construction of housing or other residential or commercial infrastructure, 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. Also, the proposed project would not extend roadways or construct other transportation infrastructure that would indirectly induce population growth.

Levee improvements would be made to restore the design level of flood protection of 3 feet of freeboard with a flow of 21,000 cfs along Deer Creek; flood protection would not change from the existing design level. Consequently, the project would not be expected to induce growth in the area that would lead to changes in land use patterns, population densities, or related impacts on environmental resources.

Chapter 6. Project Alternatives Comparison

6.1 CEQA Requirements for Alternatives Development and Selection

CEQA requires that the lead agency consider a reasonable range of potentially feasible alternatives that could achieve most of the project objectives while avoiding or substantially reducing one or more of the significant environmental effects of a proposed project (CEQA Guidelines Section 15126.6[a]). CEQA guidelines direct that the alternatives evaluated should permit a reasonable choice, foster decision-making, and inform public participation (Section 15126.6[f]). The alternatives considered 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]). An EIR must also evaluate a no project alternative to compare impacts of the proposed project with impacts that would occur if the proposed project were not implemented (Section 15126.6[e][1]).

6.2 Alternatives Development Process

6.2.1 Feasibility Study

The DCWC completed a feasibility study (Deer Creek Watershed Conservancy 2011) of creek restoration and flood management improvements for Deer Creek. This study completed habitat, flood infrastructure, and agricultural infrastructure field investigations, hydraulic and sediment transport modeling, and conceptual design. The study identified three general alternatives to achieve creek restoration and flood management improvement goals.

The feasibility study investigations and hydraulic and sediment transport modeling results were used by a technical advisory committee to logically group elements together as draft alternatives. The development of the final flood management and ecosystem improvement alternatives was an iterative process that resulted in multiple changes based on landowner and technical advisory committee input. Initially, the creek segment downstream of the SR 99 bridge was considered separately from the creek segment upstream of the SR 99 bridge, and three options for flood management and ecosystem improvement actions were developed for each creek segment.

Four options for the setback levees upstream of SR 99 were presented in the feasibility study — wide, moderate, wide setback at the south levee and retention of the north levee, and wide setback of the north levee and retention and improvement of existing south levee. Because each creek segment is hydraulically independent of the other, any of the downstream options could be paired with any of the upstream options.

The feasibility study alternatives were further refined based on landowner, DCWC, and technical advisory committee input. Ultimately, Alternative 2 from the feasibility study was selected as the best alternative to advance for CEQA compliance. The six proposed project alternatives presented in this document are based on Alternative 2 from the final feasibility study.

The DCWC Board of Directors approved three “final” alternatives at their board meeting in March 2008:

1. Alternative 1, the “no-action,” existing-conditions alternative.
2. Alternative 2, an alternative that emphasized moderate levee setbacks; replacement of Red Bridge with a taller, wider structure; and replacement of the SVRIC Dam with a seasonal structure.
3. Alternative 3, an alternative that emphasized south bank flood conveyance; replacement of Red Bridge with a taller, wider structure; and no modification of the existing SVRIC Dam.

Alternative #2 from the feasibility study was selected for further evaluation in this EIR because it represented the solution with the greatest benefit at lowest risk and was the alternative preferred by the DCWC. This alternative restores flood system design conveyance capacity and freeboard, addresses the risk of structure failure, reduces overall channel degradation, and restores channel floodplain connectivity considered essential to the sustainability of a viable ecological community in Lower Deer Creek.

6.2.2 Current Alternatives Development

Most elements included in the proposed project alternatives were evaluated originally in the 2011 feasibility study. The preferred alternative (Alternative #2) in the feasibility study was used as the basis for the alternatives presented in this document. Alternative #2 from the feasibility study included a levee setback alignment between Red Bridge and the SVRIC Dam that closely corresponds to the setback alignment presented as Alternative A in this document; slight modifications to the alignment were made based on improved elevation data and hydrodynamic modeling. The other Alternatives (B through F) evaluated in this EIR include the same elements as Alternative A, but with modifications to the setback alignments. Alternatives B through F evaluate smaller setback options between Red Bridge and SVRIC Dam as requested by landowners. Modifications to the common project elements and the evaluation of the six different setback configurations were based on new developments in the watershed. These included changes in land ownership, new regulatory requirements and restrictions, input from DWR regarding channel maintenance needs, and updated hydrodynamic and fish habitat modeling results (see Appendix F). The proposed project alternatives presented below were developed collaboratively between landowners within the area, stakeholders (SVRIC), relevant agency representatives (DWR, CDFW, and USACE), and non-governmental organizations (DCWC).

6.2.3 Alternatives Screened Out from Further Consideration

Originally, a set of alternatives that included improvements at the SVRIC Dam was evaluated as part of the proposed project. But, the improvements at the SVRIC Dam are now being developed and evaluated as a separate project with SVRIC as the project proponent and CDFW as the CEQA lead agency. The improvements at the SVRIC Dam have independent utility from the proposed project and are not considered a future expansion or foreseeable consequence of the proposed project.

6.3 Alternatives Evaluation and Comparison

The project alternatives include Alternatives A through F and the no project alternative. For full descriptions of these alternatives, please refer to Chapter 3, "Description of Project Alternatives."

6.3.1 Methodology

To evaluate an initial range of alternatives, the evaluation criteria were organized into two tiers focused on (1) the ability of an alternative to meet project objectives, and (2) the ability of an alternative to avoid or substantially reduce one or more of the significant environmental effects of the proposed project. Public input on all criteria were solicited during the environmental scoping process. The criteria used for the alternatives screening process are listed below.

6.3.1.1 Tier 1 Criteria: Ability to Meet Project Objectives

As required under CEQA Guidelines, an alternative must meet most, but not all, of the project objectives to be considered further in the alternatives screening process. Alternatives that did not meet most of the project objectives were eliminated from further consideration. Project objectives are presented in Chapter 1, Section 1.4.3, "Project Objectives." Evaluation criteria and the ranks assigned to each alternative are summarized in Table 6-1. The ability of each alternative to meet the project objectives is summarized in a table in the respective alternative discussions, below.

Table 6-1 Ability of Alternatives to Meet Project Objectives

Project Objective	Evaluation Criteria	No Project Alt. Rank	Alt. A Rank	Alt. B Rank	Alt. C Rank	Alt. D Rank	Alt. E Rank	Alt. F Rank
Improve geomorphic function to increase the potential for more naturally graded sediment composition and related channel form and the development of more diverse and ecologically complex riparian habitat.	Increased lateral width of area where channel can move.	7	1	2	3	4	5	6
Increase rearing habitat for spring-run Chinook salmon.	Modeled acreage for rearing habitat under alternatives.	7	1	2	3	4	5	6
Increase flood conveyance capacity in the Deer Creek watershed and restore USACE levee freeboard conditions for a 21,000 cfs event.	Modeled ability for USACE levees to meet design criteria for 21,000 cfs event.	7	1[1]	1[1]	1[1]	1[1]	1[1]	1[1]
Minimize levee maintenance requirements, repairs, and costs.	Comparison of how often levees would require maintenance.	7	1	2	3	4	5	6

Project Objective	Evaluation Criteria	No Project Alt. Rank	Alt. A Rank	Alt. B Rank	Alt. C Rank	Alt. D Rank	Alt. E Rank	Alt. F Rank
Minimize flood control-related channel maintenance requirements, repairs, and costs.	Comparison of how often channel would require maintenance.	7	1[1]	1[1]	1[1]	1[1]	1[1]	1[1]
Minimize impacts to viable agricultural operations for landowners in the proposed project area along Deer Creek.	Acreage of farmland converted to non-agricultural operations.	1	7	6	5	4	3	2

Notes:

[1] For these particular project objects, Alternatives A through F are essentially the same in their ability to meet the project objective and are represented as tied in the ranking.

