LOWER CACHE CREEK, YOLO COUNTY, CA
CITY OF WOODLAND AND VICINITY

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR POTENTIAL FLOOD RISK REDUCTION PROJECT

Photo courtesy of Tim Busch, City of Woodland Principal Utilities Civil Engineer

Cache Creek nearly overtops the levee in February 2019, near County Road 102, Woodland, CA.

US Army Corps of Engineers®

December 2019

This page intentionally left blank

LOWER CACHE CREEK, YOLO COUNTY, CA
CITY OF WOODLAND AND VICINITY

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR POTENTIAL FLOOD RISK REDUCTION PROJECT

DECEMBER 2019

Type of Statement: Draft Supplemental Environmental Impact Statement (DSEIS)

Lead NEPA Agency: U.S. Army Corps of Engineers, Sacramento District

Lead CEQA Agency: City of Woodland

ABSTRACT:

The U.S. Army Corps of Engineers and its non-Federal sponsors, the City of Woodland, Department of Water Resources, and the State of California Central Valley Flood Protection Board, propose to reduce the overall flood risk to the City of Woodland by improving existing levees and constructing a new levee north of the City of Woodland in order to prevent floodwaters emanating from Lower Cache Creek from reaching the City of Woodland. The DSEIS describes the environmental resources in the project area; evaluates the direct, indirect, and cumulative environmental effects of the alternative plans; and recommends avoidance, minimization, and mitigation measures. Most potential adverse effects would be either short term, or would be avoided or reduced using best management practices. However, there are some significant and unavoidable impacts associated with this project.

PUBLIC REVIEW AND COMMENTS:

The public review period for the DSEIS began on December 27, 2019 and the official closing date for receipt of comments is February 10, 2020. All comments received within the 45-day window would be considered and incorporated in the Final SEIS. Written comments or questions concerning this document were directed to the following: U.S. Army Corps of Engineers, Sacramento District; Attn: Ms. Keleigh Duey; 1325 J Street; Sacramento, California 95814-2922, or by email: Keleigh.L.Duey@usace.army.mil.

EXECUTIVE SUMMARY

ES.1 Purpose of the Draft Supplemental Environmental Impact Statement

This Draft Supplemental Environmental Impact Statement (DSEIS) for the Lower Cache Creek Flood Risk Reduction Project (1) describes the features of the proposed alternative plans; (2) discusses the existing environmental resources in the project area; (3) evaluates the effects and significance of the action alternatives on these resources; and (4) identifies best management practices (BMPs) and mitigation measures to reduce any effects to less than significant, when possible.

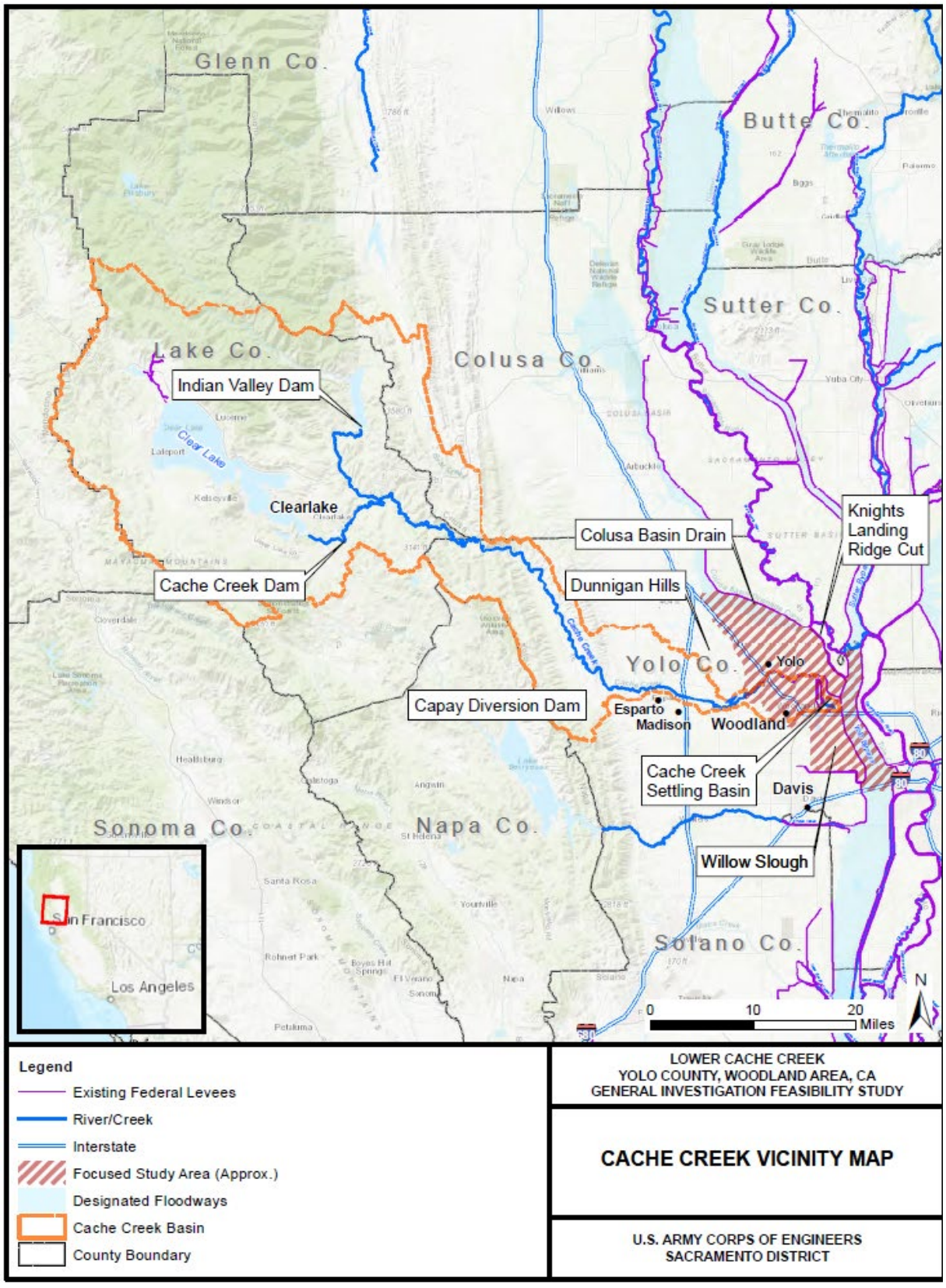
A standalone Draft Feasibility Report (DFR) accompanies this DSEIS. Additionally the City of Woodland has prepared a standalone Draft Environmental Impact Report (DEIR).

The FR and DSEIS are being released for concurrent public review, internal policy review, Agency Technical Review (ATR), and Independent External Peer Review (IEPR). All comments received during the ATR, IEPR and the 45-day public review period would be considered and incorporated into the Final FR/SEIS, as appropriate. The Final FR/SEIS would present the recommended plan for potential authorization by Congress.

ES.2 Study Area

The study area is located along the lower portion of Cache Creek in Yolo County, California. The watershed is approximately 1,139 square miles and includes portions of Colusa, Lake, and Yolo Counties. The main stem of Cache Creek originates with the outflows of Clear Lake in the Coast Range Mountains of Northern California. Water flows from Clear Lake through the Clear Lake Outlet Channel, and then through the Cache Creek Dam approximately five miles downstream, which regulates flows and generates hydroelectricity. The north fork of Cache Creek is impounded by Indian Valley Dam and joins the main stem above Capay Valley before flowing out of the foothills into California's Central Valley on an alluvial fan. The creek is ephemeral and water only reaches the Woodland area at certain times of year due to natural precipitation patterns, upstream retention, and diversions for water supply. Figure ES-1 provides a map of the watershed.

Figure ES-1. Cache Creek Watershed (Vicinity Map)



The focused study area encompasses the City of Woodland, town of Yolo, and surrounding agricultural areas, as shaded in red in Figure ES-1. The Cache Creek channel passes north of the City of Woodland through levees constructed by USACE as part of the Federally-authorized Sacramento River Flood Control Project (SRFCP). Construction began in 1918 and most facilities were completed by 1958. Construction of a flood storage reservoir was anticipated upstream (Wilson Valley Dam and Reservoir); however, the reservoir was never constructed due to seismic and environmental concerns. The existing Cache Creek levee profile was designed to provide a freeboard of at least 3 feet above an adopted flood profile calculated using a project design flood of 30,000 cubic feet per second (cfs) (USACE, 1961). Based on current analysis presented in this report, the existing levee profile would pass a 10% (1/10) annual exceedance probability (AEP) event (30,000 cfs) with 90% assurance, if the levee is assumed to not fail prior to overtopping.

The study area is located on the alluvial fan of Cache Creek. The general terrain slopes downward from the Capay Valley towards the Sacramento River. Cache Creek is perched on a ridge of higher ground that formed through the historical deposition of fine grained sediment along the Cache Creek banks during storm events that flowed out of bank. Flooding in the Cache Creek basin is principally caused by runoff of high-intensity rainstorms during the winter and spring. The primary risk of flooding from Cache Creek is overtopping of existing levees or failure of the levee prior to overtopping. Upon levee failure, the distribution of sheet flow varies depending upon the location where the overtopping or levee failure occurs.

Lower Cache Creek sits at a slightly higher elevation than surrounding land and consequently, any flows that break out of the channel quickly spread overland to the north and south of the creek and cover a large area. The existing Yolo Bypass levees prevent flooding from spilling directly into the Sacramento River. The current topography of the study area conveys Cache Creek flood waters southeast through Woodland, where waters pool against the west levee of the Yolo Bypass with no significant outlet into the bypass during significant rain events (greater than 1/500 AEP event).

ES.3 Purpose and Need

The purpose of the Lower Cache Creek Feasibility Study (LCCFS) is to investigate and determine the extent of Federal interest in a range of alternative plans that reduce flood risk to the City of Woodland and surrounding agricultural areas (study area). Flood risk in the City of Woodland is primarily related to, rainfall rates, infiltration rates, reservoir storage, topography, ground subsidence, channel dimensions and roughness, channel bed and erosion, and levee performance. Lower Cache Creek has a history of flooding and the study area experienced multiple flood events since the mid-1900s. Four major flood periods have been documented for the Cache Creek basin during the last half of the 20th century, and 20 severe floods have occurred since 1900. The most severe high water events of recent years in the Cache Creek basin downstream from Clear Lake occurred in 1939, 1955, 1956, 1958, 1964, 1965, 1970, 1983, 1995, 1997, 2005, and 2019.

Most recently on February 27, 2019, floodwaters caused road closures around the City of Woodland. Just upstream near the town of Madison, swift water rescues were performed. The event was estimated to have a peak flow of 26,400 cfs. The left bank levee downstream of the town of Yolo and the right banks upstream of the study area were overtopped. Numerous boils were discovered on the existing levees of Cache Creek downstream to Highway 113, indicating seepage and instability concerns. DWR and local agencies performed emergency flood fighting.

"An emergency rock berm was constructed on the landside of the right bank levee upstream of Interstate 5 where a significant through-seepage boil threatened levee stability" and levees were temporarily raised through the extensive placement of sandbags (MBK 2019).

Problems:

The following key problems were identified during the planning process by the study team and concerned stakeholders:

- There is risk to public health, safety, and critical infrastructure in the City of Woodland, town of Yolo, and surrounding agricultural areas from flooding from Lower Cache Creek.
- There is a significant risk of economic damages from flooding in the City of Woodland, town of Yolo, and surrounding agricultural areas.

Opportunities:

Opportunities for this study include the potential to:

- Increase public understanding of flood risk within the study area over the period of analysis.
- Leverage other existing or ongoing flood risk management initiatives, particularly the Central Valley Flood Protection Plan, within the study area and over the period of analysis.
- Consider and incorporate environmental features where compatible with flood risk management features.
- Consider and incorporate recreation features where compatible with flood risk management features.

Consideration of Alternative Plans

During the feasibility study, the Federal planning process for development of water resource projects was followed to identify a recommended plan for implementation. Following definition of flood-related problems and opportunities, specific planning objectives and planning constraints were identified. Then various management measures were identified to achieve the planning objectives and avoid the planning constraints. Management measures were screened based on how well they met the study objectives and cost effectiveness, and some measures were dropped from further consideration at that point. The retained management measures were combined to form the building blocks of alternative plans.

A preliminary array of alternatives was developed that encapsulated the identified measures to address flooding problems in the study area. These preliminary alternatives included strengthening the existing Cache Creek levee system, constructing setback levees, bypasses, levees near urban area of the City of Woodland, and various non-structural measures. The preliminary alternatives were developed to a level of detail to allow a basic comparison of the costs and benefits of each proposed plan. Many of these preliminary alternatives were eliminated based on estimated costs and effectiveness. The PDT then developed more detailed cost estimates for a focused array of alternatives. Plans were compared to identify the plan that reasonably maximized Net Economic Development (NED) benefits. Due to the nature of flooding and concentrated areas of potential damages, most alternative plans would have generated similar benefits, but at significantly different costs. Plans were eliminated that required higher costs to achieve a similar level of benefits. The tentative NED plan is also the tentatively selected plan (TSP).

ES. 4 Alternatives

The alternatives described in the DSEIS are discussed below. Additional alternatives were originally proposed during the plan formulation process, but were screened from further analysis. More information about the alternatives eliminated from consideration can be found in Section 2.1.2 Alternatives Considered, but Eliminated from Full Evaluation and 3.2 of the Feasibility Report.

ES.4.1 No Action Alternative

The No Action Alternative is the same as the future without project (FWOP) condition. This alternative serves as a baseline or benchmark against which effects and benefits of the action alternative is considered. The No Action Alternative assumes that current conditions and operation and maintenance practices would be expected to continue to occur in the foreseeable future if the project were not implemented.

Under the No Action Alternative, the Corps would not conduct any additional work to address overtopping, seepage, or levee stability concerns along Lower Cache Creek. Damages to real property from overflows from Cache Creek would be expected to be about $22.7 million annually. The City of Woodland would remain at risk of severe flooding from upstream overtopping. Other losses or adverse effects include the potential flood-related loss of life, contamination from sewage and hazardous materials, and the closure of sections of I-5 both north and east of the City of Woodland preventing residents from easily escaping rising floodwaters.

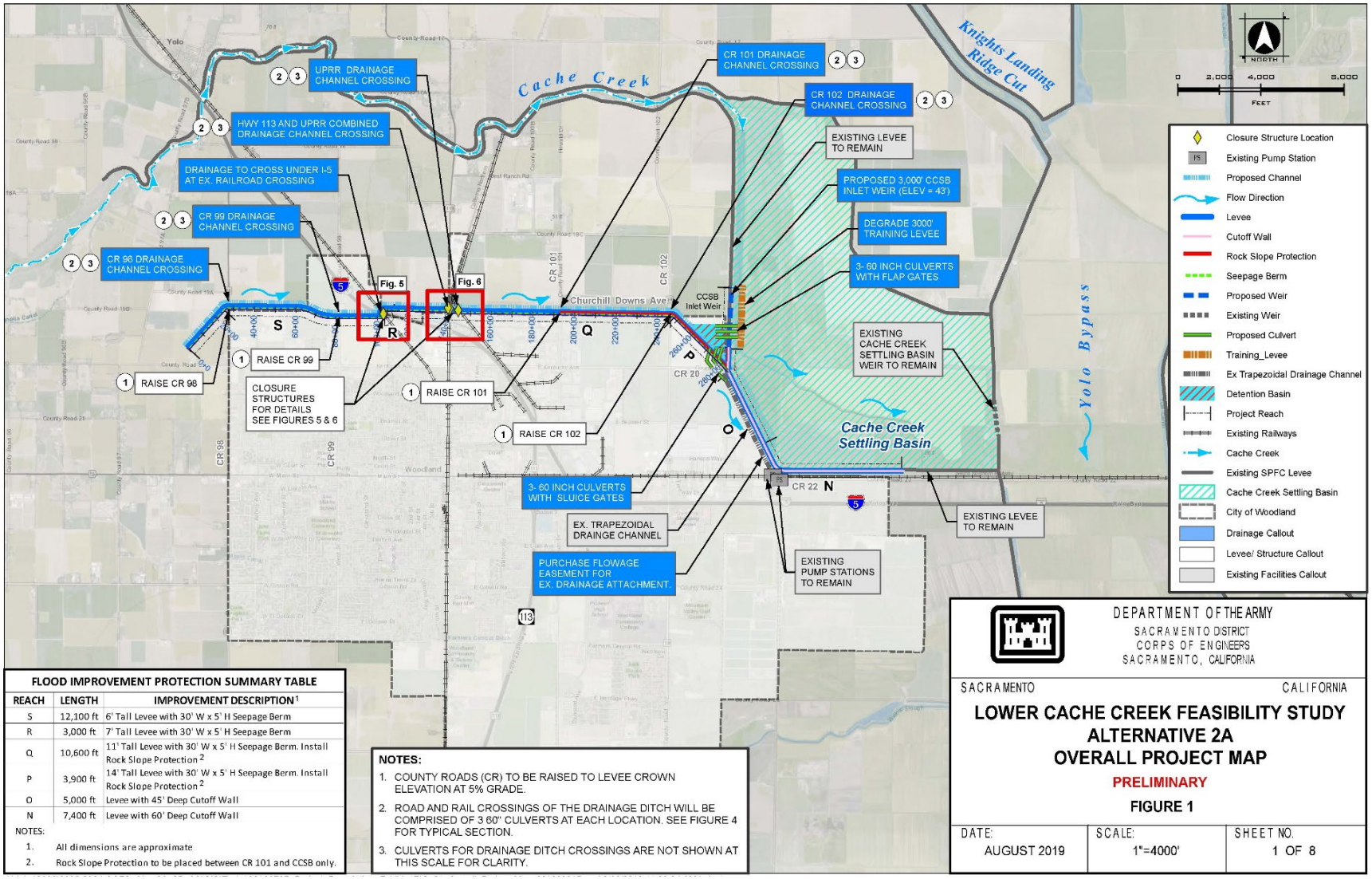
The existing levees would continue to require improvements to meet FEMA's minimum acceptable level of flood protection. Regular operations and maintenance of the existing Cache Creek channel levees would continue as currently executed by the local maintaining entities.

ES.4.2 Levee and Conveyance Plan

The Levee and Conveyance Plan (LCP), formerly Alternative 2A, meets the study objectives of reducing flood risk and flood damages in the study area. The plan significantly reduces flood risk to people and property in the City of Woodland and surrounding areas. With the TSP in place, areas in northeast Woodland, where damages are concentrated, would see a reduction in the annual chance of flooding from approximately 5.3% to 7.0%, depending on location, to about 0.1%.

The LCP consists, overall, of improving existing levees and constructing a new levee north of the City of Woodland in order to prevent floodwaters emanating from Lower Cache Creek from reaching the built up portion of the City of Woodland. Proposed project features include levee embankment, seepage berms, drainage channel; cutoff walls; weir, and closure structures across roads and railways. Figure ES-2 shows the proposed project features.

Figure ES-2. Tentatively Selected Plan and Design Features.



FLOOD IMPROVEMENT PROTECTION SUMMARY TABLE

REACH	LENGTH	IMPROVEMENT DESCRIPTION[1]
S	12,100 ft	6' Tall Levee with 30' W x 5' H Seepage Berm
R	3,000 ft	7' Tall Levee with 30' W x 5' H Seepage Berm
Q	10,600 ft	11' Tall Levee with 30' W x 5' H Seepage Berm. Install Rock Slope Protection [2]
P	3,900 ft	14' Tall Levee with 30' W x 5' H Seepage Berm. Install Rock Slope Protection [2]
O	5,000 ft	Levee with 45' Deep Cutoff Wall
N	7,400 ft	Levee with 60' Deep Cutoff Wall

NOTES:
1. All dimensions are approximate
2. Rock Slope Protection to be placed between CR 101 and CCSB only.

NOTES:
1. COUNTY ROADS (CR) TO BE RAISED TO LEVEE CROWN ELEVATION AT 5% GRADE.
2. ROAD AND RAIL CROSSINGS OF THE DRAINAGE DITCH WILL BE COMPRISED OF 3 60" CULVERTS AT EACH LOCATION. SEE FIGURE 4 FOR TYPICAL SECTION.
3. CULVERTS FOR DRAINAGE DITCH CROSSINGS ARE NOT SHOWN AT THIS SCALE FOR CLARITY.

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

SACRAMENTO CALIFORNIA

LOWER CACHE CREEK FEASIBILITY STUDY
ALTERNATIVE 2A
OVERALL PROJECT MAP
PRELIMINARY
FIGURE 1

DATE:	SCALE:	SHEET NO.
AUGUST 2019	1"=4000'	1 OF 8

ES.5 Affected Environment, Environmental Consequences, and Mitigation

Initial evaluation of the effects of the project indicated that there would likely be little to no effects on topography, geology and soils, recreation, hazardous, toxic and radioactive waste, public health vectors and vector control, or fisheries. Significant resources that may be affected by the alternatives include socioeconomics and environmental justice, land use and agriculture, transportation, noise, air quality, climate change, water quality, vegetation and wildlife, special status species, cultural resources, aesthetic and visual resources, utilities, hydrology and hydraulics.

Table ES-1 summarizes the potential effects of the alternatives, the significance of those effects, and any potential mitigation measures that would be implemented to reduce any effects to less than significant, if possible.

ES.6 Compliance with Applicable Laws, Policies, and Plans

This document would be fully compliant with the National Environmental Policy Act (NEPA) and comply with all Federal laws, regulations, Executive Orders, and permit requirements.

ES.7 Public Involvement

The Corps published the NOI to prepare the Feasibility Report/Supplemental Draft Environmental Impact Statement (FR/SDEIS) for the Lower Cache Creek Flood Risk Management Feasibility Study on August 26, 2015 (Vol. 80, No. 165). A public scoping meeting was held on September 3, 2015 from 4:00 p.m. to 7:00 p.m. at the Woodland Community Center at 2001 East Street in Woodland, CA. A total of 19 comments were received during the comment period from the public scoping meeting held in 2015. Seven comments were from agencies and tribes, three were from community or non-profit organizations, and nine were from interested individuals. These public comments can be found in Appendix J Public Involvement.

A public scoping meeting for the City of Woodland's Environmental Impact Report (EIR) was held on September 11, 2019 from 6:30 p.m. to 8:00 p.m. at Woodland City Hall at 300 1st Street in Woodland, CA. Public comments from the public scoping meeting received within two weeks would be considered for the EIR. These comments would be documented in the EIR.

A notice of availability of the DSEIS would be published in the Federal Register on November 15, 2019. The draft would be distributed for public review on December 27, 2019. A public workshop would be held during the 45-day review period to provide additional opportunities for comment on the DSEIS. All comments received by February 10, 2020 would be incorporated into the Final SEIS, as appropriate. A comments and responses appendix would be included in the Final SEIS. Comments received during the comment period for the 2003 EIS-EIR would also be addressed in the Final SEIS.

ES.8 Significant Issues

Significant issues identified by agencies and the public related to construction of the LCCFS are summarized below. These issues are based on public comments on the DSEIS, preliminary studies and comments from formal and informal agency meetings, workshops, public meetings, telephone discourse, letters, and emails.

- Construction of the project could require the permanent acquisition of private property within or near the construction area.
- Construction is expected to increase noise levels, affecting adjacent residents and local recreationists, even under circumstances of compliance with noise ordinances.
- Noise, visual esthetics, and access would be compromised during construction.
- The overall project would be a multi-phased effort that requires overlapping construction activities within the overall project area. A timeline of these overlapping efforts has not been developed.

ES.9 Areas of Controversy

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

Property Acquisition: A specific issue of concern involves potential conflicts with private property that is within or near the construction area. In some cases, permanent property acquisition may be needed for project construction, operation, and maintenance; and temporary construction easements may be needed for construction staging and equipment access. Temporary restrictions on access to private property may also be necessary.