The assigned ranking denotes how well the alternative meets the project objective in relation to the other alternatives in descending order from 1 to 7 such that ‘1’ indicates that the alternative best meets project objectives.

Alt. = Alternative

cfs = cubic feet per second

USACE = United States Army Corps of Engineers

6.3.1.2 Tier 2 Criteria: Ability to Avoid or Reduce Significant Environmental Effects

Alternatives were compared for their ability to avoid or substantially reduce the significant environmental effects of the proposed project. Potentially significant environmental impacts evaluated in this tier of the analysis are listed in Table 6-2.

Table 6-2 Potentially Significant Environmental Impacts Identified for Each Alternative

Impact	No Project	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Agricultural Resources and Land Use							
AG-2: Conflict with existing zoning for agricultural use, or a Williamson Act contract.	NA	SU	SU	SU	SU	SU	SU
Air Quality							
AIR-2: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard.	NA	SU	SU	SU	SU	SU	SU
AIR-3: Expose sensitive receptors to substantial pollutant concentrations.	NA	SU	SU	SU	SU	SU	SU
Greenhouse Gas Emissions and Climate Change							
GHG-1: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	NA	SU	SU	SU	SU	SU	SU
GHG-2: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases	NA	SU	SU	SU	SU	SU	SU

Impact	No Project	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Noise and Vibration							
NOI-1: Generate a substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	NA	SU	SU	SU	SU	SU	SU

Notes:

Alt. = Alternative

NA = Not applicable (to the no project alternative)

SU = potentially significant and unavoidable

6.3.2 No Project Alternative

Under the no project alternative, none of the project elements would be built and no easement agreements would be put in place.

6.3.2.1 Consequences of No Action

The no project alternative would expose surrounding residences, farmlands, irrigation infrastructure, and the Town of Vina to continued flood risk from levee deficiencies in Lower Deer Creek and lack of channel capacity in China Slough, and would require continued emergency repair and maintenance activities. As shown in the Hydrodynamic Modeling Report, Appendix F, the majority of the existing levees fail to meet the 50-year (21,000 cfs) design freeboard criteria. Sand-bagging and emergency levee repairs have been required most recently in December 2016 at flows as low as 10,800 cfs (Tehama County Flood Control and Water Conservation District 2017). Without improvements to the levees, a 50-year level of flood risk reduction would not be achieved. The levees would continue to be overtopped at moderate to high flow events—subjecting the land adjacent to Deer Creek to an unacceptable risk of levee failure and subsequent catastrophic flooding. Other consequences of no action related to flooding include:

- **Loss of agricultural land viability.** Agricultural resources could sustain major damage in a flood event. Damage to fields, infrastructure, facilities, and agricultural equipment could lead to a reduction in agricultural productivity, which could cause depression of the local agricultural economy and abandonment of or prolonged delay in use of productive lands.
- **Release of hazardous materials.** 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.
- **Emergency access.** 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 roads as well, causing delays in fire protection, law enforcement protection, or emergency medical assistance.
- **Air quality.** Repairing flood damage would cause substantial air emissions from clean up and reconstruction activities over an extended

period of time. Flood response likely would have high emissions and would occur under emergency conditions with less opportunity to control and mitigate air emissions.

Additional consequences of no action, including maintenance activities and incidental impacts from not taking project actions, include:

- **Continued erosion.** Bank and levee toe erosion would continue to occur because of the confinement and lateral migration of Deer Creek (see Appendix H, "Geomorphology Assessment," for more detail on existing erosion conditions). Emergency levee repairs, sediment removal, and channel grading would continue to be necessary to protect existing levees and adjacent lands.
- **Limited habitat.** Vegetation removal, channel grading, and sediment excavation associated with channel and floodplain maintenance would continue to negatively impact stream corridor complexity. This, combined with confinement of the Deer Creek channel, would continue to limit the quantity and quality of floodplain rearing and riparian habitats.
- **Impacts from maintenance activities.** Maintenance activities would result in environmental impacts including air quality impacts and GHG emissions, noise impacts, biological and cultural resources impacts from ground disturbance, and transportation impacts.

The no project alternative includes none of the project elements and differs from the other alternatives because it would not improve flood management or ecosystem conditions within lower Deer Creek.

6.3.2.2 Ability to Meet Project Objectives

The no project alternative would meet one of five project objectives. Ranks assigned for each objective and the rationale for each determination are presented below and summarized in Table 6-3.

- **Improve geomorphic function.** There would be no change to geomorphic function under the no project alternative. It ranks seventh out of the seven alternatives and would not meet this objective.
- **Increase rearing habitat.** There would be no change to rearing habitat under the no project alternative. It is tied for sixth place with Alternative F out of the seven alternatives and would not meet this objective.

- **Increase flood conveyance capacity.** There would be no change to flood conveyance capacity under the no project alternative, and it would not meet this objective.
- **Minimize levee maintenance.** There would be no change to maintenance under the no project alternative and it would not meet this objective.
- **Minimize channel maintenance.** There would be no change to maintenance under the no project alternative and it would not meet this objective.
- **Minimize impacts to agricultural operations.** Although no agricultural land would be taken out of production, agricultural operations would continue to be impacted by periodic flooding, which could cause disruption and losses to agricultural operations. The no project alternative ranks first out of the seven alternatives because it would not result in direct and permanent loss of agricultural land and consequently would meet this objective.

Table 6-3 Ability of the No Project Alternative to Meet Project Objectives

Project Objective	Meets Objective	Rationale
Improve geomorphic function to increase the potential for more naturally graded sediment composition and related channel form and the development of more diverse and ecologically complex riparian habitat.	No	No change means no improvement.
Increase rearing habitat for spring-run Chinook salmon.	No	No change means no increase.
Increase flood conveyance capacity in the Deer Creek watershed and restore USACE levee freeboard conditions for a 21,000 cfs event.	No	No change means no increase.
Minimize levee flood control-related maintenance requirements, repairs, and costs.	No	No change means no minimization.
Minimize flood control-related channel maintenance requirements, repairs, and costs.	No	No change means no minimization.
Minimize impacts to viable agricultural operations for landowners in the project area along Deer Creek.	Yes	Agricultural operations are viable under existing conditions.

Notes:

cfs = cubic feet per second

USACE = United States Army Corps of Engineers

6.3.2.3 *Avoidance or Reduction of Significant Impacts*

The no project alternative would avoid the significant construction-related impacts of the proposed project, including exceeding any air quality or GHG emissions thresholds or impacting prime farmland.

6.3.3 Alternative A

Alternative A includes all of the common project elements and differs from the other alternatives within the setback reach, where it includes the maximum acreage of proposed levee setbacks and floodplain lowering (74 acres).

6.3.3.1 Ability to Meet Project Objectives

Alternative A would meet all of the project objectives. The rationale used to evaluate the alternative's ability to meet project objectives is presented below and summarized in Table 6-4.

- **Improve geomorphic function.** Because this alternative includes the largest acreage between the setback levees, this alternative best meets the project objectives of improved geomorphic function and ranks first out of the seven alternatives.
- **Increase rearing habitat.** Under Alternative A, the area between the setback levees would provide the most riparian habitat and rearing habitat (276.8 acres of rearing habitat) for spring-run Chinook salmon. This alternative ranks first out of the seven alternatives in amount of rearing habitat created.
- **Increase flood conveyance capacity.** Alternative A would increase the flood conveyance capacity of Lower Deer Creek to restore USACE levee freeboard conditions for a 21,000 cfs event. This increase would be achieved by setting back the levees in specific areas and restoring the levee freeboard on the USACE-built levees to design criteria, implementing additional flood protection measures, and managing vegetation. Alternative A tied for the first rank with Alternatives B through F in its ability to meet this objective. For relative changes in levee heights, please see Figure 3-7 in the Chapter 3, "Description of Project Alternatives."
- **Minimize levee maintenance.** Alternative A would minimize the amount of maintenance required for the Deer Creek flood system to continue to meet design flood conveyance capacity. Because the levee setbacks would be the largest under Alternative A, levee maintenance requirements would be minimized to the greatest extent. This alternative ranked first out of the seven alternatives.
- **Minimize channel maintenance.** Under Alternative A, channel maintenance in the form of vegetation, debris, and sediment management would be minimized and potentially would be necessary only after significant channel-forming flows, and then only if vegetation, debris, or sediment causes channel change that was not anticipated in flood infrastructure design and, therefore, poses a risk to flood infrastructure integrity. Alternative A tied for first rank with Alternatives B through F in its ability to meet this objective.

- **Minimize impacts to agricultural operations.** Alternative A would convert 74 acres of farmland to non-farmland uses. Because of this, it would have the greatest impact on agricultural operations and ranks low (seventh out of the seven alternatives) in its ability to minimize impacts to agricultural operations. But, Alternative A would still meet this objective because agricultural operations would continue to be viable and impacts would be minimized through recommended mitigation measures.

Table 6-4 Ability of Alternative A to Meet Project Objectives

Project Objective	Meets Objective	Rationale
Improve geomorphic function to increase the potential for more naturally graded sediment composition and related channel form and the development of more diverse and ecologically complex riparian habitat.	Yes	Geomorphic function would be improved, and more ecologically complex riparian habitat could form in the setback reach.
Increase rearing habitat for spring-run Chinook salmon.	Yes	Rearing habitat would be increased.
Increase flood conveyance capacity in the Deer Creek watershed and restore USACE levee freeboard conditions for a 21,000 cfs event.	Yes	Flood conveyance capacity would be restored to USACE levee freeboard conditions for a 21,000 cfs event.
Minimize levee flood control-related maintenance requirements, repairs, and costs.	Yes	Expanded setback reach would minimize the amount of levee flood maintenance requirements.
Minimize flood control-related channel maintenance requirements, repairs, and costs.	Yes	Expanded setback reach would minimize the amount of channel flood maintenance requirements.
Minimize impacts to agricultural operations for landowners in the project area along Deer Creek.	Yes	With landowner mitigation for impacts to existing agricultural infrastructure, agricultural operations would continue to be viable for landowners in the project area.

Notes: cfs = cubic feet per second; USACE = United States Army Corps of Engineers

6.3.3.2 Avoidance or Reduction of Significant Impacts

Alternative A would not avoid or reduce any of the significant impacts of the proposed project.

- **Agricultural Resources and Land Use.** Alternative A would convert 42.4 acres of Prime Farmland to non-farmland uses, affect 97 acres of land in Williamson Act contracts, and conflict with existing zoning. Tables 4.3-1 and 4.3-2 in Chapter 4.3, "Agricultural Resources and Land Use," summarize the quantified agricultural impacts of each alternative.
- **Air Quality.** Alternative A would exceed the TCAPCD emissions thresholds. It would exceed the NO_X threshold of 25 lbs./day, emitting an estimated 197.9 lbs./day. Even with mitigation incorporated, the impact would be significant. Refer to Table 4.4-7 in Chapter 4.4, "Air Quality," for a summary and comparison of the quantified emissions for each alternative.
- **Greenhouse Gas Emissions and Climate Change.** Alternative A would exceed the TCAPCD construction significance threshold of 900 MT CO_2e per year, emitting an estimated 6,494 MT CO_2e.
- **Noise and Vibration.** All alternatives would have the same noise and vibration impacts. The nearest sensitive receptor to all project alternatives is 15 feet away. The impact would be significant and unavoidable.

6.3.4 Alternative B

Alternative B includes all of the common project elements and differs from the other alternatives within the setback reach, where it includes the second largest acreage of proposed levee setbacks and floodplain lowering (66.9 acres). Compared with Alternative A, Alternative B would have the same northern levee setback alignment, but the southern levee would be smaller and tie into the downstream end of the existing levee further upstream.

6.3.4.1 Ability to Meet Project Objectives

Alternative B would meet all of the project objectives. The rationale used to evaluate the alternative's ability to meet project objectives is presented below and summarized in Table 6-5.

- **Improve geomorphic function.** Because this alternative has the second largest acreage between the setback levees, this alternative ranks second out of the seven alternatives in its ability to meet the project objectives of improved geomorphic function.

- **Increase rearing habitat.** Under Alternative B, the area between the setback levees would provide less riparian habitat and rearing habitat for spring-run Chinook salmon when compared with Alternative A (269.7 acres vs. 276.8 acres of rearing habitat, respectively). This alternative ranks second out of the seven alternatives in amount of rearing habitat created.
- **Increase flood conveyance capacity.** Alternative B would increase the flood conveyance capacity of Lower Deer Creek to restore USACE levee freeboard conditions for a 21,000 cfs event. This increase would be achieved by setting back the levees in specific areas and restoring the levee freeboard on the USACE-built levees to design criteria, implementing additional flood protection measures, and managing vegetation. Alternative B tied for first rank with Alternatives A and C through F in its ability to meet this objective. For relative changes in levee heights, see Figure 3-7 in the Chapter 3, "Description of Project Alternatives."
- **Minimize levee maintenance.** Alternative B would minimize the amount of maintenance required for the Deer Creek flood system to continue to meet design flood conveyance capacity. Because the levee setbacks would be the second largest under Alternative B, levee maintenance requirements would be minimized to the second greatest extent. This alternative ranks second out of the seven alternatives.
- **Minimize channel maintenance.** Under Alternative B, channel maintenance in the form of vegetation, debris, and sediment management would be minimized and potentially would be necessary only after significant channel-forming flows, and then only if vegetation, debris, or sediment causes channel change that was not anticipated in flood infrastructure design and, therefore, poses a risk to flood infrastructure integrity. Alternative B tied for first rank with Alternatives A and C through F in its ability to meet this objective.
- **Minimize impacts to agricultural operations.** Alternative B would convert 66.9 acres of farmland to non-farmland uses. Because of this, it would have the second greatest impact on agricultural operations and ranks sixth out of the seven alternatives in its ability to minimize impacts to agricultural operations. But, Alternative B would still meet this objective because agricultural operations would continue to be

viable and impacts would be minimized through recommended mitigation measures.