Construction Related Effects: As the proposed LCP is nearby several residential areas and other developed land uses, actions proposed by the project are likely to result in construction related effects. These effects include those under the topics of public safety, noise, traffic, and air quality and are specifically described in Chapter 3 Environmental Consequences.

Public Support. The 2003 Lower Cache Creek Potential Flood Damage Reduction Project was not supported by the local community and this caused the City of Woodland to stop pursuing the project. Primary concerns with the 2003 Flood Barrier Plan included 1) physical division of the City of Woodland; 2) socioeconomic injustices to residents living north of the proposed flood barrier; 3) cessation of operations and maintenance on existing Cache Creek levees; 4) depth of inundation north of the flood barrier; 5) potential water contamination from hazardous material and wastes in the study area; 6) reduced access to emergency services; 7) loss of prime agricultural land and economic inequality; 8) lack of flood risk reduction provided to upstream communities (e.g. in the towns of Yolo and Madison); and 9) loss of historic resources. Since that time, multiple iterations for plan formulation with the NFS have resulted in alternatives development that attempt to alleviate public concerns.

Mercury. Under existing conditions, mercury-laden sediments originating in Cache Creek upstream of the study area become deposited in the CCSB. Naturally-occurring bacteria can metabolically process mercury, causing methylation. Methylmercury is a potential hazard to downstream ecological receptors in the Sacramento/San Joaquin River Delta (USFWS 2001). This feasibility study does not seek to remedy the methymercury situation in CCSB. Proposed alternatives must avoid or mitigate any interference with the State of California's obligation to maintain compliance with the Total Maximum Daily Load (TMDL) of mercury-laden sediment in the Yolo Bypass, as mandated by the Environmental Policy Agency (EPA) in accordance with the

Clean Water Act. USACE would follow all applicable Federal, State, and local law and policies (including TMDLs for pollution and sediment), as stated in ER 1105-2-100.

ES.10 Preferred Plan

Based on the results of the technical, economic, and environmental analyses and coordination with the non-Federal sponsor, the Levee and Conveyance Plan has been identified as the TSP. The environmentally preferred alternative and least environmentally damaging practicable alternative (LEDPA), which is based upon the 404 (b)(1) evaluation (Appendix I) is also the LCP.

Table ES-1. Comparative Summary of Environmental Effects, Mitigation, and Levels of Significance

	No Action Alternative	Levee and Conveyance Plan
Socioeconomic Resources and Environmental Justice		
Effect	Landowners with Federally insured mortgages and some businesses within the FEMA 1 in 100 chance floodplain would be required to pay flood insurance. Flooding of residential areas and displacement of populations during a flood event.	Construction of the new levee would result in localized areas of slight increases in floodwater depth north of the levee and impact eight structures. An additional 14 structures north of the City would remain in the floodplain, but would not experience a change in depth or duration of flooding. Temporary disruption to residents alongside construction sites from traffic, noise, and dust. Acquisition of properties for construction and staging easements. No long-term environmental injustices.
Significance	Significant.	Less than significant. Benefits to urban area.
Mitigation	None.	Landowner notification of potential disruptions and real estate acquisitions. Fair market value paid for acquisitions with implementation of appropriate BMPs.
Land Use and Agriculture		
Effect	Inconsistent with local land use policies requiring protection of the existing urban area from flood damages. Land use and future growth and development would continue as described in the City and County General Plans. Urban areas and farmlands would be susceptible to flooding during storm events.	The project would require approximately 370 acres permanent project features and temporary haul roads and staging areas. Agricultural lands compose about 283 acres of the total land needs, 235 acres of which are Prime and Unique Farmland.
Significance	Significant.	Less than significant with mitigation.
Mitigation	None.	Compliance with Relocation Assistance and Real Property Acquisition Policies Act of 1970. Compliance with Farmland Policy Protection Act. Fair market value paid for agricultural and industrial land acquisitions.
Transportation		

Effect	The potential for flooding of local, county, and major transportation corridors like Interstate-5 and State Route 113 would remain during major storm events. Damage to roadways during flood event. Emergency road repairs would increase traffic congestion.	The project would protect important roadway infrastructure from Woodland to Sacramento during flood events that would enable residents to leave flood affected areas and allow for emergency responders to enter.
Significance	Significant.	Minor and only occurring during construction.
Mitigation	None.	Preparation of a Traffic Control and Road Management Plan and implementation of BMPs. Culverts under roadways to redirect floodwaters off roads.
Noise		
Effect	Noise levels would be the same as existing conditions. Noise during flood-fighting and levee repairs may increase.	Local increase in noise levels during construction would occur that may exceed ambient noise thresholds. After construction concludes, noise levels would return to pre-project conditions.
Significance	Negligible, incremental short-term effects but no lasting increase in noise levels.	Significant. Moderate to major increases in noise levels during construction to adjacent sensitive receptors (residences and businesses).
Mitigation	None needed.	Coordination with local residents and compliance with City of Woodland noise ordinances. Work would occur during daylight hours.
Air Quality		
Effect	Woodland population expected to grow and corresponding increase in criteria pollutant emissions likely with projected traffic volume increases. Increased emissions during emergency flood fighting activities without BMPs in place. Increased emissions during clean-up and reconstruction of the urban area.	Temporary emissions of criteria pollutants from construction equipment and haul trucks.
Significance	Significant.	Less than significant with mitigation.
Mitigation	None possible.	Implementation of Yolo Solano Air Quality Management District (YSAQMD) Basic Construction Emission Control Practices and BMPs.
Climate Change		

Effect	Inland hydrology models predict higher intensity storms which could lead to local pump stations being overwhelmed. Increased GHG emissions during flood fight.	Increased GHG emissions from construction equipment.
Significance	Significant.	Less than significant with mitigation.
Mitigation	None possible.	Implementation of YSAQMD Basic Construction Emission Control Practices and BMPs.
Water Quality		
Effect	Risk of contaminants entering the water from utilities, stored chemicals, septic systems, and flooded vehicles during flood event. Flood flows would increase bank erosion increasing turbidity. Climate change may create drought conditions and higher intensity wildfires in the watershed, leading to greater sediment deposit in Cache Creek.	Potential impacts include increased turbidity during drainage canal construction and tie-in to existing drainage ditch. Potential for storm water runoff from exposed soils and cement, slurry or fuel spills during construction.
Significance	Significant.	Less than significant with mitigation.
Mitigation	None possible	Preparation of a Stormwater Pollution Prevention Plan, Spill Prevention Control and Countermeasure Plan, and a Bentonite Slurry Spill Contingency Plan and implementation of BMPs.
Vegetation and Wildlife		
Effect	Vegetation and wildlife that utilize the CCSB for habitat would continue to be affected by O&M of the existing levee system. Erosion during a flood event would cause vegetation and wildlife habitat loss. Future flood fighting and repairs would affect vegetation and wildlife. Wildlife that occupy farmlands would continue to be subject to agricultural practices.	The project would result in the loss of 0.05 acres of cottonwood willow riparian, 2 acres of valley oak woodland, 10 acres of seasonal marsh/wetland, and 8 acres of orchard habitat. 83 acres of non-native annual grassland would be also be temporarily lost.
Significance	Significant.	Less than significant with compensatory mitigation.
Mitigation	None.	Mitigation credits for riparian, wetland, and oak woodlands habitat would be purchased at a mitigation bank. Annual grasslands would be planted with a native

		forb/grass mix. Lands with the CCSB may accommodate on-site habitat creation mitigation.
Special Status Species		
Effect	Habitat for special-status species is likely to affect by O&M of the existing levee system and CCSB. Flood event or flood fight could cause fatality to species.	The project would result in the loss of 0.85 acre of palmate-bracted bird's beak, 6 elderberry shrubs, 0.82 acres of giant garter snake, and 0.65 acre of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat.
Significance	Significant.	Less than significant with compensatory mitigation.
Mitigation	None.	Mitigation credits for the impacted special status species would be purchased from a bank if available. Mitigation for palmate-bracted bird's beak would involve education and/or habitat enhancement at Woodland Regional Park. Additional analysis would be conducted to determine if on-site habitat restoration or creation could be constructed.
Cultural Resources		
Effect	Damage to archaeological sites could result from future flood events.	Potential for adverse effects to historic properties from construction of the project.
Significance	Significant.	Less than significant with mitigation.
Mitigation	None possible.	Cultural resource surveys would be conducted prior to construction, to identify historic properties that would be affected by the project. Adverse effects would be mitigated through measures described in a Programmatic Agreement executed pursuant to Section 106 of the NHPA.
Aesthetic and Visual Resources		
Effect	O&M needed to maintain existing levees would continue to degrade the visual character of Lower Cache Creek by removing or altering remaining riparian forest. A flood event could damage the visual character in the study area.	Temporary construction related interruption of visual resources. Views obstructed by the new levee would disrupt the rural, agricultural and sparsely populated visual conditions of the study area.
Significance	Not significant.	Significant.
Mitigation	None needed.	New levee would be reseeded to match local conditions.

Utilities		
Effect	In a flood event there could be significant damage to utility systems. Debris from flooded homes and properties could overwhelm solid waste disposal facilities.	Temporary disruptions to utility services possible, particularly during relocation of utilities that penetrate the new levee.
Significance	Significant.	Less than significant.
Mitigation	None possible.	Notification of potential interruptions would be provided to the appropriate agencies and landowners.
Hydrology and Hydraulics		
Effect	Emergency repairs during a flood event could result in the loss of channel capacity and alternation of current geomorphic processes.	During a large flood event (e.g. 1% AEP event) duration of flooding west of SR 113, near I-5 would be shorter than existing conditions, lasting only several days. Near SR 113, flood depths would decrease by up to 1 foot from existing conditions. East of SR 113 flooding duration would be higher (near the inlet weir flooding would last about 1 month). Flood depths would be higher or lower west of SR 113. Flood depths increase gradually to 6 feet near the CCSB inlet weir during flood events greater than 2% AEP events. Induced flooding would have minor impacts industrial/agricultural area north of the city limit line.
Significance	Significant.	Less than significant.
Mitigation	None possible.	None needed.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
ACHP	Advisory Council on Historic Preservation
ADT	Average Daily Traffic
AEP	annual exceedance probability
APE	Area of Potential Effect
BA	Biological Assessment
BMPs	best management practices
BO	Biological Opinion
CAR	Coordination Act Report
CAA	Federal Clean Air Act
CAAQS	California ambient air quality standards
CalEPA	California Environmental Protection Agency
CalTrans	California Department of Transportation
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCSB	Cache Creek Settling Basin
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
cfs	cubic feet per second
CHP	California Highway Patrol
CNDDB	California Natural Diversity Database
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
Corps	U.S. Army Corps of Engineers
CPUC	California Public Utilities Commission
CRHR	California Register of Historic Resources
CVFPB	Central Valley Flood Protection Board
CVFPP	Central Valley Flood Protection Plan
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
cy	cubic yards
dB	decibel
dBA	A-weighted decibel
dbh	diameter at breast height
DFR	draft feasibility report
DTSC	California Department of Toxic Substance Control
DWR	California Department of Water Resources
EAD	Expected Annual Damages
EFH	essential fish habitat
EIS	environmental impact statement
EIR	environmental impact report
EPA	Environmental Protection Agency
ER	Engineering Regulation
ESA	Endangered Species Act
ESA	Environmental Site Assessment
ESU	evolutionary significant unit

FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
FTA	Federal Transit Administration
FWCA	Fish and Wildlife Coordination Act
FWOP	future without project condition
GGS	giant garter snake
GHG	greenhouse gas
HEP	Habitat Evaluation Procedure
HMMP	Habitat Mitigation and Monitoring Plan
HPMP	Historic Properties Management Plan
HPTP	Historic Properties Treatment Plan
HTRW	hazardous, toxic, or radioactive waste
IPCC	Intergovernmental Panel on Climate Change
JFP	Joint Federal Project
LBV	least Bell's vireo
LEDPA	Least Environmentally Damaging Practicable Alternative
lf	linear feet
LOS	Level of Service
LCCFS	Lower Cache Creek Feasibility Study
LCP	Levee and Conveyance Plan
LPP	Locally Preferred Plan
MBTA	Migratory Bird Treaty Act
msl	mean sea level
NAAQS	national ambient air quality standards
NED	Net Economic Development
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NFS	non-Federal sponsor
NHPA	National Historic Preservation Act of 1966
NMFS	National Marine Fisheries Service
NOI	notice of intent
NOP	notice of preparation
NPDES	National Pollution Discharge Elimination System
NRCS	U.S. National Resources Conservation Service
NRHP	National Register of Historic Places
O&M	operations and maintenance
OHWM	Ordinary High Water Mark
OSHA	Occupational Safety and Health Administration
PA	programmatic agreement
PBBB	Palmate-bracted bird's beak
PED	Preconstruction Engineering and Design
PL	Public Law
PM10, PM2.5	inhalable particulate matter
ppm	parts per million
RCDM	SMAQMD Road Construction Emissions Model
RD	Reclamation District
RWQCB	Central Valley Regional Water Quality Control Board
SB	California Senate Bill
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Officer

SMAQMD	Sacramento Metropolitan Air Quality Management District
SPCCP	Spill Prevention Control and Countermeasures Plan
SR	State Route
SRA	Shaded Riverine Aquatic (habitat)
SRBPP	Sacramento River Bank Protection Project
SRFCP	Sacramento River Flood Control Project
SWPPP	Stormwater Pollution Prevention Plan
TMDL	total maximum daily load
TSP	tentatively selected plan
ULDC	Urban Levee Design Criteria
ULOP	Urban Level of Protection
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geologic Survey
VELB	valley elderberry longhorn beetle
VPB	vernal pool branchiopods
WRDA	Water Resources Development Act
WYBC	western yellow-billed cuckoo
YSAQMD	Yolo-Solano Air Quality Management District

1.0 INTRODUCTION

1.1 Background and Study History

The Lower Cache Creek, Yolo County, Woodland Area, California, Feasibility Study, assesses an array of alternatives that perform to reduce the risk of flooding to the City of Woodland and surrounding agricultural areas. The Lower Cache Creek Feasibility Study is being jointly investigated by the Federal lead agency, the U.S. Army Corps of Engineers (Corps), Sacramento District, and the non-Federal sponsors (NFS), the Central Valley Flood Protection Board (CVFPB) represented by the California Department of Water Resources (DWR), and the City of Woodland.

The National Environmental Policy Act (NEPA) provides an interdisciplinary framework for Federal agencies to fully consider environmental factors and the potential effects of the Federal action, during their decision-making (42 USC Section 4321, 40 CFR Section 1500.1). According to NEPA, an Environmental Impact Statement (EIS) is required whenever a proposed major Federal action would result in significant effects on the quality of the natural and human environment. The Corps is the lead NEPA agency.

The purpose of the Lower Cache Creek Feasibility Study (LCCFS) is to investigate and determine the extent of Federal interest in a range of alternative plans that reduce flood risk in the City of Woodland and surrounding agricultural areas. This Draft Supplemental EIS (DSEIS) has been prepared to evaluate potential environmental impacts of the LCCFS and to support the Lower Cache Creek Feasibility Report. The Feasibility Report is being prepared separately but would accompany the DSEIS. This DSEIS supplements the 2003 Environmental Impact Statement/Environmental Impact Report (DEIS-EIR) for the Lower Cache Creek, Yolo County, CA, City of Woodland and Vicinity, for Potential Flood Damage Reduction Project. The 2003 DEIS-EIR is incorporated by reference. This DSEIS evaluates proposed project alternatives, and proposes mitigation measures including avoidance, minimization, and compensation to reduce, where feasible, any significant and potentially significant adverse impacts.

1.2 Study Authority

This study was authorized by Section 209 of the Flood Control Act of 1962, Public Law (Pub. L.) 87-874, § 209, 76 Stat. 1196 (1962), which states as follows for the Sacramento River Basin:

> "The Secretary of the Army is hereby authorized and directed to cause surveys for flood control and allied purposes, including channel and major drainage improvements, and floods aggravated by or due to wind or tidal effects, to be made under the direction of the Chief of Engineers, in drainage areas of the United States and its territorial possessions, which include the following named localities: Provided, That after the regular or formal reports made on any survey are submitted to Congress, no supplemental or additional report or estimate shall be made unless authorized by law except that the Secretary of the Army may cause a review of any examination or survey to be made and a report thereon submitted to Congress, if such review is required by the national defense or by changed physical or economic conditions: Provided further, That the Government shall not be deemed to have

> entered upon any project for the improvement of any waterway or harbor mentioned in this title until the project for the proposed work shall have adopted by law:...
>
> Sacramento River Basin and streams in northern California draining into the Pacific Ocean for the purposes of developing, where feasible, multiple-purpose water resource projects, particularly those which be eligible under the provisions of title III of Public Law 85-500…"

Per Section 1203 of America's Water Infrastructure Act of 2018, Pub. L. 115-270, § 1203, 132 Stat 3803, the "Secretary shall expedite the completion of a feasibility study" for Lower Cache Creek, subject to the availability of funding.

At the request of the Yolo County Board of Supervisors the reconnaissance study was initiated in 1993, and Federal interest was found in proceeding with a feasibility level investigation of flood damage reduction along Lower Cache Creek.

1.3 Study History

The reconnaissance study was completed in 1995 and the feasibility study was undertaken from 2000 to 2003. A tentatively selected plan (TSP) was identified as a large barrier constructed at the northern city boundary, which increased flood depths between the urban city limits and Lower Cache Creek. A Draft Feasibility Report and Environmental Impact Statement/Environmental Impact Report (DFR/DEIS-EIR) for the Lower Cache Creek, Yolo County, CA, City of Woodland and Vicinity, Potential Flood Damage Reduction Project were submitted for a 45-day public comment period on March 21, 2003 (*68 FR 13907*). The Yolo County community was divided on whether to support the TSP. The City of Woodland adopted an ordinance restricting any flood solution that would similarly produce deep floodplains north of the city (City Code Section 10.1, Flood Control Policy). Due to lack of public support for the proposed plan, the NFS did not pursue the study further.

In 2009, the City of Woodland expressed interest in restarting the feasibility study, however the study was forced to pause due to lack of federal appropriations until June 2013. A focused array of alternatives was developed and a public information meeting was held in November 2013. On August 26, 2015, the Corps published the notice of intent (NOI) to prepare the SDEIS for the Lower Cache Creek Flood Risk Management Project, City of Woodland, Yolo County, California (CA) in the Federal Register (80 FR 51789). Public review of the DFR/DSEIS was anticipated for May 2016. However, in January 2016, the City of Woodland requested the study be put on hold while they developed a locally preferred plan (LPP) to gain support of the community.

The NFS halted their pursuit of the LPP and reengaged with the Corps in the fall of 2018 to restart the feasibility study and ensure public support of the Federal TSP. The study was reactivated on November 13, 2018 and the TSP milestone occurred in February 2019.

1.4 Study Area

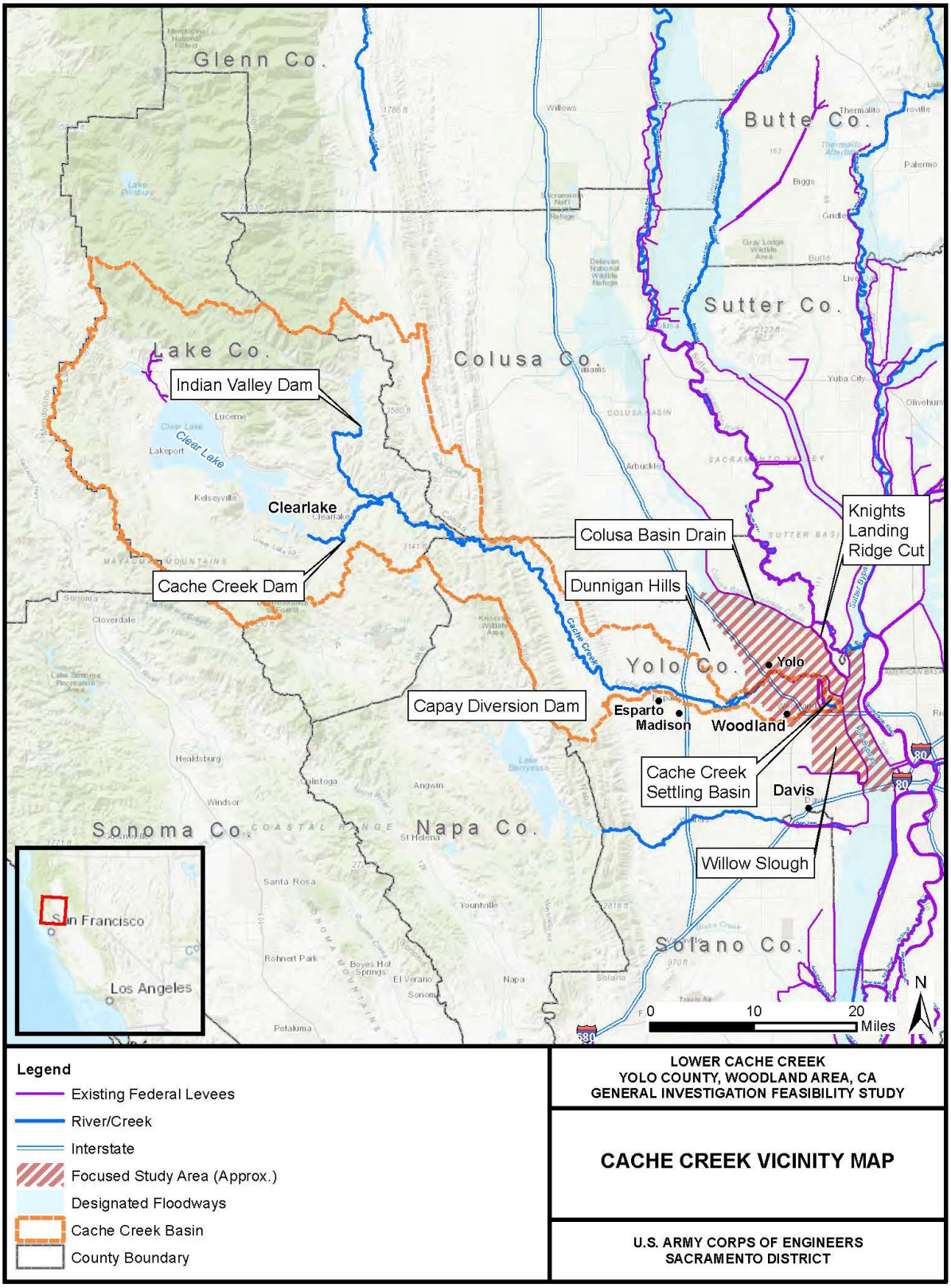
The study area addressed in this report includes the downstream segment of Cache Creek in Yolo County, California. Cache Creek is a west side tributary of the Sacramento River near Sacramento, California. The main stem of Cache Creek originates within the outflows of Clear Lake in the Coast Range Mountains of Northern California. The north fork of Cache Creek is impounded by Indian Valley Dam and joins the main stem above Capay Valley before flowing out

of the foothills into California's Central Valley. The creek is ephemeral; water only reaches the Woodland area at certain times of the year due to natural precipitation patterns, upstream retention and diversions for water supply. Figure 1-1 provides a map of the entire Cache Creek watershed.

The focused study area encompasses the City of Woodland and surrounding agricultural areas (Figure 1-2). The proposed measures in the array of alternatives are roughly bounded by the city limit line to the south, County Road 97 to the west, Cache Creek to the north, and the Yolo Bypass to the east. The channel passes north of the City of Woodland through levees constructed by USACE in 1958 as part of the Federally-authorized Sacramento River Flood Control Project (SRFCP). Construction of a flood storage reservoir was anticipated upstream (Wilson Valley Dam and Reservoir); however, the reservoir was never constructed due to seismic concerns. The existing Cache Creek levee profile was designed to provide a freeboard of at least 3 feet above an adopted flood profile calculated using a project design flood of 30,000cfs (USACE, 1961). Based on current analysis presented in this report, the existing levee profile would pass a 10% (1/10) AEP event (30,000 cfs) with 90% assurance, if the levee is assumed to not fail prior to overtopping. However, including the probability of geotechnical failure prior to overtopping, the existing levee project would pass a 50% (1/2) AEP event (10,800cfs) with 90% assurance.