Table 6-5 Ability of Alternative B to Meet Project Objectives

Project Objective	Meets Objective	Rationale
Improve geomorphic function to increase the potential for more naturally graded sediment composition and related channel form and the development of more diverse and ecologically complex riparian habitat.	Yes	Geomorphic function would be improved, and more ecologically complex riparian habitat could form in the setback reach.
Increase rearing habitat for spring-run Chinook salmon.	Yes	Rearing habitat would be increased.
Increase flood conveyance capacity in the Deer Creek watershed and restore USACE levee freeboard conditions for a 21,000 cfs event.	Yes	Flood conveyance capacity would be restored to USACE levee freeboard conditions for a 21,000 cfs event.
Minimize levee flood control-related maintenance requirements, repairs, and costs.	Yes	Expanded setback reach would minimize the amount of levee flood maintenance requirements.
Minimize flood control-related channel maintenance requirements, repairs, and costs.	Yes	Expanded setback reach would minimize the amount of channel flood maintenance requirements.
Minimize impacts to viable agricultural operations for landowners in the project area along Deer Creek.	Yes	With landowner mitigation for impacts to existing agricultural infrastructure, agricultural operations would continue to be viable for landowners in the project area.

Notes:

cfs = cubic feet per second

USACE = United States Army Corps of Engineers

6.3.4.2 Avoidance or Reduction of Significant Impacts

Alternative B would not avoid any of the significant impacts of the proposed project, but would reduce the magnitude of those impacts in comparison to Alternative A.

- **Agricultural Resources and Land Use.** Alternative B would convert 36.1 acres of Prime Farmland to non-farmland uses, affect 90 acres of land in Williamson Act contracts, and conflict with existing zoning. Table 4.3-1 and 4.3-2 in Chapter 4.3, "Agricultural Resources and Land Use," summarize the quantified agricultural impacts of each alternative.
- **Air Quality.** Alternative B would exceed the TCAPCD emissions thresholds. It would exceed the NO_X threshold of 25 lbs./day, emitting an estimated 190 lbs./day. Even with mitigation incorporated, the impact would be significant. Refer to Table 4.4-7 in Chapter 4.4, "Air Quality," for a summary and comparison of the quantified emissions for each alternative.
- **Greenhouse Gas Emissions.** Alternative B would exceed the TCAPCD construction significance threshold of 900 MT CO_2e per year, emitting an estimated 5,986 MT CO_2e.
- **Noise and Vibration.** All alternatives would have the same noise and vibration impacts. The nearest sensitive receptor to all project alternatives is 15 feet away. The impact would be significant and unavoidable.

6.3.5 Alternative C

Alternative C includes all of the common project elements and differs from the other alternatives within the setback reach, where it includes the third largest acreage of proposed setback levees and floodplain lowering (57.1 acres). Compared with Alternatives A and B, Alternative C would have the same northern setback alignment, but the southern levee would be closer to the existing channel.

6.3.5.1 Ability to Meet Project Objectives

Alternative C would meet all of the project objectives. The rationale used to evaluate the alternative's ability to meet project objectives is presented below and summarized in Table 6-6.

- **Improve geomorphic function.** Because this alternative has the third largest acreage between the setback levees, this alternative ranks third out of the seven alternatives in its ability to meet the project objective of improved geomorphic function.

- **Increase rearing habitat.** Under Alternative C, the area between the setback levees would provide less riparian habitat and rearing habitat for spring-run Chinook salmon when compared with Alternative B (259.4 acres vs. 269.7 acres of rearing habitat, respectively). This alternative ranks third out of the seven alternatives in amount of rearing habitat created.
- **Increase flood conveyance capacity.** Alternative C would increase the flood conveyance capacity of Lower Deer Creek to restore USACE levee freeboard conditions for a 21,000 cfs event. This increase would be achieved by setting back the levees in specific areas and restoring the levee freeboard on the USACE-built levees to design criteria, implementing additional flood protection measures, and managing vegetation. Alternative C tied for first rank with Alternatives A, B and D through F in its ability to meet this objective. For relative changes in levee heights, see Figure 3-7 in the Chapter 3, "Description of Project Alternatives."
- **Minimize levee maintenance.** Alternative C would minimize the amount of maintenance required for the Deer Creek flood system to continue to meet design flood conveyance capacity. Because the levee setbacks would be the third largest under Alternative C, levee maintenance requirements would be minimized to the third greatest extent. This alternative ranks third out of the seven alternatives.
- **Minimize channel maintenance.** Under Alternative C, channel maintenance in the form of vegetation, debris, and sediment management would be minimized and potentially would be necessary only after significant channel-forming flows, and then only if vegetation, debris, or sediment causes channel change that was not anticipated in flood infrastructure design and, therefore, poses a risk to flood infrastructure integrity. Alternative C tied for first rank with Alternatives A, B, and D through F in its ability to meet this objective.
- **Minimize impacts to agricultural operations.** Alternative C would convert 57.1 acres of farmland to non-farmland uses. Because of this, it would have the third greatest impact on agricultural operations and ranks fifth out of the seven alternatives in its ability to minimize impacts to agricultural operations. But, Alternative C would still meet this objective because agricultural operations would continue to be viable and impacts would be minimized through recommended mitigation measures.

Table 6-6 Ability of Alternative C to Meet Project Objectives

Project Objective	Meets Objective	Rationale
Improve geomorphic function to increase the potential for more naturally graded sediment composition and related channel form and the development of more diverse and ecologically complex riparian habitat.	Yes	Geomorphic function would be improved, and more ecologically complex riparian habitat could form in setback reach.
Increase rearing habitat for spring-run Chinook salmon.	Yes	Rearing habitat would be increased.
Increase flood conveyance capacity in the Deer Creek watershed and restore USACE levee freeboard conditions for a 21,000 cfs event.	Yes	Flood conveyance capacity would be restored to USACE levee freeboard conditions for a 21,000 cfs event.
Minimize levee flood control-related maintenance requirements, repairs, and costs.	Yes	Expanded setback reach would minimize the amount of levee flood maintenance requirements.
Minimize flood control-related channel maintenance requirements, repairs, and costs.	Yes	Expanded setback reach would minimize the amount of channel flood maintenance requirements.
Minimize impacts to viable agricultural operations for landowners in the project area along Deer Creek.	Yes	With landowner mitigation for impacts to existing agricultural infrastructure, agricultural operations would continue to be viable for landowners in the project area.

Notes:

cfs = cubic feet per second

USACE = United States Army Corps of Engineers

6.3.5.2 Avoidance or Reduction of Significant Impacts

Alternative C would not avoid any of the significant impacts of the proposed project, but would reduce the magnitude of those impacts in comparison to Alternatives A and B.