The leveed portion of Cache Creek discharges into the Cache Creek Settling Basin (CCSB), which was also constructed by USACE as a separately authorized component of the SRFCP. Cache Creek has historically carried a large sediment load, and the Cache Creek watershed is a dominant source of mercury to the San Francisco Bay-Delta. Mercury laden sediments passing through Cache Creek are resultant of legacy mercury mines in the Coast Range (DWR, 2018). Erosion and groundwater discharge from marine sediments and marine sedimentary rocks have resulted in releases of naturally occurring, high boron and mercury concentrations to the Cache Creek watershed (Yolo Habitat Conservancy, 2018) The settling basin was constructed to prevent sediment carried by Cache Creek from adversely affecting the hydraulic capacity of the Yolo Bypass through excessive sediment deposition and thereby increase the flood risk of the City of Sacramento. Water from the CCSB flows through either a 400 cubic feet per second (cfs) low-flow culvert in moderate flow conditions, or the overflow concrete weir, during high flow events. Those waters are discharged into the Yolo Bypass, which flow directly into the Sacramento River.

Figure 1-1. Cache Creek Watershed (Vicinity Map)



1.5 Hydrology and Hydraulic Flows in the Study Area

The study area includes the lower reach of Cache Creek, encompassing agricultural areas, the City of Woodland, unincorporated areas of Yolo County, and the CCSB (Figure 1-2). The principal source of flooding threatening the City of Woodland is Cache Creek. However, to evaluate potential impacts of potential alternatives, the study area included areas of comingled flooding from the Colusa Basin Drain, Yolo Bypass, and Willow Slough. The study area is drained by the Yolo Bypass, a major structural feature of the regional SRFCP which diverts water around the major urbanized areas of Sacramento, West Sacramento, Woodland, and Davis. While the existing flood management system has reduced risk of flooding to the study area, residual risks related to potential events exceeding the historic design and related failures are inherent to the system.

The study area is located on the alluvial fan of Cache Creek. The general terrain slopes downward from the Capay Valley towards the Sacramento River. Cache Creek is perched on a ridge of higher ground that formed through the historical deposition of fine grained sediment along the Cache Creek banks during storm events that flowed out of bank (Figure 1-3). General geomorphic characteristics of Cache Creek are summarized in Section 1.4 of the 2003 DEIS-EIR. Recent studies on the increased rate of land subsidence caused by groundwater extraction in the western portion of the Sacramento Valley may alter the existing hydrology in the study area (DWR 2018).

Flooding in the Cache Creek basin is principally caused by runoff of high-intensity rainstorms during the winter and spring. The primary risk of flooding from Cache Creek is overtopping of existing levees or failure of the levee prior to overtopping. Upon levee failure, the distribution of sheet flow varies depending upon the location where the overtopping or levee failure occurs. The flood threat to life and property in the study area is increased by the raised bed of Interstate 5 (I-5). The existing I-5 corridor diverts flood flows into Woodland.

Lower Cache Creek sits at a slightly higher elevation than surrounding land and consequently, any flows that break out of the channel quickly spread overland to the north and south of the creek and cover a large area. The existing Yolo Bypass levees prevent flooding from spilling directly into the Sacramento River. The current topography of the study area conveys Cache Creek flood waters southeast through Woodland, where waters pool against the west levee of the Yolo Bypass with no significant outlet into the bypass during significant rain events (greater than 1/500 AEP event) (Figure 1-4) (Busch, pers. Comm, 2019). For purposes of discussion, the study area has been divided into three sections: agricultural/industrial area between Cache Creek and the city limit line of Woodland, the Cache Creek Settling Basin, and the existing internal storm drainage system. Further discussion on the hydrology and hydraulic impacts would be discussed in Section 3.3.13.

Figure 1-2. Lower Cache Creek Focused Study Area

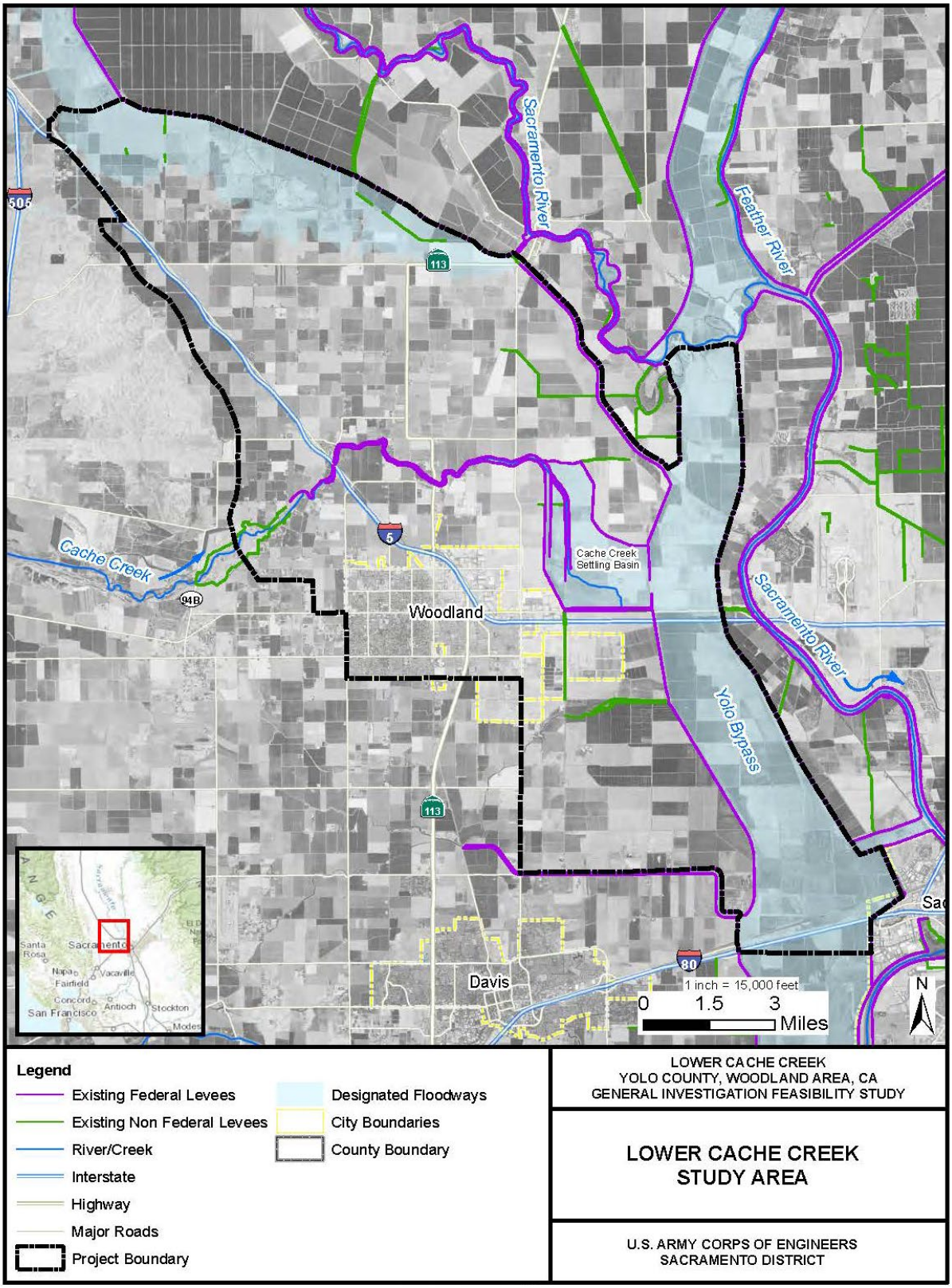
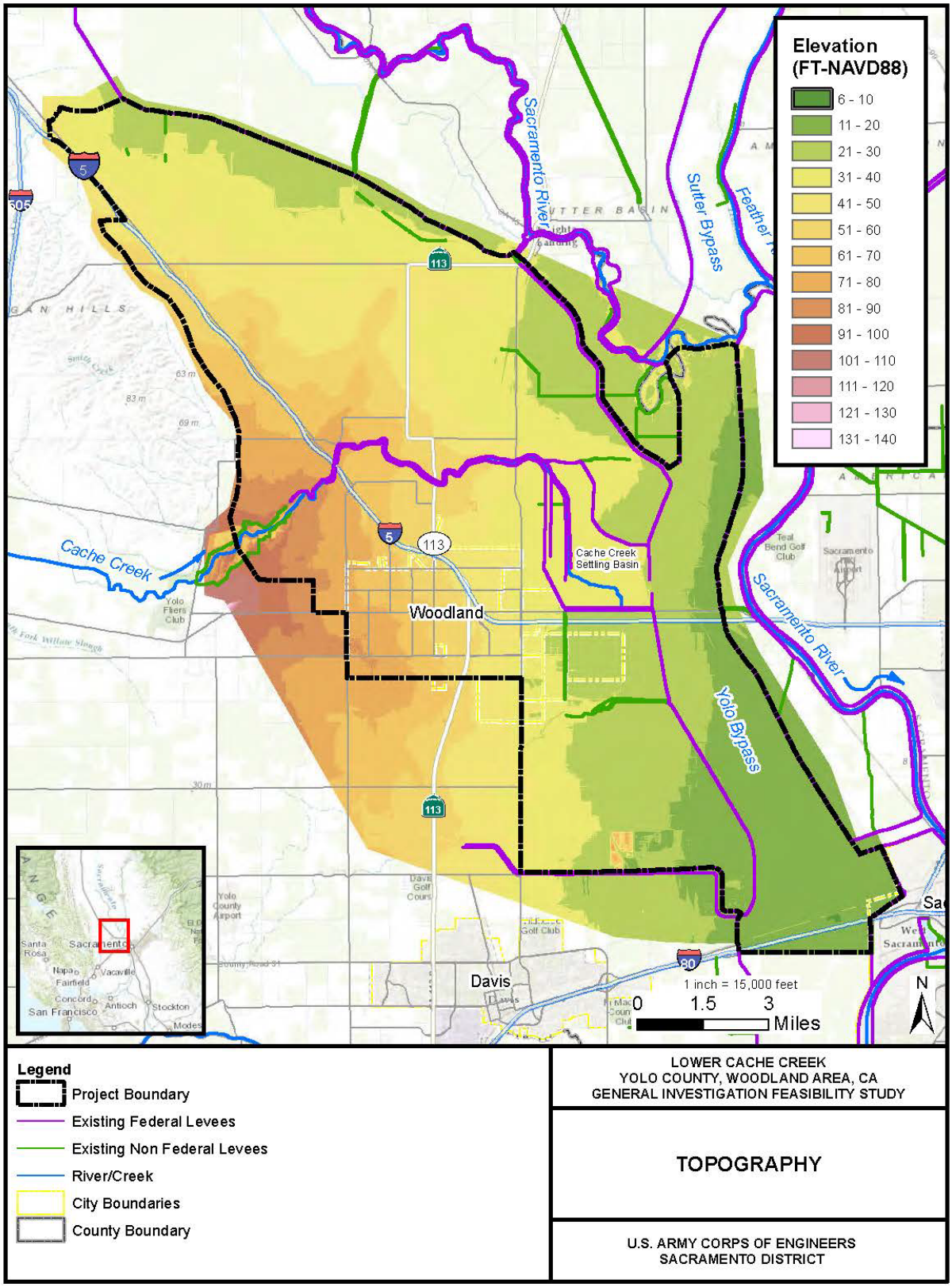


Figure 1-3. Topography of the Study Area.



1.6 Purpose and Need for the Action

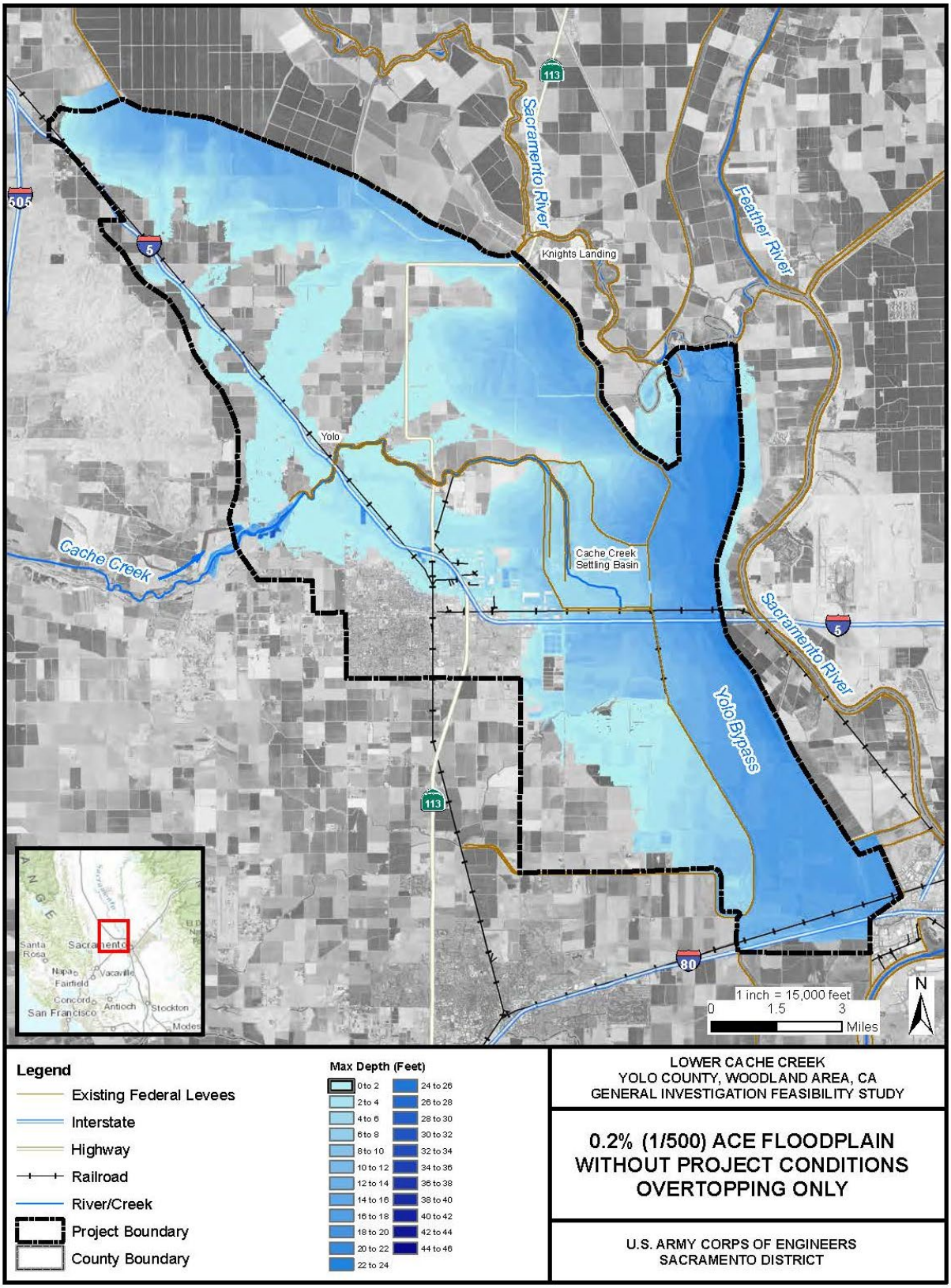
The purpose and need of the LCCFS is to reduce the overall flood risk to the City of Woodland. Flood risk in the City of Woodland is primarily related to, rainfall rates, infiltration rates, reservoir storage, topography, ground subsidence, channel dimensions and roughness, channel bed and erosion, and levee performance. The threat of flooding to the City of Woodland includes potential impacts to both residential and commercial property, disruption of two major transportation routes (Interstate 5 and the Union Pacific Railroad), and potential damages to agricultural production.

The study area has experienced multiple flood events since the mid-1900s, with twenty severe floods occurring since 1990. The most recent flood events occurred in 1983, 1995, 1997, 2006, 2011, spring 2017 and February 2019. In 1983 overland flows inundated areas in the easterly part of what is now within the Woodland city limits. According to the U.S. Geological Survey (USGS), the peak flow in January 1983 at the Rumsey gage was estimated to be 53,000 cfs, which is estimated to be a 2% (1/50) AEP event. There was a levee break downstream from County Road CR 102 during this flood. Federal, State, and local agencies patched levee boils at that time to prevent additional levee breaks along both sides of the Cache Creek levee system. In 1995, flooding from Cache Creek came within 1 block of the city. The total flow (approximately 48,000 cfs, peak) represents a 2.5% (1/40) AEP event. In 2006, floodwaters came within six inches of overtopping the Lower Cache Creek levees causing the Governor to declare a state of emergency forcing emergency evacuations. Following the severe storm event, extensive requests for levee repairs under the PL 84-99 program came to the Corps, and numerous roadway repairs were undertaken.

Most recently on February 27, 2019, floodwaters caused road closures around the City of Woodland. Just upstream near the town of Madison, swift water rescues were performed. The event was estimated to have a peak flow of 26,400 cfs. The left bank levee downstream of the town of Yolo and the right banks upstream of the study area were overtopped. Numerous boils were discovered on the existing levees of Cache Creek downstream to Highway 113, indicating seepage and instability concerns. DWR and local agencies performed emergency flood fighting. “An emergency rock berm was constructed on the landside of the right bank levee upstream of Interstate 5 where a significant through-seepage boil threatened levee stability” and levees were temporarily raised through the extensive placement of sandbags (MBK, 2019).

Flooding from Lower Cache Creek poses a risk of economic damage to property and critical infrastructure within the City of Woodland and surrounding areas. The anticipated total damageable property within the 0.2% (1/500) AEP floodplain is valued at $2.3 billion (October 2019 price levels). Future without project (FWOP) expected annual damages are estimated to be $22.7 million per year. Expected annual damages represents an estimate of the average damages that would be expected in any given year over the long term. Damages are based on floodplain modeling and current valuations of the assets, including homes, businesses, roads, etc., and based upon historical damages. Other losses or adverse effects would continue to include the potential for flood-related loss of life, contamination from sanitary sewage and hazardous materials, and the extended closure of the section of I-5 east of the city of Woodland.

Figure 1-4. The existing conditions 0.2% (1/500) AEP Floodplain.



1.7 Significant Issues

Significant issues for the purpose of this DSEIS are defined as controversial topics taken into account during the development of the alternative plans. Hydrology, water quality, land use, agriculture, transportation, environmental constraints, and public support are factors that influenced the project design feasibility. All comments received during the 45-day public comment period on the 2003 DEIS-EIR for the Lower Cache Creek Potential Flood Damage Reduction Project received prior to May 5, 2003, public meeting on April 23, 2003, and from the public scoping meeting on September 3, 2015 were taken into consideration in the plan formulation and development of alternative plans.

Public Support. The 2003 Lower Cache Creek Potential Flood Damage Reduction Project was not supported by the local community and this caused the City of Woodland to stop pursuing the project. Primary concerns with the 2003 Flood Barrier Plan included 1) physical division of the City of Woodland; 2) socioeconomic injustices to residents living north of the proposed flood barrier; 3) cessation of operations and maintenance on existing Cache Creek levees; 4) depth of inundation north of the flood barrier; 5) potential water contamination from hazardous material and wastes in the study area; 6) reduced access to emergency services; 7) loss of prime agricultural land and economic inequality; 8) lack of flood risk reduction provided to upstream communities (e.g. in the towns of Yolo and Madison); and 9) loss of historic resources. Since that time, multiple iterations for plan formulation with the NFS have resulted in alternatives development that attempt to alleviate public concerns.

Mercury. Under existing conditions, mercury-laden sediments originating in Cache Creek upstream of the study area become deposited in the CCSB. Naturally-occurring bacteria can metabolically process mercury, causing methylation. Methylmercury is a potential hazard to downstream ecological receptors in the Sacramento/San Joaquin River Delta (USFWS 2001). This feasibility study does not seek to remedy the methymercury situation in CCSB. Proposed alternatives must avoid or mitigate any interference with the State of California's obligation to maintain compliance with the Total Maximum Daily Load (TMDL) of mercury-laden sediment in the Yolo Bypass, as mandated by the Environmental Policy Agency (EPA) in accordance with the Clean Water Act. USACE would follow all applicable Federal, State, and local law and policies (including TMDLs for pollution and sediment), as stated in ER 1105-2-100.

1.8 Decision to be Made

The DFR/DSEIS would be circulated for review by the public and governmental agencies. It would then undergo a U.S. Army Corps of Engineers (USACE) policy review and Independent External Peer Review (IEPR) prior to submittal of the final reports to USACE Headquarters for approval. If the Feasibility Report is approved by USACE Headquarters, the Chief of Engineers would sign the Chief's Report and transmit the reports to the Assistant Secretary of the Army (Civil Works) (ASA[CW]). The ASA(CW) would review the study and determine whether or not to sign the Record of Decision (ROD), thus completing the NEPA process. Finally, the Reports would be reviewed by the Office of Management and Budget and would be transmitted to Congress for potential project authorization and funding of the Federal share of the project.

The District Engineer of the Sacramento District must decide whether or not to recommend that a plan described in this report be authorized for implementation as a Federal project, with modifications at the discretion of the Chief of Engineers. The City of Woodland must decide whether to implement the recommended plan as the non-Federal cost-sharing partner and CEQA

lead agency. The City of Woodland is currently preparing an Environmental Impact Report (EIR) as required under CEQA.

1.9 Organization of this DSEIS

This report is organized into seven chapters:

- Chapter 1 contains the introduction;
- Chapter 2 describes the plan formulation and alternative plans considered for this project;
- Chapter 3 discusses the existing environmental setting and baseline conditions, as well the effects of the proposed alternative plans on the affected environment and describes mitigation;
- Chapter 4 presents other required disclosures including cumulative effects, growth-inducing effects, monitoring and adaptive management plan and public involvement;
- Chapter 5 is the list of preparers and list of recipients;
- Chapter 6 lists the references; and
- Chapter 7 is the index.

2.0 ALTERNATIVES

2.1 Introduction

The Lower Cache Creek Feasibility Study has identified a number of concerns associated with the existing flood risk management system protecting the City of Woodland and surrounding lands. High flows in Cache Creek have the potential to overtop existing levees and causing flooding in the City of Woodland. This chapter describes alternative plans and summarizes their potential environmental effects and mitigation requirements.

2.1.1 Alternative Formulation and Screening

Alternative formulation describes the process of identifying objectives, constraints, and planning criteria in order to establish the most effective project alternatives. The plan formulation process is explained in detail in the 2019 “Lower Cache Creek, Yolo County, CA, City of Woodland and Vicinity Draft Feasibility Report”. The City of Woodland, CVFPB, and the Corps identified the flood risk reduction objectives of the Lower Cache Creek Feasibility Study as follows:

- Reduce risk to public health, life, and safety from flooding of Lower Cache Creek in the City of Woodland, town of Yolo, and surrounding areas. This objective would be measured in terms of a reduction in expected annual damages.
- Reduce risk of damages to property from flooding of Lower Cache Creek in the City of Woodland, town of Yolo, and surrounding areas, to the fullest extent consistent with Federal participation and community financial capabilities.
- Reduce risk of damages to infrastructure from flooding of Lower Cache Creek in the City of Woodland, town of Yolo, and surrounding areas, to the fullest extent consistent with Federal participation and community financial capabilities.

The NFS has an additional objective to meet the California State Urban Level of Protection (ULOP) requirement defined in California Government Code 65007(I). In general, to comply, levees and floodwalls in the Sacramento-San Joaquin Valley are to provide FRM protection against a flood that has a 1-in-200 chance of occurring in any given year AEP. The NFS would also seek Federal Emergency Management (FEMA) accreditation of any new or strengthened levees. Neither the ULOP nor FEMA accreditation are a Federal planning objectives or requirements. However, USACE and the NFS are sharing hydrologic and hydraulic modeling alternatives analyses and results, particularly associated with the NED plan, to allow the NFS to independently assess how the alternatives address ULOP or FEMA requirements.