- **Agricultural Resources and Land Use.** Alternative C would convert 27.2 acres of Prime Farmland to non-farmland uses, affect 80 acres of land in Williamson Act contracts, and conflict with existing zoning. Table 4.3-1 and 4.3-2 in Chapter 4.3, "Agricultural Resources and Land Use," summarize the quantified agricultural impacts of each alternative.
- **Air Quality.** Alternative C would exceed the TCAPCD emissions thresholds. It would exceed the NO_X threshold of 25 lbs./day, emitting an estimated 184.6 lbs./day. Even with mitigation incorporated, the impact would be significant. Refer to Table 4.4-7 in Chapter 4.4, "Air Quality," for a summary and comparison of the quantified emissions for each alternative.
- **Greenhouse Gas Emissions.** Alternative C would exceed the TCAPCD construction significance threshold of 900 MT CO_2e per year, emitting an estimated 5,595 MT CO_2e.
- **Noise and Vibration.** All alternatives would have the same noise and vibration impacts. The nearest sensitive receptor to all project alternatives is 15 feet away. The impact would be significant and unavoidable.

6.3.6 Alternative D

Alternative D includes all of the common project elements and differs from the other alternatives within the setback reach, where it includes the fourth largest acreage of proposed setback levees and floodplain lowering (39.7 acres). Compared with Alternatives A through C, the northern levee would be much closer to the channel and would follow the existing levee alignment through the middle section of the northern levee. The southern levee would have the same alignment as Alternative B.

6.3.6.1 Ability to Meet Project Objectives

Alternative D would meet all of the project objectives. The rationale used to evaluate the alternative's ability to meet project objectives is presented below and summarized in Table 6-7.

- **Improve geomorphic function.** Because this alternative has the fourth largest acreage between the setback levees, this alternative ranks fourth out of the seven in its ability to meet the project objective of improved geomorphic function.

- **Increase rearing habitat.** Under Alternative D, the area between the setback levees would provide less riparian and rearing habitat for spring-run Chinook salmon when compared with Alternative C (241.9 acres vs. 259.4 acres of rearing habitat, respectively). This alternative ranks fourth out of the seven in amount of rearing habitat created.
- **Increase flood conveyance capacity.** Alternative D would increase the flood conveyance capacity of Lower Deer Creek to restore USACE levee freeboard conditions for a 21,000 cfs event. This increase would be achieved by setting back the levees in specific areas and restoring the levee freeboard on the USACE-built levees to design criteria, implementing additional flood protection measures, and managing vegetation. Alternative D tied for first rank with Alternatives A through C, E, and F in its ability to meet this objective. For relative changes in levee heights, see Figure 3-7 in Chapter 3, "Description of Project Alternatives."
- **Minimize levee maintenance.** Alternative D would minimize the amount of maintenance required for the Deer Creek flood system to continue to meet design flood conveyance capacity. Because the levee setbacks would be the fourth largest under Alternative D, levee maintenance requirements would be minimized to the fourth greatest extent. This alternative ranks fourth out of the seven alternatives.
- **Minimize channel maintenance.** Under Alternative D, channel maintenance in the form of vegetation, debris, and sediment management would be minimized and potentially would be necessary only after significant channel-forming flows, and then only if vegetation, debris, or sediment causes channel change that was not anticipated in flood infrastructure design and, therefore, poses a risk to flood infrastructure integrity. Alternative D tied for first rank with Alternatives A, B, C, E and F in its ability to meet this objective.
- **Minimize impacts to agricultural operations.** Alternative D would convert 39.7 acres of farmland to non-farmland uses. Because of this, it would have the fourth greatest impact on agricultural operations and ranks fourth out of seven alternatives in its ability to minimize impacts to agricultural operations. But, Alternative D would still meet this objective because agricultural operations would continue to be viable and impacts would be minimized through recommended mitigation measures.

Table 6-7 Ability of Alternative D to Meet Project Objectives

Project Objective	Meets Objective	Rationale
Improve geomorphic function to increase the potential for more naturally graded sediment composition and related channel form and the development of more diverse and ecologically complex riparian habitat.	Yes	Geomorphic function would be improved, and more ecologically complex riparian habitat could form in the setback reach.
Increase rearing habitat for spring-run Chinook salmon.	Yes	Rearing habitat would be increased.
Increase flood conveyance capacity in the Deer Creek watershed and restore USACE levee freeboard conditions for a 21,000 cfs event.	Yes	Flood conveyance capacity would be restored to USACE levee freeboard conditions for a 21,000 cfs event.
Minimize levee flood control-related maintenance requirements, repairs, and costs.	Yes	Expanded setback reach would minimize the amount of levee flood maintenance requirements.
Minimize flood control-related channel maintenance requirements, repairs, and costs.	Yes	Expanded setback reach would minimize the amount of channel flood maintenance requirements.
Minimize impacts to viable agricultural operations for landowners in the project area along Deer Creek.	Yes	With landowner mitigation for impacts to existing agricultural infrastructure, agricultural operations would continue to be viable for landowners in the project area.

Notes:

cfs = cubic feet per second

USACE = United States Army Corps of Engineers

6.3.6.2 Avoidance or Reduction of Significant Impacts

Alternative D would not avoid any of the significant impacts of the proposed project, but would reduce the magnitude of those impacts in comparison to Alternatives A through C.

- **Agricultural Resources and Land Use.** Alternative D would convert 24.2 acres of Prime Farmland to non-farmland uses, affect 70 acres of land in Williamson Act contracts, and conflict with existing zoning. Table 4.3-1 and 4.3-2 in Chapter 4.3, "Agricultural Resources and Land Use," summarize the quantified agricultural impacts of each alternative.
- **Air Quality.** Alternative D would exceed the TCAPCD emissions thresholds. It would exceed the NO_X threshold of 25 lbs./day, emitting an estimated 172.9 lbs./day. Even with mitigation incorporated, the impact would be significant. Refer to Table 4.4-7 in Chapter 4.4, "Air Quality," for a summary and comparison of the quantified emissions for each alternative.
- **Greenhouse Gas Emissions.** Alternative D would exceed the TCAPCD construction significance threshold of 900 MT CO_2e per year, emitting an estimated 4,845 MT CO_2e.
- **Noise and Vibration.** All alternatives would have the same noise and vibration impacts. The nearest sensitive receptor to all project alternatives is 15 feet away. The impact would be significant and unavoidable.

6.3.7 Alternative E

Alternative E includes all of the common project elements and differs from the other alternatives within the setback reach, where it includes the smallest acreage of proposed setback levees and floodplain lowering (29.3 acres). The northern levee would be the same alignment and height as Alternative D and the southern levee would be the same alignment as Alternative C.

6.3.7.1 Ability to Meet Project Objectives

Alternative E would meet all of the project objectives. The rationale used to evaluate the alternative's ability to meet project objectives is presented below and summarized in Table 6-8.

- **Improve geomorphic function.** Because this alternative has the fifth largest acreage between the setback levees, this alternative ranks fifth out of seven in its ability to meet the project objective of improved geomorphic function.