Measures were developed to meet the flood risk reduction measures with the understanding of the greatest risk drivers. The primary flood risk driver to the City of Woodland is the risk of overtopping of the upstream Cache Creek levees during a flood event. Secondary risks include general levee instability and seepage of the existing levees along the channel and the Cache Creek Settling Basin. Extensive research and subsequent hydraulic modeling of flood events in the study area have informed measures to address flood risk concerns.

Due to the lengthy study history of the Lower Cache Creek Feasibility Study, multiple iterations of plan formulation have occurred. Plan formulation for the current iteration of the study included development of a list of management measures, many of which had been considered in the 2003 study. A brief summary of the plan formulation method as described in the 2003

Feasibility Report for the Potential Flood Damage Reduction Project is presented below to compare and contrast with the current feasibility study.

Flood Risk Management Measures

A variety of flood risk management structural and non-structural measures were identified early on in the plan development process. Non-structural measures reduce flood damages without altering the nature or extent of the flooding and are accomplished by changing the use of the floodplains or by adapting existing uses to the flood hazard. In contrast, structural measures alter the nature or extent of the flooding by modifying the magnitude, direction, extent, or timing of the flooding.

Eight measures were used to determine the historic TSP seen below in Table 2-1. Additionally, the City of Woodland aided in developing criterion of public acceptability. The Lower Cache Creek Flood Barrier Plan was selected as the TSP in 2003.

Table 2-1. Measures used to determine the array of alternatives for the 2003 TSP. Grayed out measures were determined to be infeasible.

	MEASURES USED TO DETERMINE 2003 TSP				
Non-Structural	Raising/Flood Proof Structures		Relocate Structures		Flood Warning System
Structural	Storage	Channel Improvements	Levee Modification	Setback Levees	Backup Levees

Due to the public's expressed concerns over the tentatively selected plan (TSP) in 2003, the alternative development process reformed alternatives using newly compiled structural and non-structural measures. When the study reactivated in 2011, 29 measures were considered, see Table 2-2. Non-structural measures like a flood warning system, flood proofing, and relocating structures were identified. Structural measures were developed for multiple purposes including floodwater containment, channel modification, improving transportation infrastructure, and utilizing existing floodplains. A preliminary screening of measures reduced redundancy. This screening was done by evaluating the measures against the four planning criteria established in the Economic and Environmental Principles and Guidelines (P&G) for Water and Related Land Resources Implementation Studies: completeness, efficiency, effectiveness, and acceptability. Of the 29 measures for alternative development, 18 were carried forward.

Table 2-2. Summary of measures carried forward during the plan formulation iteration. Grayed-out measures were screened out for cost, socioeconomic and environmental concerns.

	CURRENT MEASURES USED TO DETERMINE 2019 TSP				
Non-Structural	Enhance Educational Outreach	Reservoir Reoperation	Flood Warning System	Flood Response Plans	Flood Proofing
	Raising Structures	Removing Structures	Relocating Structures	Preserve Floodplain	Floodplain Management
Containment	Strengthen Levees		Raise Levees	New Levees	Floodwalls
	Upstream Detention	In-channel Retention	Storm water Detention		
Channel Modification	Vegetation Clearing	Sediment Removal/Channel Deepening	Channel Straightening	Channel Widening	Bank and/or Bed Protection
Transportation Infrastructure	Raise I-5 Roadbed	Lower I-5 Roadbed	Raise Railroad Bed		Bridging/ Culverts
Use Existing Floodplain	Bypass/ floodway	Floodplain Contouring		Modification of CCSB Outlet Weir	

Future without Project Condition

The future without-project condition is the most likely condition expected to exist in the future, absent the proposed Federal water resources project. Proper definition and forecast of the future without-project (FWOP) condition are critical to the success of the planning process. While the alternatives considered in this DSEIS must be compared to existing conditions, the FWOP condition constitutes the benchmark against which these alternatives must be compared for Federal planning purposes. Other adopted plans in the study area and local planning efforts with high potential for implementation shall be considered as part of the forecasted without-project condition.

Under the FWOP condition, loss of life would be expected, as well as injuries, illnesses, and other public health and safety problems. Flooding in the City could trigger releases of hazardous and toxic contaminants into the waterways surrounding the floodplain, and potentially the failure of liquid petroleum gas tanks and underground storage tanks. Post-flood cleanup of these substances could be a major undertaking.

Transportation through Woodland and the surrounding area would be severely hampered by a major flood. Woodland is intersected by Interstate 5 (I-5) and California State Route 113 (SR 113) running north-south. Flooding on I-5 occurred in 1983 and emergency routes were blocked. Without a flood risk management project, a major flood could trap residents from escaping dangerous flood waters on the major transportation corridors.

Critical infrastructure would be rendered non-functional for an extended period of time after a flood. Power, sewer, and fresh water supply could be interrupted for a substantial time period. Emergency costs associated with evacuation, flood fighting, fire and police, and government disruptions would occur. After floodwaters have receded, debris cleanup would be a substantial undertaking.

The following ongoing local programs, past studies, and regional activities have been considered in regard to the formulation of the future without-project condition for this study:

- Lower American River Common Features Project
- American River Common Features, Natomas Basin Project
- Sacramento River Bank Protection Project
- West Sacramento Project
- Folsom Dam Safety and Flood Damage Reduction Project
- Folsom Dam Water Control Manual Update
- Folsom Dam Raise Project
- American River Common Features 2016 Project
- Off-Channel Gravel Mining
- Guinda Bridge Replacement Project
- Cache Creek Area Plan Update
- 2018 City of Woodland Water and Sewer Repair and Replacement Project
- North Regional Pond and Pump Station Project
- Yolo Bypass/Cache Slough Partnership Improvement Project

Critical flood risk management would not be provided to the City of Woodland without implementation of the study. People and property would continue to be at risk of flooding within the study area.

2.1.2 Alternatives Considered, but Eliminated from Full Evaluation

Five preliminary plans were considered in the 2003 DFR. These five plans were Channel Clearing, Raising Existing Levees and Construct New Levees, Channelization and Constructing New Levees, Constructing Setback Levees and Raising Existing Levees, and Constructing a Flood Barrier Levee. Based upon a comparison of costs and ability to meet planning criteria, Constructing Setback Levees and Raising Existing Levees (Setback Levees), and Constructing a Flood Barrier Levee (Lower Cache Creek Flood Barrier) were selected as the final array of alternatives. For a complete description of the preliminary plans, see Chapter 2.3 Flood Damage Reduction Measures and Preliminary Plans in the 2003 DEIS-EIR.

The Flood Barrier Plan was selected as the TSP in 2003. Due to the lack of public acceptance of the Flood Barrier Plan, the current feasibility study completed a new iteration of alternative development. The 2003 preliminary plans are not evaluated in detail in this DSEIS.

Eleven alternatives composed the initial array in the current feasibility study. These alternative plans primarily consist of various levee configurations to prevent floodwaters from Cache Creek reaching the City of Woodland, an in strengthening the existing CCSB levees.

Table 2-3. Alternatives selected for the Focused Array. Alternatives were screened out that had low benefit to cost ratios, high environmental mitigation costs, or low acceptability (shown in gray).

	Initial Array of Alternatives	
	Alternative Number	**Alternative Name**
Bypass	Alt 1	North Bypass
	Alt 2	South Bypass
	Alt 3	West Bypass
	Alt 4	North and South Bypass
Containment	Alt 5	Upstream Detention/Retention
	Alt 6	Levee Fix in Place
	Alt 7	Partial Setback Levees
	Alt 8	Continuous Setback Levees
	Alt 9	Yolo Flood Risk Reduction
Non-Structural	Alt 10	Raise, Flood-proof, Buyout
	Alt 11	Bridging with Raise, Flood-proof, Buyout

Based upon the screening process using P&G criterion of the initial array, the no action and four action alternatives were carried forward to the focused array: Alternative 1: North Bypass, Alternative 2: South Bypass, Alternative 6: Levee Fix in Place, and Alternative 7: Partial Setback Levees (Table 2-3, Figure 2-1). These alternatives were screened using the following criteria:

- Complete – The extent to which the plan provides and accounts for all necessary investments or other actions. To be complete, a plan must not reply on other activities to function.
- Effective – The extent to which the plan meets planning objectives.
- Efficient – The extent to which the benefits of a plan are likely to exceed the costs. (Even though costs were developed, the uncertainty was such that the team elected not to use cost for screening; rather, the criterion of “efficient” was based on professional judgment of how plans compared to each other.)
- Implementable – The extent to which an alternative is technically sound and feasible to implement in the context of the study area.
- Acceptable – The extent to which an alternative is environmentally, economically, politically, and socially acceptable.

The PDT then developed and evaluated several configurations of each alternative in the focused array based on a qualitative assessment of inflection points in the costs and/or benefits of alternatives. Letters following the alternative number (i.e., 1A, 1B, 1C) represent various performance options of each alternatives. A value engineering (VE) study conducted on the focused array further informed the screening of alternatives. Net benefits for each alternative were estimated. Based on the flood behavior and geographic concentration of damages (and thus benefits), most alternatives would provide broadly similar benefits, but at widely varied costs. The LCP maximized net benefits.

Figure 2-1. Floodplain Bypass Alternatives.

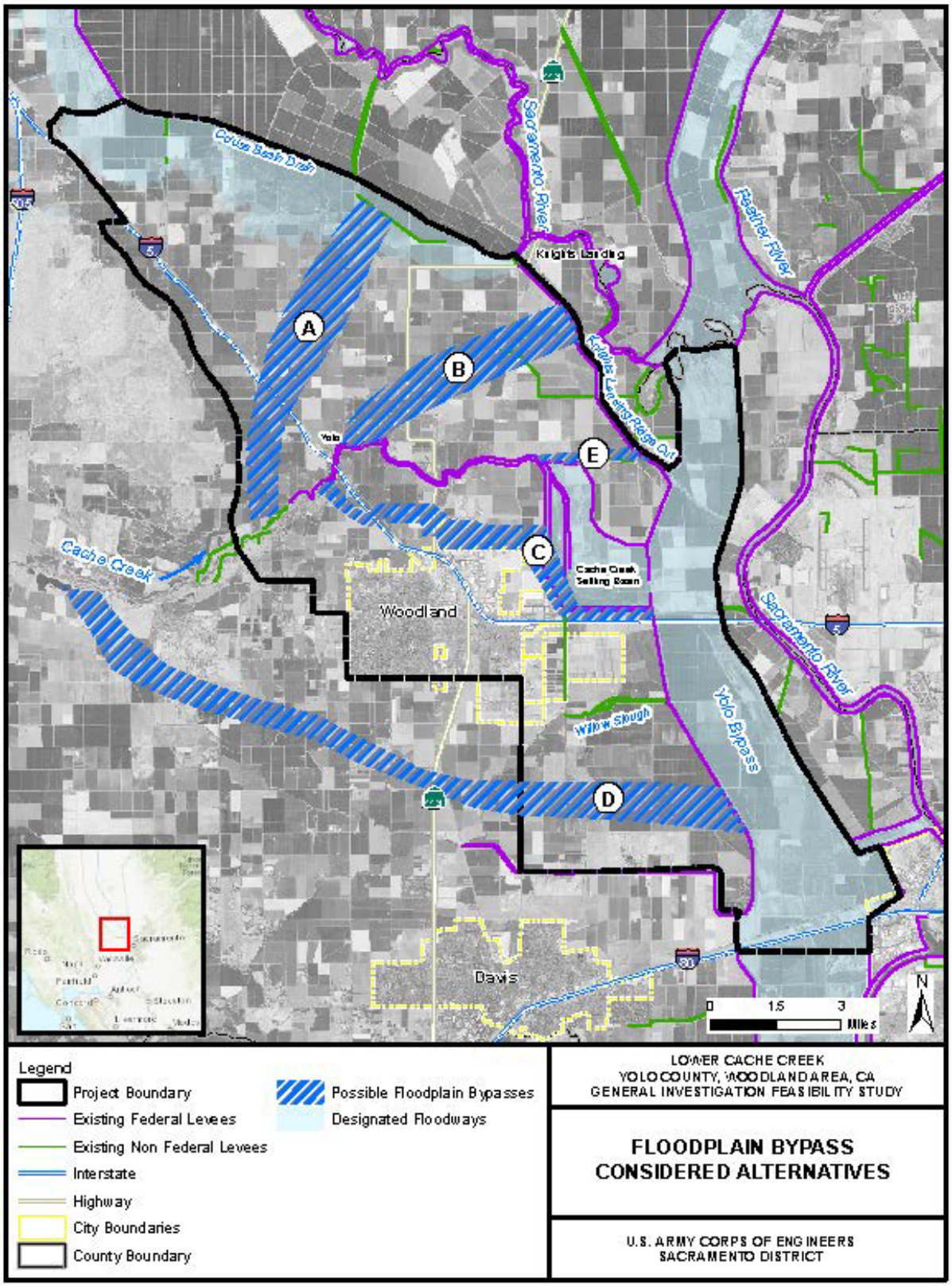


Table 2-4. A description of each alternative in the focused array.

Focused Array of Alternatives	
Alternative Name	**Description**
Alternative 1A: North Bypass A	Strengthen right bank of the existing levees from downstream of I-5 to the CCSB, as well as the left bank near the town of Yolo. Grade control structure and a right bank levee extension upstream of I-5, to accommodate excess flows. Features would increase the stage upstream of I-5, resulting in floodwaters overtopping the left bank and flowing north towards the Colusa Basin Drain. Seepage mitigation and rock bank protection.
Alternative 1B: North Bypass B	Same structural features as Alt 1A, adds the purchase of flowage easements on the land that would convey floodwaters to the Colusa Basin Drain. Seepage mitigation and rock bank protection.
Alternative 1C: North Bypass C	Same structural features as Alt 1A and 1B. Includes construction of bypass levees to ensure the floodwaters are conveyed to the Colusa Basin Drain. Seepage mitigation and rock bank protection.
Alternative 1D: North Bypass D	Similar to Alt 1A. Replaces the grade control structure and a right bank levee extension upstream of I-5 with a smaller extension of the right bank, a degrade of the left bank levee upstream of I-5, and no strengthening of levees on the right bank of Cache Creek downstream of I-5.
Alternative 2A: South Bypass A	New levee that would prevent floodwaters from entering the urban area of the City of Woodland. The floodwaters emanating south of the creek would pass into the CCSB. A new inlet weir in the western levee of the CCSB would allow overland flows to enter the CCSB while reducing the probability that Cache Creek floodwaters would escape the CCSB during smaller flood events.
Alternative 2B: South Bypass B	Levee similar to Alt 2A, but rather than constructing an inlet weir to accommodate excess flows to the west of the CCSB, a channel would convey floodwaters to the south of the CCSB and into the Yolo Bypass. This channel would involve moving a portion of the CCSB west levee further to the east to avoid a large industrial complex.
Alternative 2C: South Bypass C	Levee similar to Alt 2A and 2B, but rather than constructing an inlet weir to accommodate excess flows to the west of the CCSB, a channel would convey floodwaters to the south of the CCSB and into the Yolo Bypass. The railroad line along the south side of the CCSB would also require extensive modifications to allow for the flood conveyance channel.
Alternative 2D: South Bypass D	Levee and channel similar to Alt 2C, but it would also include strengthening the right bank levee of Cache Creek and the left bank levee of Cache Creek along the town of Yolo. Seepage mitigation and rock bank protection.
Alternative 6A: Strengthen/ Raise in Place A	Strengthen the right bank levee of Cache Creek and fix the left bank of Cache Creek along the town of Yolo. Reduces the risk of flooding associated with geotechnical related failures. The hydraulic capacity (overtopping) related failure probability would remain the same. Seepage mitigation and rock bank protection.

Focused Array of Alternatives	
Alternative Name	**Description**
Alternative 6B: Strengthen/ Raise in Place B	Increases the height of the right bank levee and the left bank levee near Yolo. Floodwaters would flow overland to the Colusa Basin Drain and Knights Landing Ridge Cut before draining into the Yolo Bypass. Seepage mitigation and rock bank protection.
Alternative 6C: Strengthen/ Raise in Place C	Strengthen/increase the height of existing left and right bank levees to contain flow in the existing levee alignment. The left bank levee upstream of I-5 would be removed and a new levee would be constructed adjacent to I-5, to force the floodwaters to the north where they would be conveyed across I-5 through a bank of culverts. Seepage mitigation and rock bank protection.
Alternative 7A: Partial Setback Levee A	Build levees set back from Cache Creek on the right bank to contain flow within an expanded levee system, reducing the probability of flooding in the City of Woodland. This alternative also involves new levees upstream of I-5 set back from the right bank, and culverts under I-5, UPRR and other utilities, to accommodate excess flows. This alternative would modify the existing CCSB outlet weir into the Yolo Bypass.
Alternative 7B: Partial Setback Levee B	Build levees and culverts similar to 7A, and also includes a bypass channel to the north of the CCSB. Measures include excavation of material to accommodate flow through the North Channel, flowage easements on inundated lands, and a new inlet weir north of the CCSB to allow flows to enter the Yolo Bypass.

The Tentatively Selected Plan is the LCP, a version of the South Bypass alternative. It consists of constructing a new levee that would prevent floodwaters from Lower Cache Creek from entering the built-up areas of the City of Woodland, as well as improving existing CCSB levees. This plan would reduce the spatial extent of surface flows that drive the risk of economic damages, as well as decrease the flooding of roadways that drives life safety risk. The City of Woodland would no longer be at risk of flooding from flood events resulting from Lower Cache Creek overtopping its existing levees during winter storms. The LCP would reduce the depth and duration of flood waters compared to the without project condition, in most of the unincorporated community north of the City of Woodland with existing structures and residences.

2.2 Alternative Plans Considered in Detail

Based upon a comparison of net benefits and ability to meet the planning criteria, The LCP was selected for further study as the NED plan. This plan, as well as the No Action Alternative are considered in detail and retained for effects analysis in this DSEIS.

The LCP was not considered in the 2003 Potential Flood Damage Reduction Project (PFDRP) DEIS-EIR. Instead, Constructing Setback Levees and Raising Existing Levees (Setback Levees) and the Flood Barrier Levee (Lower Cache Creek Flood Barrier or LCCFB) were analyzed in detail. This new alternative was developed in response to public comments, new plan formulation iterations, multiple iterations of engineering design and hydraulic modeling, and economic analysis. Refer to the “Lower Cache Creek, Yolo County, CA, City of Woodland and Vicinity Draft Feasibility Report” for further detail on the screening of measures and formulation of alternatives.

2.2.1 No Action Alternative

The No Action Alternative is required pursuant to NEPA. The No Action Alternative is the same as the future without project (FWOP) condition. This alternative serves as a baseline or benchmark against which effects and benefits of the action alternative is considered. The No Action Alternative assumes that current conditions and operation and maintenance practices would be expected to continue to occur in the foreseeable future if the project were not implemented.

Under the No Action Alternative, the Corps would not conduct any additional work to address overtopping, seepage, or levee stability concerns along Lower Cache Creek. The Cache Creek levee system would continue to provide protection from a flood that has a 1 in 10 (10% (1/10) ACE) chance of occurring in any given years. Damages to real property from overflows from Cache Creek would be expected to be about $22.7 million annually. The City of Woodland would remain at risk of severe flooding from upstream overtopping. Other losses or adverse effects include the potential flood-related loss of life, contamination from sewage and hazardous materials, and the closure of sections of I-5 both north and east of the City of Woodland preventing residents from easily escaping rising floodwaters.

The existing levees would continue to require improvements to meet FEMA’s minimum acceptable level of flood protection. Regular operations and maintenance of the existing Cache Creek channel levees would continue as currently executed by the local maintaining entities.

The Cache Creek Settling Basin would undergo O&M depending upon the sediment trap efficiency. The USACE 2007 Cache Creek Settling Basin Draft O&M Manual, states the outlet

weir is to be raised an additional 6-feet at year 25 (2018) of the project, or when the trap-efficiency becomes less than 30%. Beginning in year 25 of the project, 400-foot sections of the training levee would be removed every five years, starting with a section 1100 feet upstream from the current terminus of the training channel. Each subsequent section would be removed 1100 feet upstream from the last removed section. The sediment trap efficiency values are within 37.5 to 65.4 percent for the historical conditions, which remain above the 30% value requiring O&M (DWR 2018). Within the life of the Federal project, mandated O&M is likely to occur within the CCSB. These modifications would not impact the performance of the Levee and Conveyance Alternative.

In the No Action Alternative, there is the potential that the City of Woodland could propose their own structural and non-structural measures to reduce the life safety risk and economic damage that may occur during a relatively frequent flood event. However the City of Woodland would still be at risk of flooding.

2.2.2 Levee and Conveyance Plan

Features

The FWOP condition considers that the LCP would not require any internal drainage optimization. The existing drainage ditch alongside the landside of the CCSB west and southwest levees would not be expanded as the capacity is expected to withstand any floodwaters diverted from the new detention basin into the existing East Main Pumping Plant. The LCP includes improvements to existing levees and construction of a new levee north of the City of Woodland. The LCP is comprised of six distinct project reaches (Reach N through Reach S) shown in Figure 2-2. Project summary table, Table 2-5, shows each Reach and the corresponding improvements.

Levee Improvements. The southwest levee of the CCSB would be rehabilitated by constructing a 45-foot deep cutoff wall through an approximately 5,000 linear foot length of the existing levee in Reach O. An approximately 7,400 linear foot long portion of the southern CCSB levee would be improved by constructing a 60-foot deep cutoff wall in Reach N. The cutoff wall installation would prevent seepage from passing through the CCSB levees and would occur within 2.3 miles of existing CCSB levee. The typical cross section is shown in Figure 2-3.

Weir Installation. Within the CCSB west levee, a 3,000 foot-long section of levee would be degraded to an elevation of 43 feet (NAVD 88) to accommodate a concrete inlet weir with a height of approximately 9-feet above existing adjacent grade. The weir would serve to accept floodwater emanating from Cache Creek west of the CCSB, and would prevent backflow from the CCSB to the west during small, more frequent events. The typical cross section of the CCSB inlet weir is shown in Figure 2-4. The existing outlet CCSB weir on the east levee would remain in place. The outlet weir passes floodwaters from Cache Creek into the Yolo Bypass.

Training Levee. The interior training levee to the east of the Cache Creek channel within the CCSB would be degraded to prevent backflow. Approximately a 3,000 foot length would be degraded in geographical alignment with the new concrete inlet weir. Training levee degrade is authorized as a portion of the USACE O&M Manual. Because the settling basin is not at expected capacity with year 25 occurring in 2018, the O&M date cannot be anticipated. Without degrading the height of the training levee, floodwaters gravity spilling over the new weir may overflow and flood back into the agricultural plain north of the City of Woodland. If excavated materials are suitable to use as fill per USACE levee requirements, the material would be hauled north on the

training levee, east towards County Road 102, over the County Road 102 bridge, and south towards the project footprint.

New Levee. A new levee with a 20-foot wide crest would begin near the intersection of County Road 20 and County Road 98. The levee would extend east until the intersection with the CCSB. The new alignment of the new levee would generally follow the northern City limit line west of State Highway 113 and Churchill Downs Avenue east of High 113. The new levee height would vary from six feet near County Road 98 to 14 feet at its intersection with the CSSB near the newly proposed inlet weir. Rock slope protection is proposed on the waterside slope of the new levee from County Road 101 to the southern end of the proposed inlet weir near County Road 20. The new levee alignment and seepage berm typical cross-sections are shown in Figure 2-5.

Conveyance Improvements. A trapezoidal drainage canal with a design capacity of 350 cubic feet per second (cfs) would be excavated north (waterside) of the new levee to capture smaller, more frequent events and discharge them to the CCSB. With a canal width of approximately 150 feet, flood waters would not be expected to overwhelm the canal capacity. The excavated material from the canal would be used as fill material for the new levee and seepage berm. The exact width of the drainage canal may vary. A seepage berm would be constructed on the landside of the new levee as a resiliency measure.

Closure Structures. Closures structures (gates that are automatically raised or manually assembled by operations and maintenance personnel prior to a flood event) would be constructed where the embankment crosses the Union Pacific Railroad (UPRR) tracks near I-5, the UPRR tracks west of SR 113, SR 113, and the UPRR tracks east of SR 113 (Figure 2-7). Short sections of floodwall may need to be constructed to connect the closure structure at the I-5 crossing to the existing roadway embankment and to connect the closure structures at the SR 113 crossing and the adjacent UPPR crossing to the west.

Internal Drainage. Floodwaters that have overtopped existing Cache Creek levees would be impounded by the proposed new levee, gravity drain into the drainage canal and flow east. Water would pond in a constructed 15 acre detention basin. The detention basin would include an east outlet and south outlet. The east outlet would provide for gravity drainage to the CCSB and consist of a set of three 60 inch diameter culverts fitted with flap gates. This would allow the gravity flow of water into the CCSB after the water surface elevation in the CCSB had fallen below the inlet weir crest. Reverse flow from the CCSB into the detention basin would be prevented by the flap gates. The gated culverts would discharge to a ditch that terminates at a pump station owned and operated by the City of Woodland. The south outlet would consist of a set of three 60 inch diameter culverts fitted with sluice gates. The sluice gate outlet, in combination with the detention basin, would allow for temporary detention of drainage until the pump station had available capacity to discharge the floodwaters to the Yolo Bypass.

Roadway Improvements. The alignment of the new levee would require road raising of County Road 98, County Road 99, County Road 101, and County Road 102. Culverts would be installed at each of these raised crossings, and under Highway 113 to provide drainage. In order to convey floodwaters along the railroad underpass at I-5 without damages, rock revetment and concrete lining would be placed to prevent scour and undermining of the underpass structure. It is estimated that flows may exceed 5 feet per second (fps) through the underpass. Other areas that would be armored with concrete lining or rock slope protection includes existing slopes of the I-5 roadway embankment, the slopes of the proposed Reach R and Reach S levees, the proposed channel (both bottom and slope), and the existing UPRR railway berm and bridge abutments (Figure 2-6).

Figure 2-2. LCP Overall Project Map

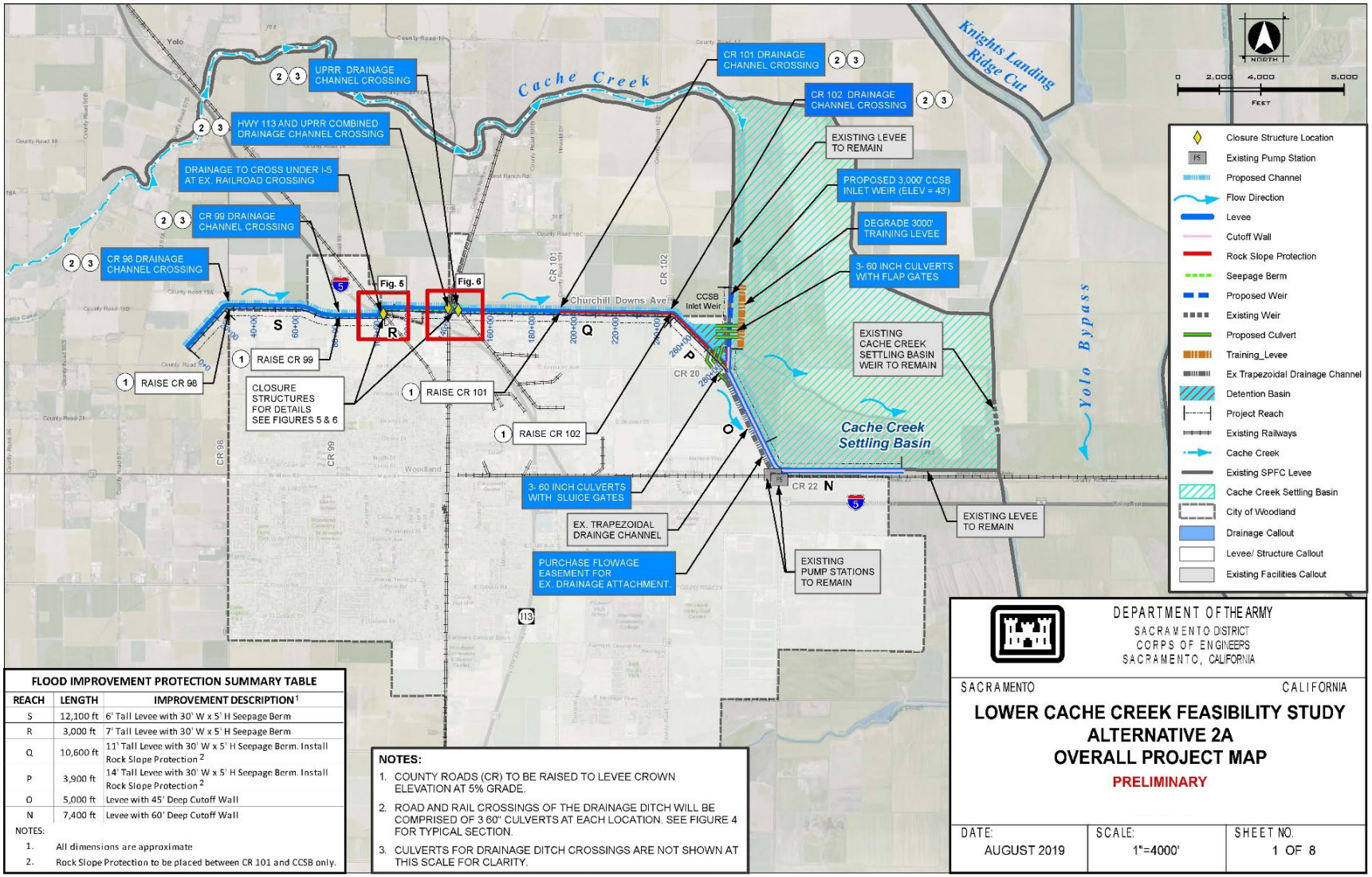


Figure 2-3. Typical cutoff wall section for Reach N &O.

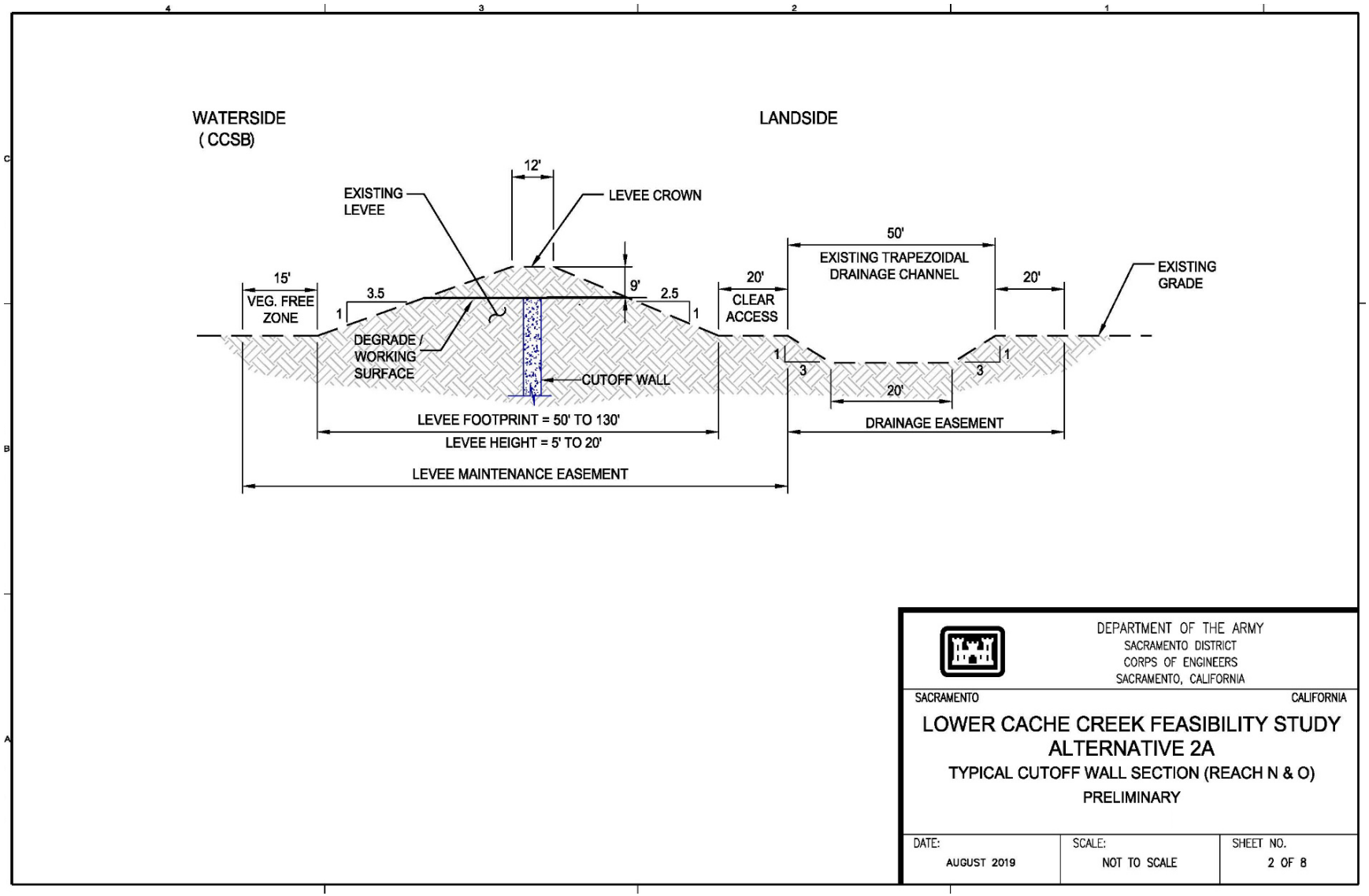


Figure 2-4. Typical section for the CCSB Inlet Weir in Reach P.

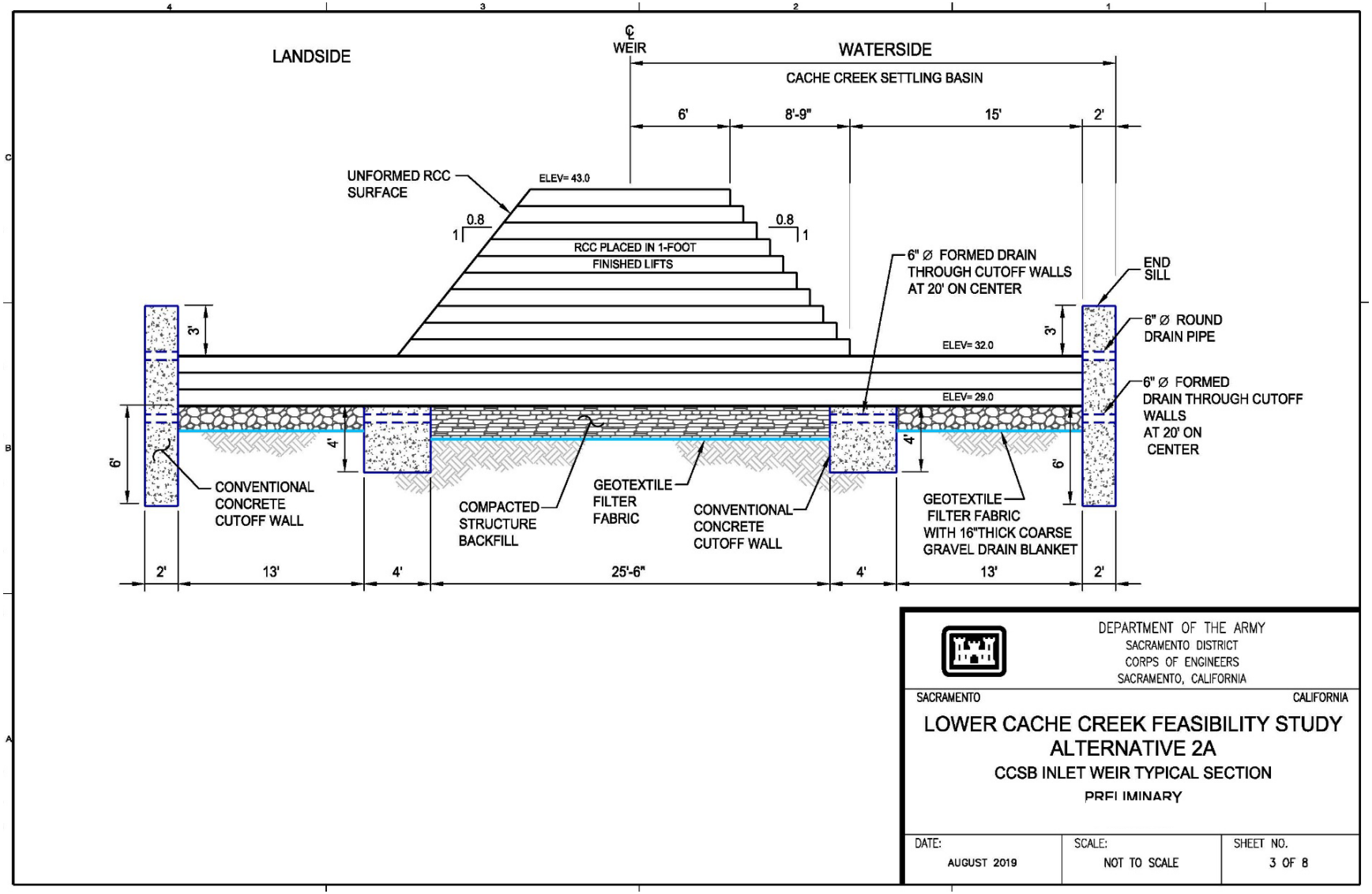


Figure 2-5. Typical cross section of the new levee and seepage berm in Reach P, Q, R, and S.

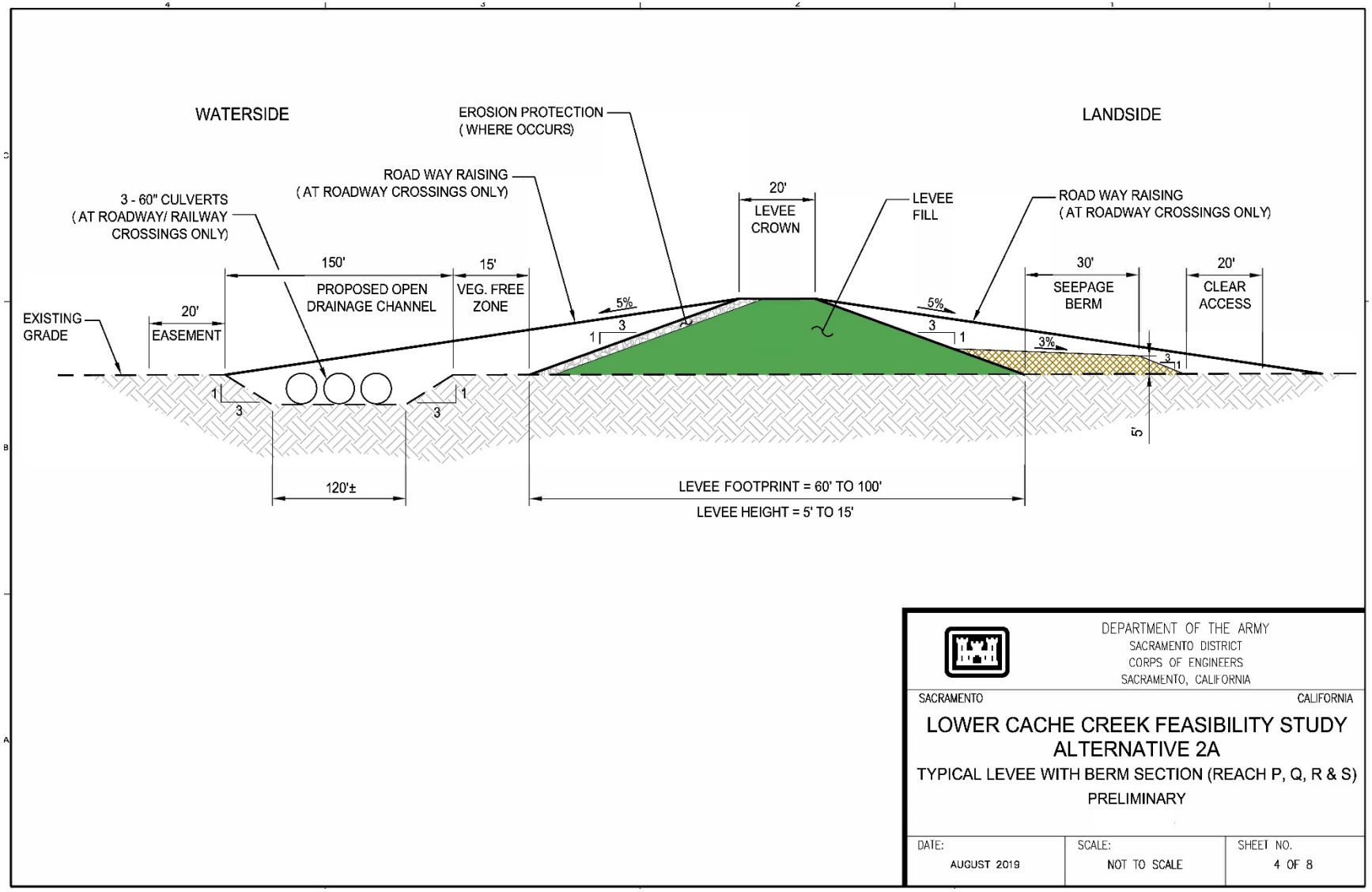


Figure 2-6. Concrete erosion protection, floodwall, and rail closure at the I-5 under crossing.

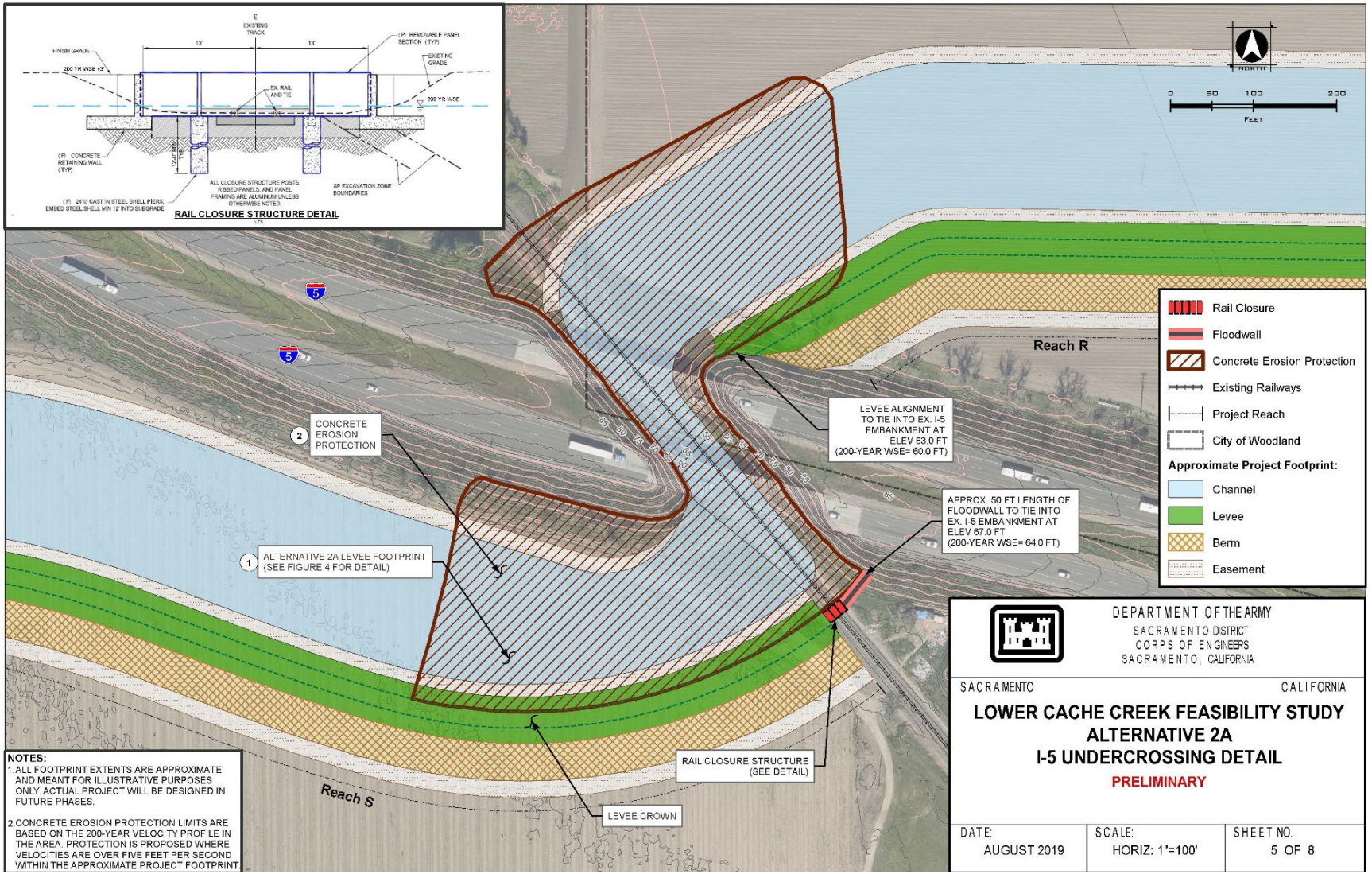


Figure 2-7. Rail closures, floodwall, culverts and road closures at the intersection of State Route 113 and the Union Pacific Railroad (UPRR) Crossing.

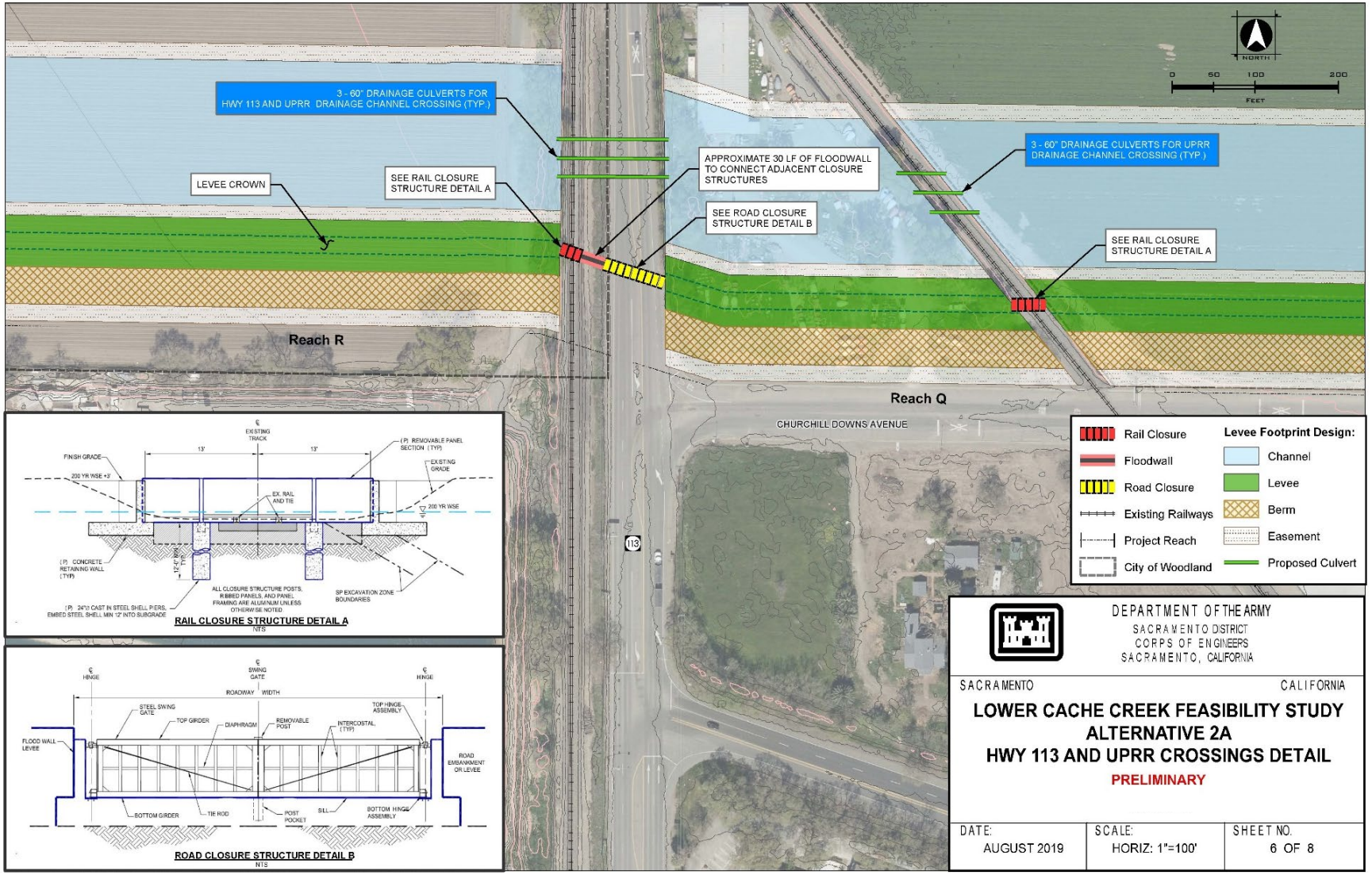


Table 2-5. Summary of the Levee and Conveyance Plan features.