- **Increase rearing habitat.** Under Alternative E, the area between the setback levees would provide less riparian and rearing habitat for spring-run Chinook salmon when compared with Alternative D (230.9 acres vs. 241.9 acres of rearing habitat, respectively). This alternative ranks fifth out of the seven in amount of rearing habitat created.
- **Increase flood conveyance capacity.** Alternative E would increase the flood conveyance capacity of Lower Deer Creek to restore USACE levee freeboard conditions for a 21,000 cfs event. This increase would be achieved by setting back the levees in specific areas and restoring the levee freeboard on the USACE-built levees to design criteria, implementing additional flood protection measures, and managing vegetation. Alternative E tied for first rank with Alternatives A through D and F in its ability to meet this objective. For relative changes in levee heights, see Figure 3-7 in the Chapter 3, "Description of Project Alternatives."
- **Minimize levee maintenance.** Alternative E would minimize the amount of maintenance required for the Deer Creek flood system to continue to meet design flood conveyance capacity. Because the levee setbacks would be the fifth largest under Alternative E, levee maintenance requirements would be minimized to the fifth greatest extent. This alternative ranks fifth out of the seven alternatives.
- **Minimize channel maintenance.** Under Alternative E, channel maintenance in the form of vegetation, debris, and sediment management would be minimized and potentially would be necessary only after significant channel-forming flows, and then only if vegetation, debris, or sediment causes channel change that was not anticipated in flood infrastructure design and, therefore, poses a risk to flood infrastructure integrity. Alternative E tied for first rank with Alternatives A through D in its ability to meet this objective.
- **Minimize impacts to agricultural operations.** Alternative E would convert 29.3 acres of farmland to non-farmland uses. Because of this, it would have the fifth greatest impact on agricultural operations and ranks third out of seven alternatives in its ability to minimize impacts to agricultural operations. But, Alternative E would still meet this objective because agricultural operations would continue to be viable and impacts would be minimized through recommended mitigation measures.

Table 6-8 Ability of Alternative E to Meet Project Objectives

Project Objective	Meets Objective	Rationale
Improve geomorphic function to increase the potential for more naturally graded sediment composition and related channel form and the development of more diverse and ecologically complex riparian habitat.	Yes	Geomorphic function would be improved, and more ecologically complex riparian habitat could form in the setback reach.
Increase rearing habitat for spring-run Chinook salmon.	Yes	Rearing habitat would be increased.
Increase flood conveyance capacity in the Deer Creek watershed and restore USACE levee freeboard conditions for a 21,000 cfs event.	Yes	Flood conveyance capacity would be restored to USACE levee freeboard conditions for a 21,000 cfs event.
Minimize levee flood control-related maintenance requirements, repairs, and costs.	Yes	Expanded setback reach would minimize the amount of levee flood maintenance requirements.
Minimize flood control-related channel maintenance requirements, repairs, and costs.	Yes	Expanded setback reach would minimize the amount of channel flood maintenance requirements.
Minimize impacts to viable agricultural operations for landowners in the project area along Deer Creek.	Yes	With landowner mitigation for impacts to existing agricultural infrastructure, agricultural operations would continue to be viable for landowners in the project area.

Notes: cfs = cubic feet per second
USACE = United States Army Corps of Engineers

6.3.7.2 Avoidance or Reduction of Significant Impacts

Alternative E would not avoid any of the significant impacts of the proposed project, but would reduce the magnitude of those impacts in comparison to Alternatives A through D.

- **Agricultural Resources and Land Use.** Alternative E would convert 14.9 acres of Prime Farmland to non-farmland uses, affect 66.5 acres of land in Williamson Act contracts, and conflict with existing zoning. Table 4.3-1 and 4.3-2 in Chapter 4.3, "Agricultural Resources and Land Use," summarize the quantified agricultural impacts of each alternative.
- **Air Quality.** Alternative E would exceed the TCAPCD emissions thresholds. It would exceed the NO_X threshold of 25 lbs./day, emitting an estimated 167.2 lbs./day. Alternative D would not exceed the PM_{10}, threshold of 137 lbs./day, emitting an estimated 32.9 lbs./day. Even with mitigation incorporated, the impact would be significant. Refer to Table 4.4-7 in Chapter 4.4, "Air Quality," for a summary and comparison of the quantified emissions for each alternative.
- **Greenhouse Gas Emissions.** Alternative E would exceed the TCAPCD construction significance threshold of 900 MT CO_2e per year, emitting an estimated 4,435 MT CO_2e.
- **Noise and Vibration.** All alternatives would have the same noise and vibration impacts. The nearest sensitive receptor to all project alternatives is 15 feet away. The impact would be significant and unavoidable.

6.3.8 Alternative F

Alternative F includes all of the common project elements and differs from the other alternatives because it does not include levee setbacks or floodplain lowering in the setback reach.

6.3.8.1 Ability to Meet Project Objectives

Alternative F would meet or partially meet the five project objectives. Although the common project elements would improve geomorphic function, Alternative F would only marginally increase rearing habitat for spring-run Chinook salmon because of the lack of levee setbacks in the setback reach. Because this alternative would not increase the space between levees in the setback reach, levee maintenance requirements would remain the same in the setback reach, although it may be reduced elsewhere in the project area. The rationale used to evaluate the alternative's ability to meet project objectives is presented below and summarized in Table 6-9.

- **Improve geomorphic function.** Although this alternative would not set back levees or lower the floodplain, Alternative F ranks sixth out of the seven alternatives in its ability to meet the project objective of improved geomorphic function because some of the common project elements would improve geomorphic function. Alternative F would, therefore, partially meet this objective.

- **Increase rearing habitat.** Alternative F would marginally increase rearing habitat for spring-run Chinook salmon as a result of instream and floodplain habitat created from the private levee and berm removal that is included in the common project elements. This alternative ranks sixth with Alternatives A through E in its ability to meet this objective because of the minimal amount of rearing habitat that would be created. Alternative F would partially meet this objective.
- **Increase flood conveyance capacity.** Alternative F would increase the flood conveyance capacity of Lower Deer Creek to restore USACE levee freeboard conditions for a 21,000 cfs event. This increase would be achieved by setting back the levees in specific areas and restoring the levee freeboard on the USACE-built levees to design criteria, implementing additional flood protection measures, and managing vegetation. Alternative F tied for first rank with Alternatives A through E in its ability to meet this objective. For relative changes in levee heights, see Figure 3-7 in the Chapter 3, "Description of Project Alternatives."
- **Minimize levee maintenance.** Because the setback area between the levees would remain the same as existing conditions under Alternative F, it is assumed that levee maintenance requirements would be the same as existing conditions in this reach. Alternative F ranks sixth out of the seven alternatives in its ability to minimize levee maintenance.
- **Minimize channel maintenance.** Under Alternative F, channel maintenance in the form of vegetation, debris, and sediment management would be minimized and potentially would be necessary only after significant channel-forming flows, and then only if vegetation, debris, or sediment causes channel change that was not anticipated in flood infrastructure design and, therefore, poses a risk to flood infrastructure integrity. Alternative F tied for first rank with Alternatives A through E in its ability to meet this objective.

- **Minimize impacts to agricultural operations.** Alternative F would convert 3.9 acres of farmland to non-farmland uses. Because of this, it would have a low impact on agricultural operations and ranks second out of seven alternatives. Alternative F would meet this objective because agricultural operations would continue to be viable and impacts would be minimized through recommended mitigation measures.