Project Feature Summary			
Feature	**Improvement Description**	**Applicable Reaches**	**Quantity**
New Levee	New Levee with Seepage Berm	Q (Partial), R, S	3.9 Miles
New Levee with RSP	New Levee with Seepage Berm and Rock Slope Protection	P, Q (Partial)	1.7 Miles
Improve Existing Levee	Improve existing levee with cutoff wall	N, O	2.3 Miles
Drainage Channel	New drainage channel and culverts. Also serves as borrow source for levee fill.	P, Q, R, S	5.6 Miles
Elevated Roadways	Elevate Roadway over levee at CR98, CR99, CR101, and CR102	P, Q, R, S	4
Gated Roadway Closure Structure	Gate at SR 113	Q, R	1
Gated Railroad Closure Structures	Gate for Railroad at I-5, West of SR 113, East of SR 113	Q, R, S	3
Cache Creek Settling Basin Inlet Weir	Concrete Inlet Weir	CCSB Inlet Weir	3,000 Feet
Degrade Training Levee	Degrade 3,000 feet of Existing Cache Creek Settling Basin Training Levee	Training Levee	3,000 Feet
Detention Basin and Outlets	New Detention Basin and Outlets	P	1
Improve Existing Drainage Ditch	Utilize Existing drainage ditch from Detention Basin to City of Woodland Pump Station.	O	1 Mile

Operation and Maintenance

The existing Cache Creek levees would continue to undergo regular operations and maintenance, despite the construction of the new levee. The City of Woodland and local reclamation districts would be responsible for the O&M of both existing and the new levee once the project is completed. Levee and seepage berm O&M may include hand and mechanical mowing, burning, or application of herbicides. Tree and shrub trimming may be required. Additionally pesticide control of burrowing rodent activity may be needed. The levee slope and road would occasionally need reconditioning using a bull dozer. Maintenance of the new drainage canal and new detention basin would require the periodic removal of sediments and vegetation once they reached capacity sediment load.

All chemicals would be applied by certified applicators and according to manufacturer's instructions. Chemical applications would be applied with sustained wind speeds 8 miles per hour (mph) and below, and with temperatures below 90°F, to prevent wind drift and harmful volatilization.

Construction Details

Project construction is anticipated to be completed within the next six years. Construction may begin as soon as 15 April 2025 and would take two full years to complete. Construction activities are expected to occur year-round. Certain construction activities would be limited by a giant garter snake (GGS) work window of May 1 to October 1 in areas considered GGS suitable habitat. Most of the project area is not GGS habitat. Construction that includes degrade of the CCSB levees, including the installation of the concrete inlet weir and cutoff walls, would need to be completed in the dry season. All work areas must be winterized and levees floodworthy by November 15 of each year. Any tree or shrub removal would be completed in the winter months to avoid migratory bird nesting season.

Year 1.

- Construct Reach P Channel, Detention Basin, Levee, and seepage berm. Construct South gated culvert from detention basin and integrate into levee. This levee is constructed first because it mitigates flood risk associated with later CCSB levee degrade for inlet weir.
- Degrade 3000 feet of Cache Creek Settling Basin west levee along alignment of inlet weir and stockpile at detention basin site. (Outside flood season)
- Degrade 3000 feet of Cache Creek Settling Basin training levee adjacent to inlet weir and stockpile at detention basin site. (Outside flood season)
- Construct CCSB inlet weir. (Outside flood season)
- Construct Reach Q Channel, levee and closure structures. Use CCSB levee degrade material as levee fill.
- Site stabilization and restoration of temporary impacts.

Year 2.

- Construct Reach R Channel, Levee, Seepage Berm, and closure structures
- Construct Reach S Channel, Levee, Seepage Berm, and closure structures
- Construct Reach O improve levee with cutoff wall (Outside flood season)
- Improve Reach N levee with cutoff wall. (Outside flood season)
- Site stabilization and restoration of temporary impacts.

Staging Areas.

Staging areas would be placed along the project footprint, between one-two miles increments. Staging areas would be used for storage of equipment and materials, project offices, employee parking, and other construction-related uses. The approximate locations of staging areas are shown in Figure 2-8.

Batch Plants.

The batch plant for the cutoff wall slurry to be used in Reach O & N would be placed and maintained in the staging area in the southeast corner of the CCSB. Slurry would be pumped via piping along the improved levees. Booster pumps would ensure the slurry flows to its final destination along the reach without drying or hardening.

Concrete required for the I-5 undercrossing erosion protection and armoring would be trucked in pre-mixed, not requiring a batch plant.

Earthwork and Hauling.

The project's total estimated fill need is approximately 1.19 million cubic yards (CY), and suitable material from excavations estimated to be about 1.18 CY, leaving approximately 10,000 CY of imported fill to meet construction requirements. Fill material for the levee and seepage berm would be obtained from the excavation of the trapezoidal drainage ditch north of the levee toe, detention basin excavation, and degradation of the training levee. (The training levee within the interior of the CCSB, would require geotechnical testing to determine if it meets Corps specifications for the levee and seepage berm fill.) If necessary, material can be sourced from an existing permitted stockpile or commercial source within five miles of the project site.

Aggregate base and asphalt materials would be obtained from local sources within 10 miles. Businesses within the City of Woodland have the capacity to produce many of the needed construction materials. Rip rap for the new levee waterside slope would likely come from the City of Marysville or City of Yuba City, CA, both about 40 miles north of Woodland. The gravels needed for the inlet weir and for the levee crown roads would likely come from commercial sources within a 5 mile radius around the City of Woodland.

Personnel, equipment and imported materials would reach the project site via I-5, SR 113, County Road 102, and County Road 22. Once on site, haul trucks would use the embankment footprint to transport material between borrow and staging areas and the levee construction area.

It is expected that approximately 15 trailer truck round trips, each with a 20 CY capacity, would be required to transport the cutoff wall material batch plant components and equipment to the site, and a similar number of round trips would be needed to remove the equipment from the site as the work is completed.

Approximately 60 truckloads would be needed to bring dry bentonite to the site. Approximately 100 truckloads would be needed to bring aggregate base and asphalt materials from the local sources. Approximately 600 haul truck trips per day for approximately 60 days would be required to transport material between the on-site borrow areas or off-site borrow source and the levee construction area. Approximately 500 haul truck trips would be needed to transport demolition debris, construction debris, and other materials to the Yolo County Central Landfill.

Construction footprint

The estimated acreage for the right-of-way (ROW) needs for the permanent constructed features of the LCP are below in Table 2-6. Most of the land required is currently used for agriculture.

Table 2-6. Estimated ROW/easements required for LCP construction.

Ownership	**Quantity**	**Acres**
Private Ownerships	24	257.8
Public Ownerships	8	45.8
Railroad	1	0.6
Estates	**Quantity**	**Acres**
Permanent Easement Estates	40	314.4
Temporary Work Areas	11	32.6
Fee	0	0
Number of PL-91-646	0	0

The NEPA analysis required more detailed land-use and vegetative cover types. These cover types are described in Table 2-7. The acreages do not match exactly with Table 2-6, the required ROW needs, because the DSEIS footprint considered haul roads and access routes, that while are not directly impacted by excavation or other ground disturbance, are contributing to impacts on resources such as air quality and transportation. One such example is the haul route used to access the training levee located in the CCSB. The haul route uses CR 102 and the Cache Creek levee to haul degraded levee materials to the primary staging area. This haul route was not considered in the ROW acreages, because no real estate is required to use the county road. However, the DSEIS does analyze impacts related to using the county road, like temporary increase in traffic and localized pollution for motor vehicles.

Table 2-7. Cover types impacted by the LCP construction.

Vegetation Community	**LCP Footprint (acres)**
Cottonwood Willow Riparian	0.05
Developed	21.48
Fallow	9.58
High Intensity Agriculture	233.54
Levee	70.95
Non-Native Annual Grassland	1.44
Open Water	1.64
Orchard	8.28
Ruderal	9.26
Seasonal Marsh	9.95
Tamarisk Riparian Scrub	0.05
Valley Oak Woodland	1.97
Total	**368.19**

Figure 2-8. Construction footprint showing current land use with potential staging areas.

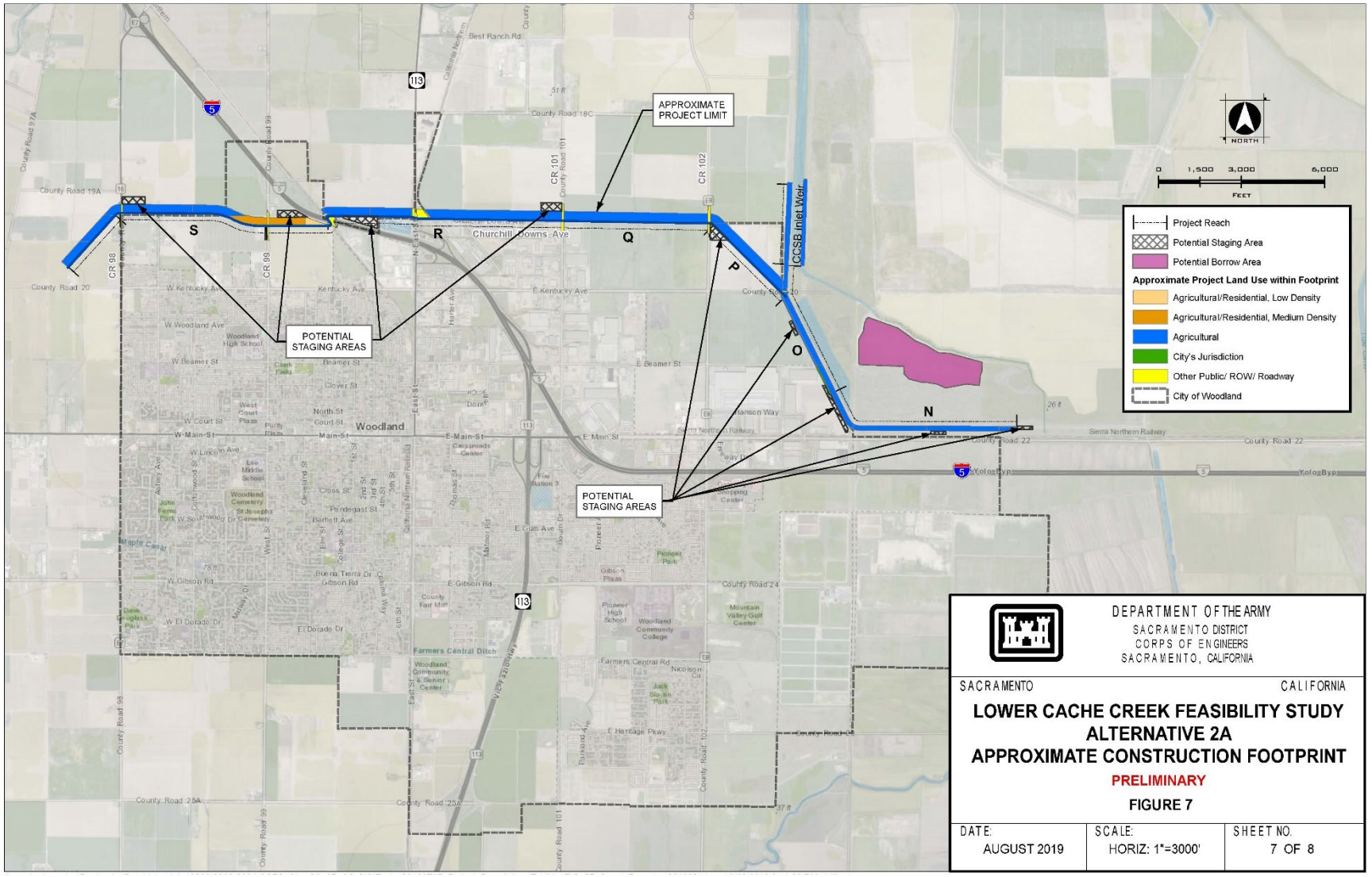
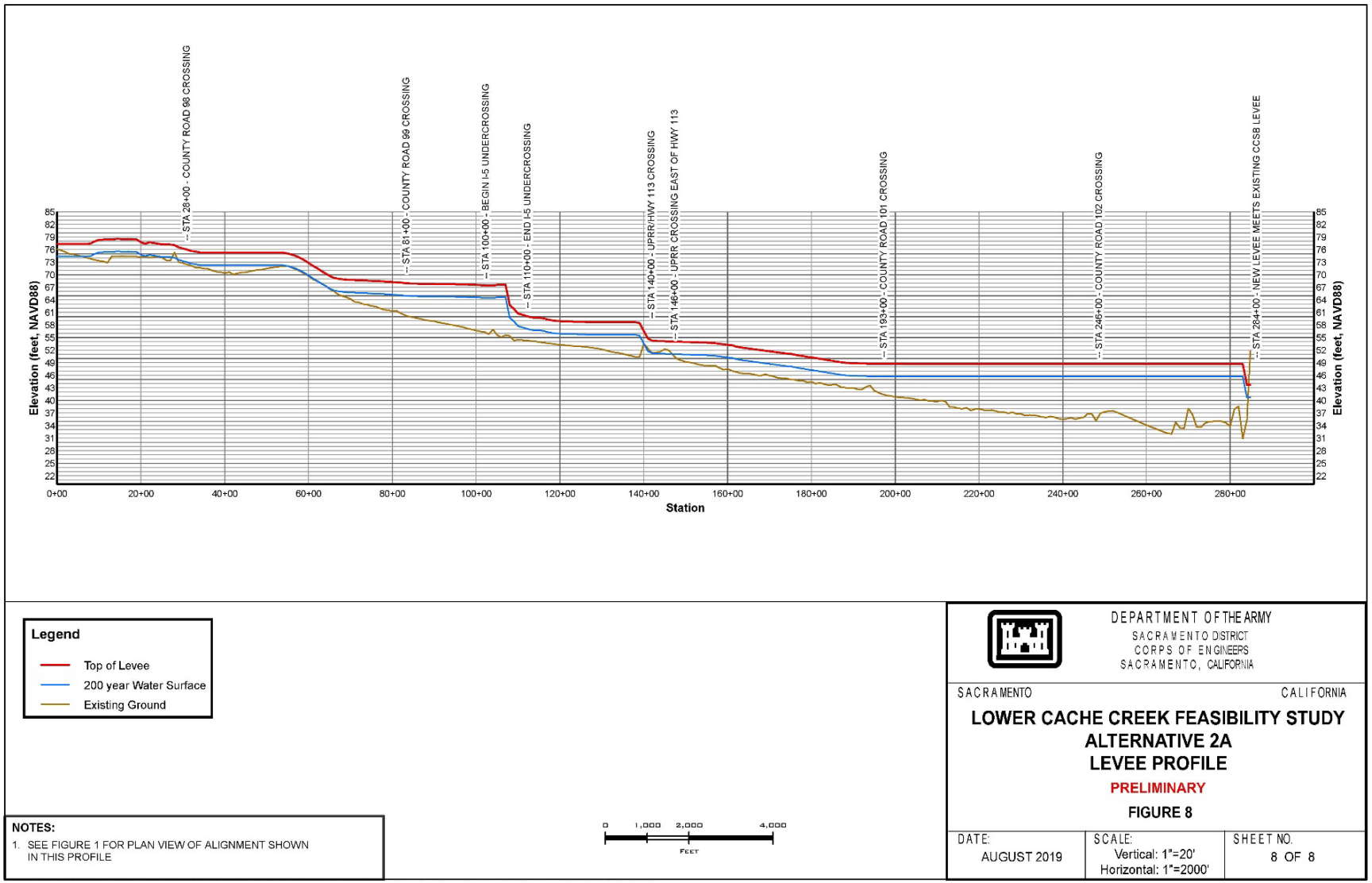


Figure 2-9. The levee profile starting at Station 0+00 and heading east toward Station 280+00 near the CCSB.



2.3 Comparison of Alternatives

The environmental effects, the significance of the effect, and potential mitigation measures of the No Action Alternative and the LCP are analyzed in Table 2-8. For analytical purposes, the environmental effects have been classified as direct and indirect effects. A flood event that has a 1% (1/100) AEP event was used in this comparison.

Mitigation for all direct effects of the LCP would be joint responsibility of the Corps, DWR and the City of Woodland on a cost-share basis. The mitigation measures to avoid, minimize, or compensate for these effects are also summarized in Table 2-8.

Environmental commitments related to direct environmental effects would be implemented during 1) PED, 2) project construction, or 3) O&M. The PED Phase begins prior to project authorization and extends until all project-related plans and specifications are completed. This process included preparation of detailed mitigation plans and ongoing coordination with other agencies.

The acquisition of all lands, easements, rights-of-way, and relocations included in any project mitigation measure are the responsibility of the City of Woodland. During construction, the Corps is responsible for administering project construction contracts and for ensuring that the mitigation measures in these contracts are fully carried out. After project completion, the NFS is required to maintain the improvements. The Corps prepares the O&M Manual during the closeout process, which the NFS are responsible for implementing. The O&M Manual includes requirements for annual inspections to review and evaluate all mitigation features and ensure compliance.

Table 2-8. Comparative Summary of Environmental Effects, Mitigation, and Levels of Significance

	No Action Alternative	Levee and Conveyance Plan
Socioeconomic Resources and Environmental Justice		
Effect	Landowners with Federally insured mortgages and some businesses within the FEMA 1 in 100 chance floodplain would be required to pay flood insurance. Flooding of residential areas and displacement of populations during a flood event.	Construction of the new levee would result in localized areas of slight increases in floodwater depth north of the levee and impact eight structures. An additional 14 structures north of the City would remain in the floodplain, but would not experience a change in depth or duration of flooding. Temporary disruption to residents alongside construction sites from traffic, noise, and dust. Acquisition of properties for construction and staging easements. No long-term environmental injustices.
Significance	Significant.	Less than significant. Benefits to urban area.
Mitigation	None.	Landowner notification of potential disruptions and real estate acquisitions. Fair market value paid for acquisitions with implementation of appropriate BMPs.
Land Use and Agriculture		
Effect	Inconsistent with local land use policies requiring protection of the existing urban area from flood damages. Land use and future growth and development would continue as described in the City and County General Plans. Urban areas and farmlands would be susceptible to flooding during storm events.	The project would require approximately 370 acres permanent project features and temporary haul roads and staging areas. Agricultural lands compose about 283 acres of the total land needs, 235 acres of which are Prime and Unique Farmland.
Significance	Significant.	Less than significant with mitigation.
Mitigation	None.	Compliance with Relocation Assistance and Real Property Acquisition Policies Act of 1970. Compliance with Farmland Policy Protection Act. Fair market value paid for agricultural and industrial land acquisitions.
Transportation		

Effect	The potential for flooding of local, county, and major transportation corridors like Interstate-5 and State Route 113 would remain during major storm events. Damage to roadways during flood event. Emergency road repairs would increase traffic congestion.	The project would protect important roadway infrastructure from Woodland to Sacramento during flood events that would enable residents to leave flood affected areas and allow for emergency responders to enter.
Significance	Significant.	Minor and only occurring during construction.
Mitigation	None.	Preparation of a Traffic Control and Road Management Plan and implementation of BMPs. Culverts under roadways to redirect floodwaters off roads.
Noise		
Effect	Noise levels would be the same as existing conditions. Noise during flood-fighting and levee repairs may increase.	Local increase in noise levels during construction would occur that may exceed ambient noise thresholds. After construction concludes, noise levels would return to pre-project conditions.
Significance	Negligible, incremental short-term effects but no lasting increase in noise levels.	Significant. Moderate to major increases in noise levels during construction to adjacent sensitive receptors (residences and businesses).
Mitigation	None needed.	Coordination with local residents and compliance with City of Woodland noise ordinances. Work would occur during daylight hours.
Air Quality		
Effect	Woodland population expected to grow and corresponding increase in criteria pollutant emissions likely with projected traffic volume increases. Increased emissions during emergency flood fighting activities without BMPs in place. Increased emissions during clean-up and reconstruction of the urban area.	Temporary emissions of criteria pollutants from construction equipment and haul trucks.
Significance	Significant.	Less than significant with mitigation.
Mitigation	None possible.	Implementation of Yolo Solano Air Quality Management District (YSAQMD) Basic Construction Emission Control Practices and BMPs.
Climate Change		

Effect	Inland hydrology models predict higher intensity storms which could lead to local pump stations being overwhelmed. Increased GHG emissions during flood fight.	Increased GHG emissions from construction equipment.
Significance	Significant.	Less than significant with mitigation.
Mitigation	None possible.	Implementation of YSAQMD Basic Construction Emission Control Practices and BMPs.
Water Quality		
Effect	Risk of contaminants entering the water from utilities, stored chemicals, septic systems, and flooded vehicles during flood event. Flood flows would increase bank erosion increasing turbidity. Climate change may create drought conditions and higher intensity wildfires in the watershed, leading to greater sediment deposit in Cache Creek.	Potential impacts include increased turbidity during drainage canal construction and tie-in to existing drainage ditch. Potential for storm water runoff from exposed soils and cement, slurry or fuel spills during construction.
Significance	Significant.	Less than significant with mitigation.
Mitigation	None possible	Preparation of a Stormwater Pollution Prevention Plan, Spill Prevention Control and Countermeasure Plan, and a Bentonite Slurry Spill Contingency Plan and implementation of BMPs.
Vegetation and Wildlife		
Effect	Vegetation and wildlife that utilize the CCSB for habitat would continue to be affected by O&M of the existing levee system. Erosion during a flood event would cause vegetation and wildlife habitat loss. Future flood fighting and repairs would affect vegetation and wildlife. Wildlife that occupy farmlands would continue to be subject to agricultural practices.	The project would result in the loss of 0.05 acres of cottonwood willow riparian, 2 acres of valley oak woodland, 10 acres of seasonal marsh/wetland, and 8 acres of orchard habitat. 83 acres of non-native annual grassland would be also be temporarily lost.
Significance	Significant.	Less than significant with compensatory mitigation.
Mitigation	None.	Mitigation credits for riparian, wetland, and oak woodlands habitat would be purchased at a mitigation bank. Annual grasslands would be planted with a native

		forb/grass mix. Lands with the CCSB may accommodate on-site habitat creation mitigation.
Special Status Species		
Effect	Habitat for special-status species is likely to affect by O&M of the existing levee system and CCSB. Flood event or flood fight could cause fatality to species.	The project would result in the loss of 0.85 acre of palmate-bracted bird's beak, 6 elderberry shrubs, 0.82 acres of giant garter snake, and 0.65 acre of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat.
Significance	Significant.	Less than significant with compensatory mitigation.
Mitigation	None.	Mitigation credits for the impacted special status species would be purchased from a bank if available. Mitigation for palmate-bracted bird's beak would involve education and/or habitat enhancement at Woodland Regional Park. Additional analysis would be conducted to determine if on-site habitat restoration or creation could be constructed.
Cultural Resources		
Effect	Damage to archaeological sites could result from future flood events.	Potential for adverse effects to historic properties from construction of the project.
Significance	Significant.	Less than significant with mitigation.
Mitigation	None possible.	Cultural resource surveys would be conducted prior to construction, to identify historic properties that would be affected by the project. Adverse effects would be mitigated through measures described in a Programmatic Agreement executed pursuant to Section 106 of the NHPA.
Aesthetic and Visual Resources		
Effect	O&M needed to maintain existing levees would continue to degrade the visual character of Lower Cache Creek by removing or altering remaining riparian forest. A flood event could damage the visual character in the study area.	Temporary construction related interruption of visual resources. Views obstructed by the new levee would disrupt the rural, agricultural and sparsely populated visual conditions of the study area.
Significance	Not significant.	Significant.
Mitigation	None needed.	New levee would be reseeded to match local conditions.

Utilities		
Effect	In a flood event there could be significant damage to utility systems. Debris from flooded homes and properties could overwhelm solid waste disposal facilities.	Temporary disruptions to utility services possible, particularly during relocation of utilities that penetrate the new levee.
Significance	Significant.	Less than significant.
Mitigation	None possible.	Notification of potential interruptions would be provided to the appropriate agencies and landowners.
Hydrology and Hydraulics		
Effect	Emergency repairs during a flood event could result in the loss of channel capacity and alternation of current geomorphic processes.	During a large flood event (e.g. 1% AEP event) duration of flooding west of SR 113, near I-5 would be shorter than existing conditions, lasting only several days. Near SR 113, flood depths would decrease by up to 1 foot from existing conditions. East of SR 113 flooding duration would be higher (near the inlet weir flooding would last about 1 month). Flood depths would be higher or lower west of SR 113. Flood depths increase gradually to 6 feet near the CCSB inlet weir during flood events greater than 2% AEP events. Induced flooding would have minor impacts industrial/agricultural area north of the city limit line.
Significance	Significant.	Less than significant.
Mitigation	None possible.	None needed.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

The baseline environmental conditions assumed in this DSEIS for analyzing the effects of the Lower Cache Creek Feasibility Study consists of the physical environment as of 2015, the date when the Corps published the notice of intent (NOI) in the Federal Register to prepare a Supplemental EIS. The 2015 existing physical environment is consistent with the current conditions in the project area because no major changes to resources have occurred within the last several years in the study area. Relevant updates to resources have been discussed in each resource category.

Chapter 3 contains the study-level analyses for the LCCFS for each resource, which includes the Affected Environment, Methodology and Basis of Significance, Impact Analysis by Alternative, and Mitigation Measures. These sections are described in more detail below:

Affected Environment. This section provides an overview of the physical environmental existing conditions in the study area. The baseline environmental conditions assumed in this DSEIS for analyzing the effects of the project consist of the existing physical environment as of 2015.

Methodology. This section describes the methods, models, process, procedures, data sources, and/or assumptions used to conduct the effect analysis. Where possible, effects are evaluated quantitatively. Where quantification is not possible, effects are evaluated qualitatively.

Basis of Significance. This section provides the criteria used in this document to define the level at which an effect would be considered adverse in accordance with NEPA. Significance criteria used in this DSEIS are based upon Federal laws and regulations, factual or scientific information and data and regulatory standards of Federal agencies. Under NEPA, preparation of an EIS is triggered if a Federal action has the potential to "significantly affect the quality of the human environment," which is based on the context and intensity of each potential effect. The significance thresholds used in this DSEIS also encompass the factors taken into account under NEPA to evaluate the context and the intensity of the effects of an action.

Effects. This section describes the analysis of effects relating to each resource area for each of the alternatives in accordance with NEPA regulations (40 CFR 1502.16). To comply with NEPA, the effects are considered and evaluated for each alternative as to whether they are direct, indirect, or cumulative. Direct effects are those that are caused by the action and occur at the same time and place. Indirect effects are reasonably foreseeable consequences to the physical environment that may occur at a later time or at a distance from the project area. Each effect is accompanied by a finding or conclusion, as required under NEPA. Cumulative effects for all resource areas are combined and discussed in Chapter 4, "Growth-Inducing and Cumulative Effects." The effect findings are determined by relative severity (increasing in degree of adversity to the environment) and are described below.

- Beneficial. This effect would provide a benefit to the environment as defined for that resource.
- No Effect. This effect would cause no discernible change in the environment as measured by the applicable significance criterion; therefore, no mitigation would be required.

- Less than Significant. This effect would cause no substantial adverse change in the environment as measured by the applicable significance criterion.
- Significant. This effect would cause a substantial adverse change in the physical conditions of the environment. Effects determined to be significant based on the significance criteria fall into two categories: those for which there is feasible mitigation available that would avoid or reduce the environmental effects to less-than-significant levels and those for which there is either no feasible mitigation available or for which, even with implementation of feasible mitigation measures, there would remain a significant adverse effect on the environment.

Mitigation Measures. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant effects accompany each effect discussion. The mitigation measures are listed at the end of each resource section.

In this chapter, the proposed project footprint refers to the area that would be directly affected by construction activities and includes roughly 370 acres, and the study area refers to the general location of the project area including the larger watershed (Figure 1-1).

3.2 Resources Eliminated from Detailed Analysis

Some resources considered in this DSEIS were found to have no potential for effects resulting from the proposed alternatives. These resources were eliminated from the detailed analysis, but their baseline conditions are described below to provide context within the study area.

3.2.1 Topography

Most of the topographic information identified in the 2003 DEIS-EIR remains unchanged, and thus is incorporated into this DSEIS by reference. Changes in the existing topography pertinent to the current proposed alternative are discussed below.

Topographic features of the Cache Creek basin vary from the steep hills of the eastern slopes of the Coast Range Mountains to the nearly flat valley floor. Elevations range from 6,000 feet in the mountains dropping to nearly sea level near the town of Yolo. Stream channel gradients in the upper basin are steep; gradients in the lower basin are very small. Flood control and land reclamation levees provide some topographic relief in the relatively flat project area, ranging from 91 feet mean sea level (msl) upstream within the Cache Creek gravel mining reach to 35 feet msl (NAVD88) at the settling basin.

The study area is located on the alluvial fan of Cache Creek. Cache Creek is perched on a ridge of higher ground that formed through the historical deposition of fine grained sediment along the Cache Creek banks during storm events that flowed out of bank (Figure 1-3). Flooding that overtops the existing channel levees quickly spreads overland to the north and south of the creek. Study area topography conveys Cache Creek flood waters through Woodland, south into the City of Davis where waters pool against the west levee of the Yolo Bypass with no outlet into the Sacramento River.

Recent studies on the increased rate of land subsidence caused by groundwater extraction in the western portion of the Sacramento Valley may alter the existing topography in the study area (DWR, 2018). Construction of the LCP features would blend into existing grade

and therefore would be consistent with existing topographic relief and would have negligible effects on the topography of the project area.

3.2.2 Geology and Soils

Most of the information on geology and soils identified in the 2003 DEIS-EIR has not changed, and is incorporated into this SDEIS by reference. Changes in geologic or agronomic conditions pertinent to the current proposed alternative are discussed below. Refer to Section 3.2.3 of the 2003 DEIS-EIR for information on deposits and descriptions of the study area's geomorphic area.

Table 3-1. Soil Types found within the City of Woodland (NRCS 2019)

Soil Symbol	Soil Name	Description	Farmland Designation
BrA	Brentwood	Silty clay loam, 0 to 2 percent slopes	Prime Farmland*
Ca	Capay	Silty clay, 0 percent slopes, MLRA 17	Prime Farmland*
Ck	Clear Lake	Clay, 0 to 1 percent slopes, MLRA 17	Prime Farmland*
Lk	Laugenour	Very fine sandy loam, deep, flooded	Not Prime Farmland
Lm	Loamy alluvial land	Loamy alluvial land	Not Prime Farmland
M-W	Miscellaneous water	Water, miscellaneous	Not Prime Farmland
Md	Maria	Silt loam, deep	Prime Farmland*
Mf	Marvin	Silty clay loam	Prime Farmland*
Mo	Merritt	Silty clay loam, deep, drained	Prime Farmland*
Mp	Merritt	Complex, saline-alkali	Statewide Importance
Ms	Myers, clay	0 to 1 percent slopes. MLRA 17	Prime Farmland*
Pb	Pescadero	Silty clay, saline-alkali	Not Prime Farmland
Ra	Reiff	Very fine sandy loam	Prime Farmland*
Rb	Reiff	Gravelly loam	Prime Farmland*
Rg	Rincon	Silty clay loam	Prime Farmland*
Rh	Riverwash	none	Not Prime Farmland
Rk	Riz	Loam	Not Prime Farmland
Sn	Soboba	Gravelly sand loam	Not Prime Farmland
Sp	Sycamore	Silt loam, drained, 0 percent slopes, MLRA 17	Prime Farmland*
Ss	Sycamore	Silty clay loam, 0 to 1 percent slopes, MLRA 17	Prime Farmland**
St	Sycamore	Silty clay loam, drained, 0 percent slopes, MLRA 17	Prime Farmland*

Sv	Sycamore	Complex, drained	Prime Farmland*
Tc	Tyndall	Very fine sandy loam, drained	Prime Farmland*
W	Water	Water	Not Prime Farmland
Wb	Willows	Clay, 0 percent slopes, MLRA 17	Statewide Importance
Wc	Willows	Clay, 0 percent slopes, sodic, MLRA 17	Statewide Importance
Wm	Willows variant	Clay, marly variant	Statewide Importance
Ya	Yolo	Silt loam, 0 to 2 percent slopes, MLRA 17	Prime Farmland
Yb	Yolo	Silty clay loam, 0 to 2 percent slopes, MLRA 17	Prime Farmland

** Prime Farmland if Irrigated*
*** Prime Farmland if Irrigated and Drained*

Soil types differ only slightly between the City of Woodland and the LCP due the city boundary not including the Cache Creek Settling Basin. Only one soil type is not reflected in the City of Woodland Table 3-1, which occurs in the LCP project area, which is Lang silty loam.

The only active or potentially active fault in the County is the Dunnigan Hills Fault, which extends west of I-5 between the Town of Dunnigan and northwest of the Town of Yolo. This fault has caused Holocene (the last 11,000 years) displacement, but not during historic times (approximately the last 200 years). The Dunnigan Hills Fault is considered potentially active, but has not been delineated by the California Geological Survey (CGS) as an Alquist-Priolo Earthquake Fault Zone, indicating that the CGS does not consider the fault to have potential for surface rupture or earthquake.

A number of older faults, including the Capay, Sweitzer, East Valley, and West Valley faults are located in the western portion of the County. However, displacement of these faults occurred more than 1.6 million years ago, and as such, these faults are generally considered inactive. No known faults occur in any of the major inhabited areas of the Yolo County (County of Yolo, 2009).

In July 2018, the Mendocino Complex Fire became the largest wildfire complex in California history, spanning 459,123 acres. The Ranch Fire itself burned 410,203 acres between July and September 2018. Wildfire frequency and intensity has been increasing over the last few decades due to climate change, drought, and forest pathogen outbreaks. Wildfires can change soils nutrient content, organic carbon content and the ability to hold and repel water. Wildfire-induced soil changes likely result in water quality impacts throughout the watershed. Rain events can readily transport exposed soil sediments to freshwater aquatic systems (Cawley et. al, 2018).

The absence of vegetative cover leaves soils vulnerable to erosion. It is likely erodible soils resulting from the Mendocino Complex Fire entered the watershed starting the winter of 2018-2019. Sediments likely entered Clear Lake, as the wildfire was only a few away, 2.5 miles at the nearest. It is possible newly deposited sediments from Clear Lake and the watershed entered into Cache Creek. These sediments would be trapped in the CCSB preventing any soils and potentially harmful contaminants from entering the Sacramento River and affecting water quality.

Land subsidence is the lowering of land-surface elevation, through the compression of subsurface sediments. Subsidence could damage or reduce the integrity of highways, levees, and irrigation canals. The primary hazards associated with subsidence include: increased pressure on levees, increases in relative flood water depths and area, damage to underground utilities, and changes in gradients of storm water and sewage drainage systems, especially when flows are gravity-driven.

In Yolo County, the primary mechanism for subsidence relates to groundwater pumping and subsequent consolidation of loose aquifer sediments (County of Yolo, 2009). Precise monitoring of subsidence has been conducted by the DWR through the 2017 GPS Survey of the Sacramento Valley Subsidence Network. Initiated in 2008, the nine-year comparative study found that Yolo County experienced between -0.3 and -1.1 ft. of elevation change at several monitoring stations, the largest spatial extent of subsidence in the Sacramento Valley survey area. For the purposes of the 2017 survey, land surface decreases greater than, or equal to, 0.17 feet were considered statistically significant (DWR 2018).

Although construction of the proposed plan would temporarily disturb soils, there would be no loss of soils or unique soil types and therefore no significant effects on soils. Soil used to construct the levee and seepage berm would be sourced from the trapezoidal drainage canal. Material may also be sourced from the degraded training levee. There is no risk of introducing new soil types into the area. Soil stockpiles and project features would be protected by SWPPP measures to prevent storm water run-off. Due to the fact that most soil required for the project would be relocated from within the study area itself, there are negligible impacts to soil resources.

Construction of the LCP would cause permanent effects on soil resources associated with Prime Farmland. These effects are discussed in Section 3.3.2.

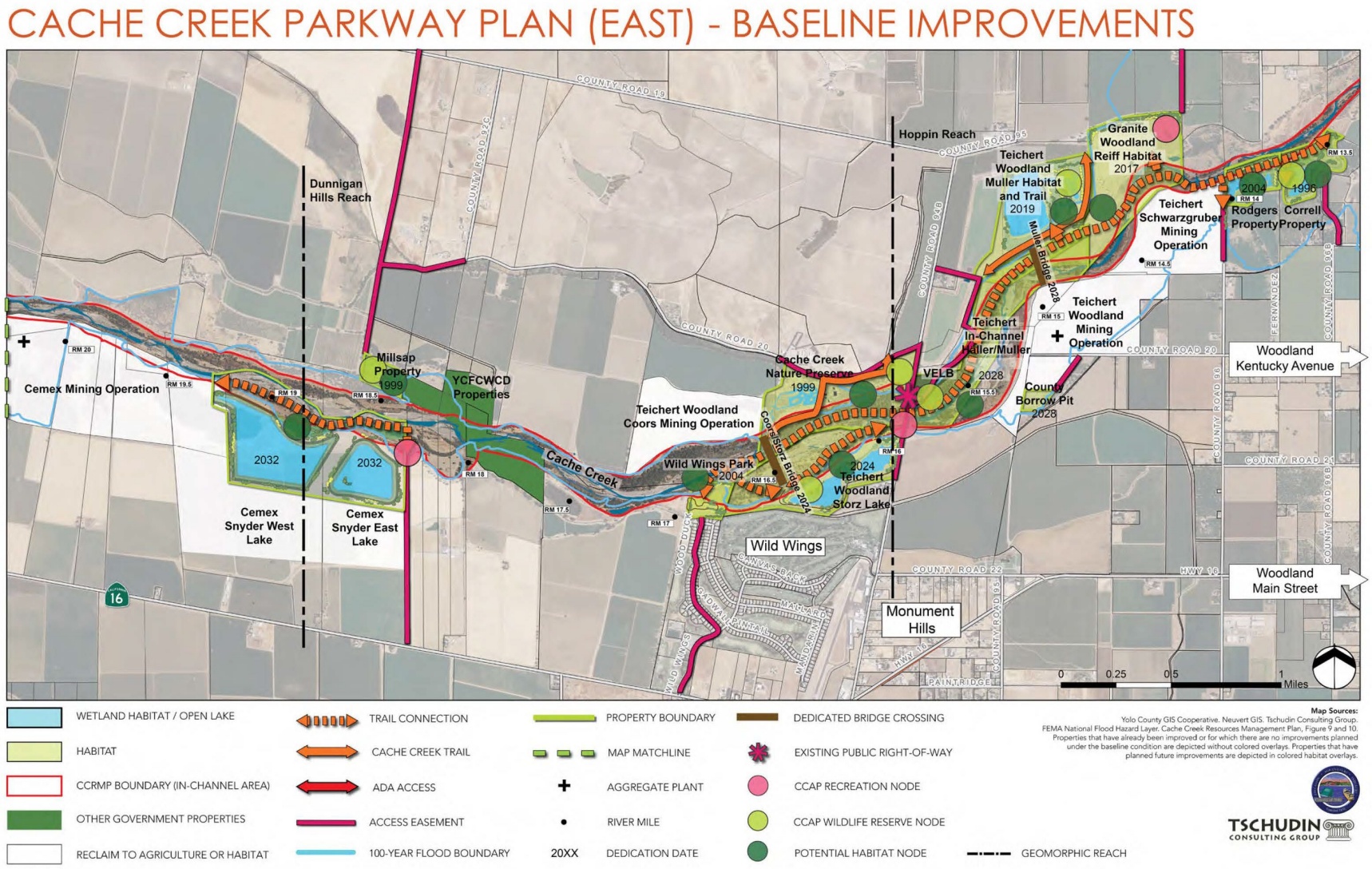
3.2.3 Recreation

The baseline conditions in the study area for recreation identified in the 2003 DEIS-EIR have not changed substantially. They are incorporated into this DSEIS by reference and are summarized with any other relevant updated information below.

Federal lands within the floodplain include: the Yolo Bypass Wildlife Area and the Fremont Weir Wildlife Area. Upstream of the study area, generally between Clear Lake and the unincorporated community of Rumsey, 31 miles of Upper Cache Creek are a designated State Wild and Scenic River; however Lower Cache Creek within the study area is not a part of the Wild and Scenic River system.

The Cache Creek Area Plan (CCAP) is a riverine management plan that spans 14.5 miles of Lower Cache Creek, between the Capay dam and town of Yolo. The Rio Jesus Maria Reach of the CCAP is one mile west of LCP study area (Figure 3-1). The Cache Creek Resources Management Plan (CCRMP) regulates approximately 2,324 acres of in-channel area primarily for creek stabilization and restoration, maintaining flood capacity, and providing recreational opportunities.

Figure 3-1. The Cache Creek Area Plan East boundary. The City of Woodland is the furthest east and downstream extent of proposed projects. (Yolo County 2019)



Yolo County has set the following goals and objectives for improving recreation opportunities along Cache Creek (County of Yolo 2018b):

GOALS

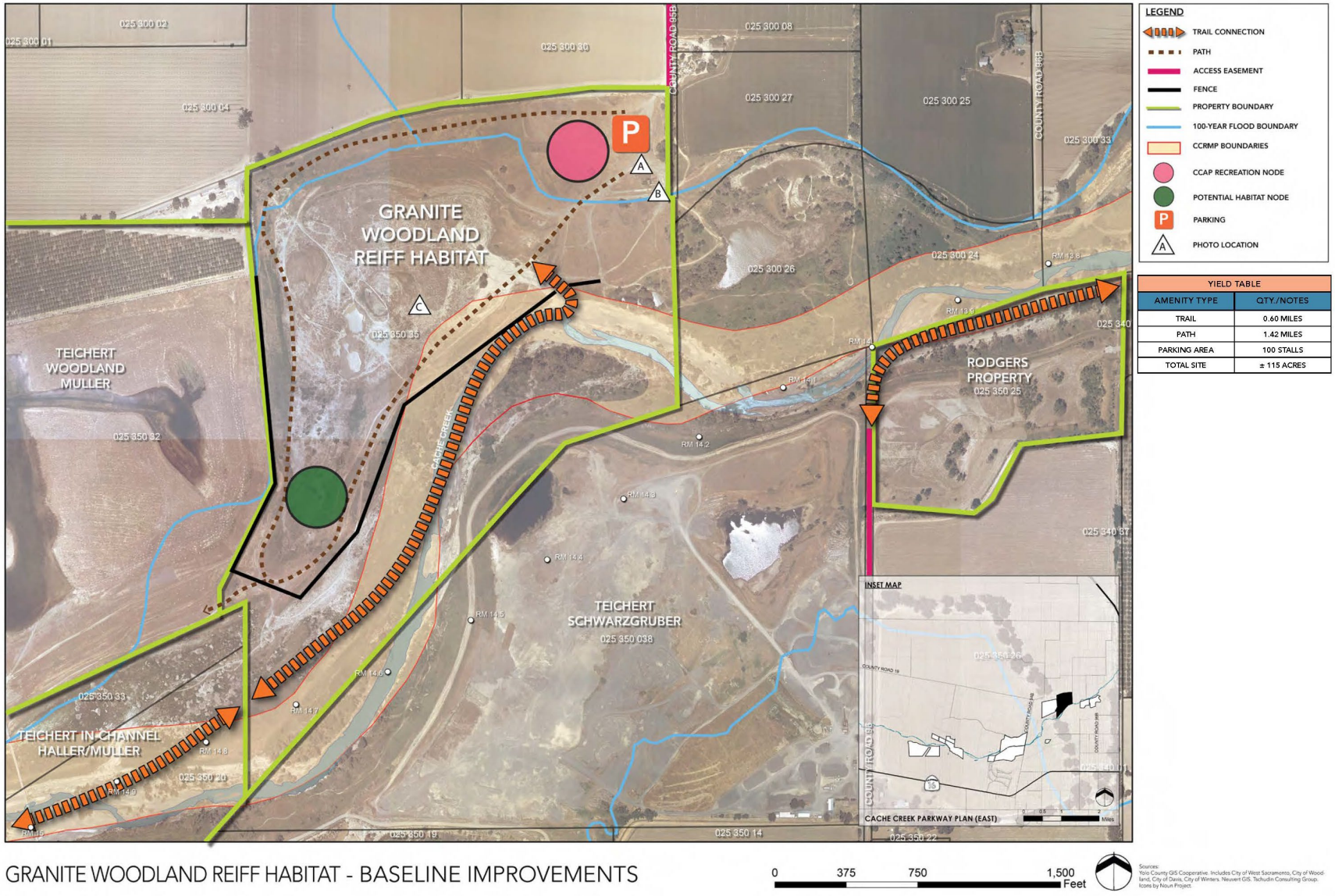
- 5.2-1 Improve scenic resources within the Cache Creek channel.
- 5.2-2 Establish a variety of outdoor recreational and educational opportunities along Cache Creek for use by the public.
- 5.2-3 Ensure the compatibility of recreational facilities with surrounding land uses and sensitive wildlife habitat, in order to minimize adverse impacts.

OBJECTIVES

- 5.3-1 Create a continuous corridor of natural open space along the creek and provide for limited access, at specific locations, to recreational and educational uses.
- 5.3-2 Continue to use the “Open Space” designation for the areas where resource management and habitat protection is warranted.