Table 6-9 Ability of Alternative F to Meet Project Objectives

Project Objective	Meets Objective	Rationale
Improve geomorphic function to increase the potential for more naturally graded sediment composition and related channel form and the development of more diverse and ecologically complex riparian habitat.	Partial	Geomorphic function would be improved, but more ecologically complex riparian habitat could not form in the setback reach.
Increase rearing habitat for spring-run Chinook salmon.	Partial	Rearing habitat would be increased marginally, but not in setback reach.
Increase flood conveyance capacity in the Deer Creek watershed and restore USACE levee freeboard conditions for a 21,000 cfs event.	Yes	Flood conveyance capacity would be restored to USACE levee freeboard conditions for a 21,000 cfs event.
Minimize levee flood control-related maintenance requirements, repairs, and costs.	Partial	Alternative would not minimize the amount of levee flood maintenance requirements in the setback reach.
Minimize flood control-related channel maintenance requirements, repairs, and costs.	Yes	Alternative would have similar channel maintenance requirements to other alternatives.
Minimize impacts to viable agricultural operations for landowners in the project area along Deer Creek.	Yes	With minimal impact to agricultural infrastructure, agricultural operations would continue to be viable for landowners in the project area.

Notes:

cfs = cubic feet per second

USACE = United States Army Corps of Engineers

6.3.8.2 Avoidance or Reduction of Significant Impacts

Alternative F would not avoid any of the significant impacts of the proposed project, but would reduce the magnitude of those impacts in comparison to Alternatives A through E.

- **Agricultural Resources and Land Use.** Alternative F would convert 3.9 acres of Prime Farmland to non-farmland uses, affect 55 acres of land in Williamson Act contracts, and conflict with existing zoning. Table 4.3-1 and 4.3-2 in Chapter 4.3, "Agricultural Resources and Land Use," summarize the quantified agricultural impacts of each alternative.
- **Air Quality.** Alternative F would exceed the TCAPCD emissions thresholds. It would exceed the NO_X threshold of 25 lbs./day, emitting an estimated 167.2 lbs./day. Even with mitigation incorporated, the impact would be significant. Refer to Table 4.4-7 in Chapter 4.4, "Air Quality," for a summary and comparison of the quantified emissions for each alternative.
- **Greenhouse Gas Emissions.** Alternative F would exceed the TCAPCD construction significance threshold of 900 MT CO_2e per year, emitting an estimated 1,972 MT CO_2e.
- **Noise and Vibration.** All alternatives would have the same noise and vibration impacts. The nearest sensitive receptor to all project alternatives is 15 feet away. The impact would be significant and unavoidable.

6.4 Environmentally Superior Alternative

CEQA requires that EIRs identify the environmentally superior alternative and discuss the facts that support that selection. The Lead Agency is not, however, obligated to select the environmentally superior alternative for implementation if it would not accomplish the basic project objectives and/or is infeasible (CEQA Guidelines Section 15126.6[a], [c] and [f]).

6.4.1 Summary of Alternatives Evaluation

Several key differences among the six "build" alternatives (Alternatives A through F) identified during the alternatives evaluation and comparison are summarized below:

- Alternative A would have the greatest impact on agricultural resources and Alternative F would have the smallest impact, with decreasing impacts from Alternatives A through F in alphabetical order.
- Alternative A would provide the most fish rearing habitat benefits and Alternative F would provide the least, with decreasing benefits from Alternatives A through F in alphabetical order.
- Levee maintenance to prevent channel changes (i.e., lateral migration and geometry adjustment) that could threaten the integrity of flood control and water management infrastructure would be necessary, but would vary between the alternatives. Alternative A would provide the greatest reduction in levee maintenance requirements and Alternative F would provide the least, with decreasing benefits from Alternatives A through F in alphabetical order.
- Although Alternatives A through E would meet all of the project objectives, Alternative A would best meet three of the project objectives:
    - Alternative A would provide the greatest improvement in geomorphic function.
    - Alternative A would result in the greatest increase in rearing habitat.
    - Alternative A would minimize levee maintenance to the greatest extent.

Alternatives A through F essentially would have the same impact related to increasing flood conveyance capacity, as they would all meet USACE levee freeboard criteria for a 21,000 cfs event. In addition, Alternatives A through F would maintain viable agricultural operations.

Alternative A would have the most severe significant environmental impacts, though Alternatives B through F would also exceed the thresholds of significance for air quality and GHG emissions and result in impacts that cannot be mitigated to less-than-significant levels. Although Alternative F would have the least severe environmental impacts, it would not provide the environmental benefits of Alternatives A through E.

Because it would provide the greatest environmental benefits and would meet all of the project objectives, Alternative A is the environmentally superior alternative.

Chapter 7. Consultation, Coordination, and Outreach

This chapter summarizes project consultation and coordination efforts to date with Native American Tribes and regulatory agencies—particularly the NMFS, USFWS, CDFW, CVFPB, and the TCFCWCD — which satisfy CEQA requirements for consultation and coordination. This chapter also summarizes public outreach and involvement.

7.1 Tribal Consultation

AB 52 coordination is required when a Tribe has requested that a CEQA lead agency consult with them for a specific geographic area. DWR has not received notification requests pursuant to AB 52 that include the project area, so AB 52 coordination is not required for the proposed project. Although AB 52 coordination is not required, consultation efforts were conducted by DWR in compliance with the California Natural Resources Agency Tribal Consultation Policy (California Natural Resources Agency 2012) and the DWR Tribal Engagement Policy to ensure effective government-to-government consultation between DWR and Indian Tribes affiliated with the geographic area of the project. The Paskenta Band of Nomlaki Indians was identified as being traditionally and culturally affiliated with the project area. Tribal consultation efforts to date with the Paskenta Band of Nomlaki Indians are summarized in Section 4.9, "Cultural and Tribal Cultural Resources." To date, no response has been received.

7.2 Agency and Stakeholder Consultation and Coordination

DWR and DCWCs consultants (FlowWest and Brunner Engineering and Consulting, Inc.) have conducted a series of outreach meetings since summer 2018 with various agencies and stakeholders to receive input on project components and other aspects of the proposed project. 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 representatives from federal and State agencies and regional and local interests. To date, outreach has been conducted with the DCWC (calls and in-person meetings quarterly or more frequent as needed), the SVRIC (calls approximately quarterly, as needed), and the Abbey (in-person meetings approximately twice per year). Outreach has also been conducted with the CDFW, USFWS, USACE, TCFCWCD, The Nature Conservancy, the Northern California Land Trust, Trout Unlimited, and American Rivers.

7.3 Public Outreach

Outreach meetings have also been conducted with some of the individual landowners adjacent to the proposed project boundaries to receive input on project components and other aspects of the proposed project. Landowner outreach has included the Amato, Hamilton, Leininger, Rumsey, Sunseri, and Wood families (calls and in-person meetings monthly to twice per year depending on landowner interest).

In addition, notices regarding the proposed project were mailed to landowners located along China Slough who would be affected by project construction. No responses were received.

7.4 Public Scoping

On December 9, 2020, DWR issued a notice of preparation (NOP) to inform agencies and the general public that an EIR was being prepared for the proposed project. The NOP was published on the public notices page of the DWR website and on the State Clearinghouse website. The NOP included information regarding the project location, background, objectives, description, and potential environmental impacts, and requested input about the content and scope of the EIR. The NOP was emailed to interested parties pursuant to PRC 21092.2 and was mailed to the adjacent landowners, other interested stakeholders, the Paskenta Band of Nomlaki Indians, and the agencies listed below.

Federal Agencies

- National Marine Fisheries Service
- Natural Resources Conservation Service
- United States Army Corps of Engineers
- United States Bureau of Indian Affairs
- United States Bureau of Reclamation
- United States Environmental Protection Agency
- United States Fish and Wildlife Service

State and Regional Agencies

- California Air Resources Board
- California Department of Conservation
- California Department of Fish and Wildlife
- California Department of Food and Agriculture
- California Department of Toxic Substances Control
- California Department of Transportation
- California Natural Resources Agency
- California State Clearinghouse
- Central Valley Flood Protection Board
- Central Valley Regional Water Quality Control Board
- Native American Heritage Commission
- State Historic Preservation Office
- State Lands Commission
- State Water Resources Control Board

Local Agencies

- Tehama County Clerk, Planning Department, Public Works, Administrator, Agricultural Commissioner, Air Pollution Control District, Flood Control and Water Conservation District, and Mosquito and Vector Control District
- Resource Conservation District of Tehama County

7.4.1 Public Meeting

An NOP scoping meeting was held to solicit input related to the scope and content of the environmental information to be included in the EIR. The meeting was held virtually because of the COVID-19 pandemic and the subsequent local and regional stay-at-home orders. DWR held the virtual public scoping meeting on December 15, 2020, from 11 a.m. to 12 p.m. via Zoom. Agencies and interested parties were given the opportunity to provide oral and written comments on the proposed scope and content of the EIR during the meeting. Four members from DWR, one member from the TCFCWCD, three members from FlowWest, and two members of the public attended the meeting. Nine comments, listed below, were received during the discussion portion of the scoping meeting.

- One commenter asked when the NOP meeting slides would be available with the NOP document. A presenter responded that scoping meeting slides would be made available upon request and sent to individuals because they could not be added as an attachment to the NOP.
- One commenter said that the TCFCWCD should be referenced as the County stakeholder, rather than Tehama County.
- One commenter asked if rock revetment between the SVRIC Dam and Red Bridge would be removed or left in place in the channel. A presenter responded that once a preferred alternative was identified during the design phase, there would be more details of how to best address existing rock revetment.
- One commenter asked if this project would raise the levee by 3 feet everywhere. A presenter responded that no, the freeboard criteria for the USACE levees is 3 feet between the water surface elevation and the crest of the levee. The levees are failing the freeboard criteria in various locations through the project area, but at different elevations.
- One commenter said that 3 feet is very dramatic, and they would like to see any proposed studies that show the actual elevations of change.
- One commenter requested to be informed of any setback options in the area downstream of Red Bridge.
- One commenter commented that most of the project upstream of Leininger Road has 1 to 1.5 feet of freeboard.
- One commenter said that the Abbey has a culvert project they are working on at the same culvert where the proposed culvert replacement is located (at China Slough).
- One commenter asked if the levee upstream of Red Bridge on the northern bank would be removed. A presenter responded that yes, the levees would be set back and tied into Leininger Road (which would also be raised).
- One commenter noted that it looks like the design has no intention of making the bridge a longer span. A presenter responded that the length of the bridge span likely will increase to accommodate a higher bridge deck elevation and a realignment that minimizes the jog in the existing road alignment.

- One commenter noted that coordination with landowners was necessary for the SVRIC Dam project.
- One commenter said that Union Pacific has been in touch and planning work on the railroad crossing next summer. Union Pacific is trying to get access via the levee, but the property to the north is proving difficult for access.

7.4.2 Public Review

The NOP was circulated from December 9, 2020, to January 11, 2021. Written comments on the NOP were received by DWR from the NAHC and CDFW.

The NAHC comment letter included the consultation requirements of AB 52, recommended consultation with California Native American Tribes that are traditionally and culturally affiliated with the geographic area of the proposed project, provided recommendations for cultural resources assessments, and advised contacting the NAHC for a sacred land file search and Native American Tribal consultation list appropriate for the project area. All recommendations were taken into consideration and addressed during preparation of the EIR.

The CDFW comment letter described CDFW’s role as both a CEQA trustee and responsible agency and requested that the EIR include specific information to enable CDFW to adequately review and comment on the proposed project. Information requested included a complete assessment of the flora and fauna within and adjacent to the project area with particular emphasis upon identifying special-status species including rare, threatened, and endangered species; a thorough discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources, with specific measures to offset such impacts; an analysis of a range of project alternatives; mitigation measures for adverse project-related impacts to sensitive plants, animals, and habitats; an evaluation that demonstrates the project will not result in a net loss of wetland habitat values or acreage; and the anticipated long-term maintenance and operational activities associated with the project. The letter also expressed concerns about populations of invasive giant reed in the project area, incidental take of CESA-listed species during construction, and the potential for grazing in riparian areas. The letter also requested that special-status species or natural communities detected during project area surveys be reported to the CNDDB. All recommendations were taken into consideration and addressed during preparation of the EIR.

7.4.3 Changes to The Project Resulting from Public Scoping

After the public scoping meeting, the proposed SVRIC Dam improvements were removed from the project description and formulated as a separate project led by SVRIC, Trout Unlimited, and CDFW.

7.5 Environmental Document Review

This draft EIR is being circulated for a 45-day public review period from November 30, 2021, to January 14, 2022. See Section 1.7, "Review of the Draft EIR," in Chapter 1, "Introduction," for instructions on how to provide comments on the draft EIR.

Chapter 8. List of Preparers

This EIR was prepared by FlowWest at the direction of the Deer Creek Watershed Conservancy in coordination with DWR.

The following is a list of the individuals who directed, managed, prepared, or reviewed sections of this EIR; conducted related fieldwork or modeling; or provided significant background materials.

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Useful Web Links

California Air Pollution Control Officers Association Health Effects Webpage
http://www.capcoa.org/health-effects/#CRITERIA_AIR_POLLUTANTS

California Air Resources Board DOORS Program
http://www.arb.ca.gov/msprog/ordiesel/ordiesel.htm

California Department of Water Resources Project Website
https://water.ca.gov/News/Public-Notices

California Department of Water Resources Public Notices
https://water.ca.gov/News/Public-Notices/2020/Dec-20/NOP-Lower-Deer-Creek-Flood

California Natural Resources Agency Tribal Consultation Policy
https://resources.ca.gov/Tribal-Policy

CEQAnet Web Portal
https://ceqanet.opr.ca.gov

Draft Environmental Impact Report for Lower Deer Creek Flood and Ecosystem Improvement Project, Phase 1
https://ceqanet.opr.ca.gov/ and
https://water.ca.gov/News/Public-Notices

Mid and Upper Sacramento River Regional Flood Management Plan
https://secureservercdn.net/198.71.233.31/dhp.663.myftpupload.com/wp-content/uploads/2014/11/Appendix_E-1_MUSR_RFMP_Potential_Projects_List_111014.pdf

Notice of Availability for Lower Deer Creek Flood and Ecosystem Improvement Project
https://water.ca.gov/News/Public-Notices

Notice of Preparation for Lower Deer Creek Flood and Ecosystem Improvement Project
https://water.ca.gov/News/Public-Notices and
https://ceqanet.opr.ca.gov/2020120149/2

Portable Equipment Registration Program
http://www.arb.ca.gov/portable/portable.htm

State Clearinghouse Website
https://ceqanet.opr.ca.gov/2020120149/2

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