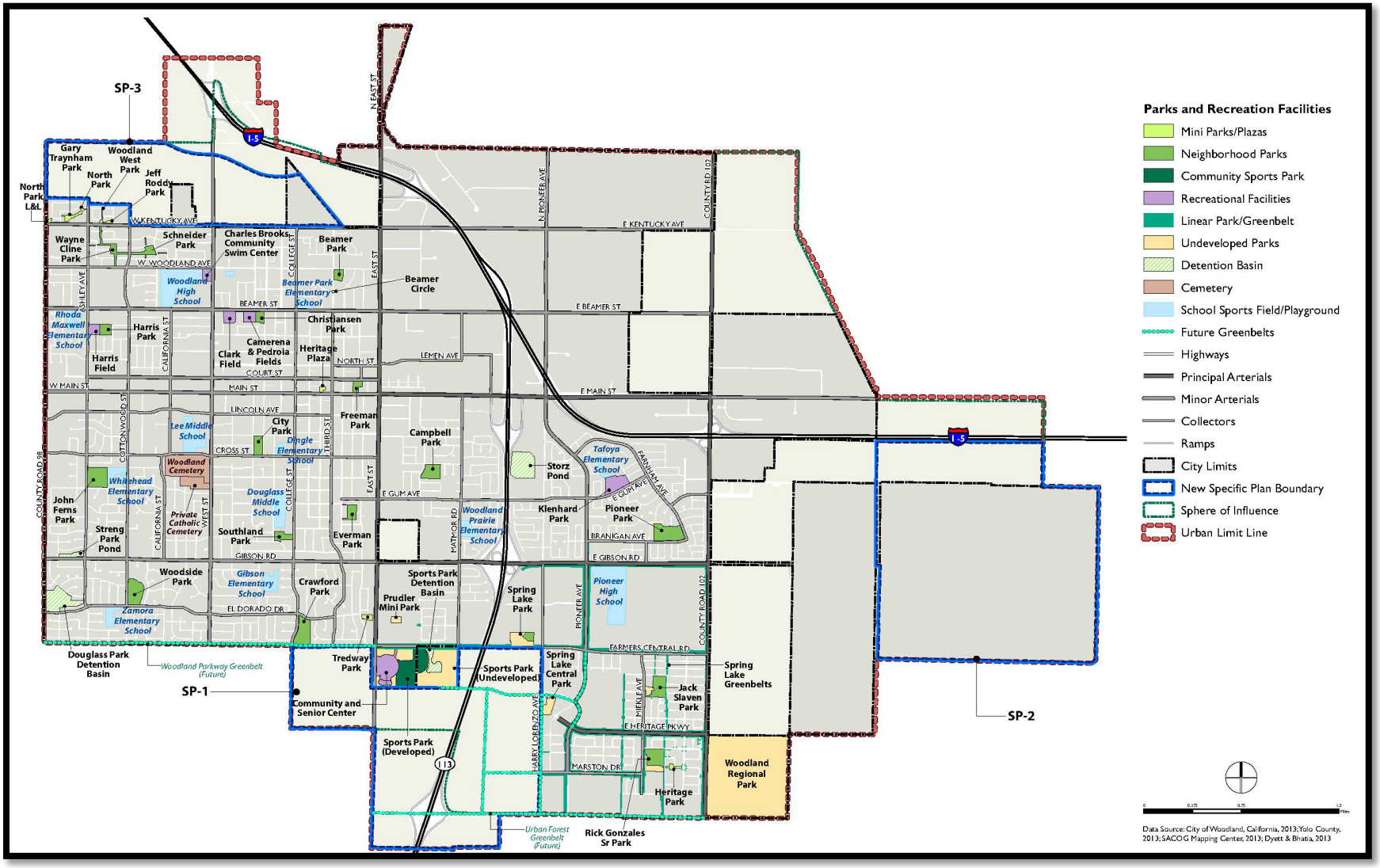
While the Cache Creek Parkway Plan proposed projects are just one mile west of the study area, access to recreation would be improved for residents living in and around the project area. The Cache Creek Parkway Plan proposes to improve former gravel mining quarry sites that extend along Lower Cache Creek, and restore them for wildlife habitat, passive open space, and parklands for various active uses. Recreational improvements would include building new trails and trail connections, providing lookout areas with interpretative signage and trail maps, and improving wildlife habitat (Yolo County, 2019a). These improvements would provide recreational opportunities for residents in the City of Woodland and surrounding areas.

Figure 3-2. The Granite Woodland Reiff Habitat Improvements.



GRANITE WOODLAND REIFF HABITAT - BASELINE IMPROVEMENTS

Figure 3-3. Parks and Recreational Areas in Woodland (City of Woodland 2017).



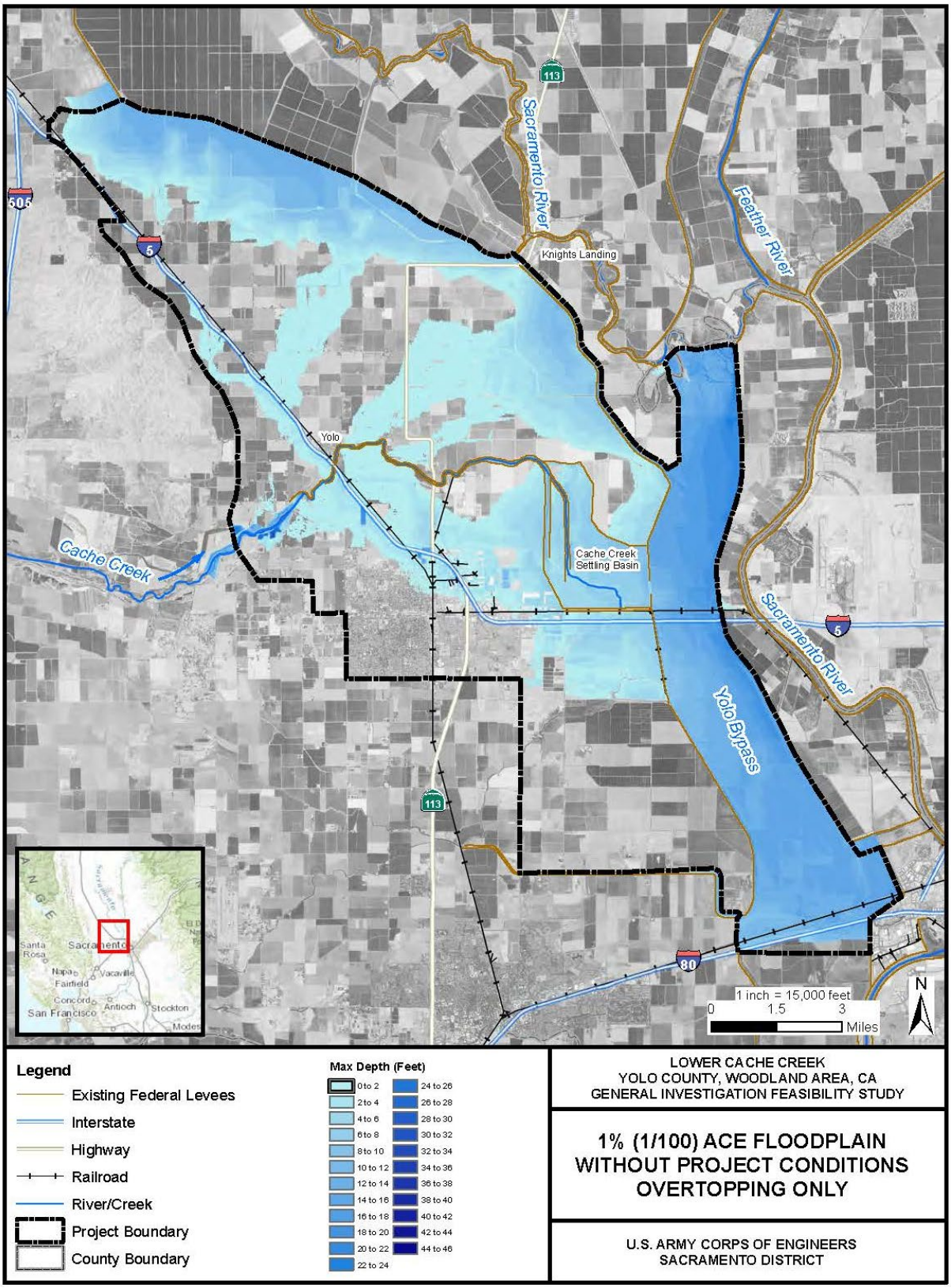
The City of Woodland has nine mini parks/plazas, 15 neighborhood parks, one community sports park, and six recreational facilities. The City also owns a 154-acre undeveloped park site known as Woodland Regional Park, which is located along CR 102 and CR 25. Total acreages of these facilities is approximately 408 acres. Of the 32 parks and facilities in the City of Woodland, several are in the 100 AEP event floodplain (Figure 3-2). The majority of these parks have picnic and barbeque facilities. Beamer Park on East Street and Christiansen Park may flood during existing conditions. Two fields, Camarena Field and Clark Field, have baseball diamonds. City parks in the area have little use during the wetter, winter months, but numerous county and city residents, including adults and children, use the parks during the remainder of the year. These parks would no longer be susceptible to flooding if the LCP was implemented.

The only designated recreational facility in the study area is Velocity Island Park. This 15-acre waterpark facility is located on the northern edge of the city of Woodland adjacent to I-5 and Highway 113, approximately 1.5 miles south of Lower Cache Creek. Velocity Island Park offers beach front and cabanas, paddle boarding, wake boarding, volleyball, and food services. Velocity Island Park is within the natural floodplain. With the LCP, flooding depth at Velocity Island Park would reduce by up to one foot, and duration of flooding would decrease by several days (Figure 3-21). The LCP would provide positive benefits to the park, reducing damages associated with erosion and scour. Temporary construction related activities near the park would likely last several weeks to a month. The increased noise may deter people from recreating at the park; however, these impacts would be short-term. Construction work windows could be coordinated with the park to avoid prime business hours.

There is one event venue in the natural floodplain, Nelson's Grove. The Maples and The Lawley Ranch located along SR 113 near Lower Cache Creek are not within the floodplain. Nelson's Grove would not be impacted by the LCP. Flooding would remain the same as existing conditions during a 1% (1/100) AEP event (Figure 3-23).

Public access to Cache Creek in the project area is limited. Access is restricted as a result of private lands bordering the creek to the north and south, and locked gates at the entrances of the levees. The new levee has the potential to be used for passive recreational purposes. Walkers, runners and bikers may be able to enjoy a safe new path on the levee crown. The Levee and Conveyance plan is expected to have negligible short-term construction-related adverse effects to recreational resources in the project area, primarily Velocity Island Park. However, long-term beneficial effects resulting from the proposed plan providing lowered risk of flooding potential for multiple recreational facilities within the current 1% (1/100) AEP event floodplain.

Figure 3-4. The existing condition 1% (1/100) AEP Floodplain.



3.2.4 Hazardous, Toxic, and Radioactive Waste

Most of the information on hazardous, toxic, and radiological waste (HTRW) identified in the 2003 DEIS-EIR has not changed, and is incorporated into this DSEIS by reference. Changes in HTRW conditions pertinent to the current proposed alternative are discussed below.

In 2000, a Phase 1 Environmental Site Assessment was performed by the Environmental Design Section of the Corps Sacramento District for the 2003 DEIS-EIR. The status of the HTRW sites were confirmed through subsequent contacts with local and State regulatory agencies. For more information on the methods and results of the study conducted in 2000, see section 3.2.5 of the 2003 DEIS-EIR.

In 2005, the Central Valley Regional Water Quality Control Board (CVRWQCB) adopted a TMDL for mercury in Cache Creek and its tributaries. Cache Creek is also listed on the Clean Water Act Section303 (d) list as impaired for unknown toxicity. The presence of mercury and methylmercury resulting from upstream historic mining operations has been considered during the formulation of the various alternatives, and is further described in section 3.3.7, Water Quality.

In July of 2012, a HTRW Phase I Environmental Site Assessment was completed for Mid Valley Area, Phase III Levee Reconstruction project. The project site consisted of six sites that were located southeast of Knights Landing. The sites were bounded by County Road 102 on the west, Karnak Road on the north, Becker Road on the east and County Road 17 on the south. Five recognized environmental conditions (REC) were identified – two dry gas well facilities and three pole-mounted power transformers. During two previous Phase I Environmental Site Assessments, EDS and ECS personnel identified pole mounted electrical transformers as potential REC sites.

In 2014, the Corps prepared an updated Phase I Environmental Site Assessment (ESA) to identify and evaluate potential hazardous and toxic waste issues in and near the project area in accordance with ASTM 1527-13 and ER 1165-2-132. The purpose of the ESA was to review available documentation regarding past and current land use activities to assess the possible presence of hazardous substances and waste. The ESA consisted of a records investigation and site reconnaissance, encompassing both the project area and the surrounding area. This assessment revealed no evidence of recognized environmental conditions, which could impact the proposed project alternative. Sites that were reported by Environmental Data Resources, Inc. would not affect the proposed construction because they are under control, exhibit no signs of continuing release and are generally more than ¼ mile away from the construction area. Based on the ESA and field reconnaissance, there are no additional HTRW sites in the study area, and there is no apparent HTRW contamination that would interfere with construction of the project. As a result, the effects associated with HTRW sites remain consistent with the analysis conducted for the 2003 DEIS-EIR. The minimization measures discussed below would continue to be implemented as a part of project construction.

During construction there is a potential for a hazardous materials such as fuels, oils, or paints to be accidentally spilled or released into the environment. Prior to construction, a hazardous materials management plan would be prepared and implemented. Additionally, a new ESA would be prepared prior to construction to identify any new HTRW sites. The plan would include measures to reduce the potential for spills of toxic chemicals and other hazardous materials during construction. The plan would also describe a specific protocol for the proper handling and disposal of these hazardous materials, as well as contingency procedures to follow

in the event of an accidental spill. As a result, construction of the project is not expected result in any adverse effects due to HTRW.

3.2.5 Public Health Vectors and Vector Control

Most of the information on public health vectors and vector control in the 2003 DEIS-EIR remains unchanged, and thus is incorporated into this SDEIS by reference. Changes in the existing environment pertinent to the current proposed alternative are discussed below. West Nile Virus has been added to the list of vector-borne diseases since 2003.

A vector is any organism that can serve as a transmission vehicle for a disease-causing agent. Insects such as mosquitoes, flies, fleas, and ticks are the most prominent vectors in the United States, along with animals such as rats and mice. Vector diseases are most often caused by a virus, protozoan, bacteria, or worm. Table (3-2) lists vector-borne diseases documented in the Sacramento-Yolo Mosquito and Vector Control District (SYMVCD), their causes, their transmission vectors, and their potential locations. All of these vector-borne diseases occur on a very limited basis within the SYMVCD.

Table 3-2. Mosquitos and vectors common in the Woodland area. (Sacramento-Yolo Mosquito and Vector Control District, 2019)

Common Name	Scientific Name	Range	Breeding Locations	Diseases Spread
Western Encephalitis Mosquito	*Culex tarsalis*	Rural areas of Sac and Yolo Counties	Wetland, duck clubs, rice fields, irrigated crops	West Nile, western equine encephalitis, Saint Louis encephalitis virus
Northern House Mosquito	*Culex pipiens*	Towns, cities, rural areas	Backyard sources - ponds, fountains, bird baths, buckets, neglected swimming pools, dairy lagoons, catch basins	West Nile, Saint Louis encephalitis virus
Western Malaria Mosquito	*Anopheles freeborni*	Rice growing regions and cities	Rice fields, wetlands, duck clubs, rain pools	Malaria
Inland Floodwater Mosquito	*Aedes vexans*	Rural and cities	Irrigated pastures and woodland water pools	None
Western Treehole Mosquito	*Aedes sierrensis*	Rural	Water-filled rot holes in trees	Dog heartworm
No Common Name	*Aedes melanimon*	Inland valleys of California	Wetland, duck clubs, rice fields, irrigated crops	Western equine encephalitis

Western Black-Legged Tick	*Ixodes pacificus*	Sacramento and Yolo County	Areas of high humidity from October-July	Primarily responsible for transmitting Lyme Disease and babesiosis; potential for Rocky Mountain spotted fever, tularemia, ehrlichiosis, anaplasmosis and cytauxzoonosis, fever spirochetes
Pacific Coast Tick	*Dermacentor occidentalis*	Sacramento and Yolo County	Areas of high humidity from November to June	Potential for all listed diseases above.
American Dog Tick	*Dermacentor varabilis*	Sacramento and Yolo County	May to August	Potential for all listed diseases above.
Brown Dog Tick	*Rhipicephalus sanguineus*	Sacramento and Yolo County	Dog kennels and homes year round	Primarily transmits Ehrlichiosis, but has the potential for all listed diseases above.

Construction of the 350 cfs capacity drainage canal at the northern toe of the levee, and the detention basin at the inlet weir to the CCSB would create more opportunities for standing water; however, standing water would only be present in the wet, winter months, typically from December-March following a significant storm event. It is expected that these project features have drained into the CCSB following the winter rain events. The average high temperature during these winter months is around 50 degrees, and because mosquitos (the main vector of concern) cannot survive in temperatures 50 degrees and below, this standing water would not create suitable summertime habitat for mosquito egg laying. Additionally, the construction of this project would actually move water away from the town and towards the CCSB and the City pump plants; so, in the case of a large storm or flood event, prolonged standing water would be a safe distance from residents.

The SYMVCD takes the following actions to monitor and control vectors and vector diseases:

- Public Information and Education. – Outreach program educates and informs the public about mosquito control and prevention.
- Mosquito and Vector Surveillance – Laboratory and surveillance program monitors mosquito and virus activity by testing mosquitos, birds, and sentinel chickens for the presence of a viral pathogen.
- Biological Control – Use of living organisms to control a pest. Organism would attack the harmful pest, resulting in reduction of population levels. The primary biological control used against mosquitoes is the mosquitofish, *Gambusia affinis*.
- Physical Control and Source Reduction – Reduce mosquito breeding sites by promoting effective drainage, controlling vegetation, appropriate timing of irrigation, and encouraging BMPs in urban, agricultural and conservation areas.
- Microbial and Chemical Control – Prudent use of chemical compounds (insecticides) that reduce mosquito populations.

The SYMVCD may administer Ultra Low Volume (ULV) treatments by using backpack foggers, hand sprayers, truck-mounted foggers or aircraft, in and around areas where virus activity has been detected (SYMCVC 2018). Currently as a part of the Mosquito and Mosquito-Borne Disease Management Plan, areas of concern in Sacramento and Yolo County are sprayed with ULV treatments.

The Corps would coordinate with the vector control district and incorporate avoidance and minimization measures into project designs and O&M manuals to the extent practicable. Close coordination and the vector control measures would ensure that there would be no adverse effects related to the construction of the LCP.

3.2.6 Fisheries

Most of the fisheries information identified in the 2003 D EIS-EIR has not changed, and is incorporated into this DSEIS by reference. Any potential changes in fisheries pertinent to the current proposed alternative are discussed below.

The variable stream flow, shallow depths, agricultural runoff, gravel mining, and passage impediment in Lower Cache Creek influence the species of fish found in the study area. Previous surveys in Lower Cache Creek conducted in June and July of 1997, by the Cache Creek Conservancy showed a total of 18 fish captured, 5 of which were natives. The non-native red shiner was the most predominately found fish. Native fish include the hitch (*Lavinia exilicauda*), Sacramento sucker (*Catostomus occidentalis*), Sacramento pikeminnow (*Ptychocheilus grandis*), speckled dace (*Rhinichthys osculus*), and Sacramento blackfish (*Orthodon microlepidotus*). None of which are listed under the Endangered Species Act.

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) establishes a management system for national marine and estuarine fishery resources. This legislation requires all Federal agencies to consult with NOAA Fisheries regarding all actions or proposed actions permitted, funded, or undertaken that may adversely affect essential fish habitat (EFH). EFH is defined as “waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” The legislation states that migratory routes to and from anadromous fish spawning grounds should also be considered EFH. The phrase “adversely affect” refers to the creation of any effects that reduce the quality or quantity of EFH.

An analysis was completed in July 2019 to evaluate the project’s impact on local fisheries. The study area consisted of the lower portion of Goodnow Slough-Lower Cache Creek, a perennial tributary/drainage to the Sacramento River. The study site is located within the Hydrologic Unit Code 1802011 and has been identified as EFH for Pacific Chinook Salmon (*Oncorhyncus tshawytscha*). Designated Critical Habitat is not found within the study area. The study site is part of an existing flood control project consisting of levees, maintenance roads and flood control weir structures along Lower Cache Creek and the Cache Creek Settling Basin (CCSB). Due to fluctuating flows, bypass drainage, fish passage impediments and upstream gravel mining operations, fluctuating flows, the proposed study site does not provide suitable passage, rearing, or spawning habitat for Pacific Salmonids.

There are no expected impacts to Cache Creek as the levee improvements are set back from the natural channel and riparian corridor. A 3,000 foot long section of the west levee of the CCSB would be degraded to accommodate for a concrete inlet weir that would be placed on top of the existing adjacent grade. The current impact footprint does not contain shaded aquatic

riverine habitat, habitat areas of particular concerns or any EFH elements. Instead the impact area consists of concrete, debris, dirt and other miscellaneous fill material from previous constructed features.

The impacts are like-for-like meaning fill material would be taken out and replaced with the same type of fill material i.e. dirt, concrete. There would be no loss of, or impact to habitat under the EFH jurisdiction within the study area. A 'no effect' determination has been made for EFH in the study area. As a result, the LCCFS is in full compliance with the Magnuson-Stevens Act.

3.3 Resources Analyzed in Detail

3.3.1 Socioeconomics and Environmental Justice

This section describes the affected environment and environmental consequences relating to socioeconomics and environmental justice. Environmental justice issues are mandated and regulated primarily at the Federal level. Most of the information on socioeconomics identified in the 2003 DEIS-EIR has not changed, and is incorporated into this DSEIS by reference. Changes in socioeconomic conditions pertinent to the current proposed alternative are discussed below.

Affected Environment

Executive Order (EO) 12898, Environmental Justice, was issued in 1994. Environmental justice is defined as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies". Fair treatment means that no racial, ethnic, or socioeconomic group should bear a disproportionate share of adverse effects as a result of the execution of Federal, State, local and tribal environmental programs and policies (FEMA, 2015). A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population.

The first step in conducting an environmental justice analysis is to determine the presence of minority and low-income populations. The second step requires that the Federal agency determine if the Federal action would result in disproportionately high or adverse health or environmental effects. The Council of Environmental Quality (CEQ) guidance indicates that when determining whether the effects are high and adverse, agencies are to consider whether the risks or rates of impact "are significant (as employed by NEPA) or above generally accepted norms". The environmental justice analysis is based on a review of relevant demographic data to define the relative proportion of minority and low-income populations in the City of Woodland and surrounding areas to determine whether the Lower Cache Creek flood risk management project would result in environmental justice effects on the relevant populations.

Low income is considered 200 percent of the federal poverty level. In 2018, the weighted average poverty threshold for a family of two was $16,247, for a family of three, $19,985, and a family of four was $25,701. The poverty threshold is dependent upon the size of the family unit and the number of related children under 18 years of age. A one person unit poverty level is $12,784 and the maximum nine or more until family poverty threshold is $51,393(US Census 2019). United States Census Bureau defines a "poverty area" as a Census tract with 20 percent

or more of its residents below the poverty threshold, and an “extreme poverty area” as one with 40 percent or more below the poverty level.

Yolo County

The project area is located in Yolo County, a primarily rural and sparsely populated area. The largest urban center in the county is the City of Davis. The estimated racial demographics are detailed in Table 3-3 below:

Table 3-3. Racial Demographics in the Project Area by percentage (U.S. Census, 2018).

Race	City of Woodland	Yolo County	California State
American Indian, Alaska Native	1.3	1.8	1.6
Asian	8.1	15	15.3
Black, African American	1.7	3	6.5
Hispanic, Latino	48.3	31.9	39.3
Native Hawaiian, Pacific Islander	0.3	0.6	0.5
White, not Hispanic or Latino	39.3	46.3	36.8
White	70.0	74.2	72.1
Two or more races	4.1	5.4	3.9

In 2017, the median household income in Yolo County was $61,621, which is below the state’s median household income of $67,169 (U.S Census, 2017). The poverty level was 17.5%.There are currently no designated affordable housing units within the project area. The City of Woodland is proposing to develop some low income units and housing for homeless populations at the corner of County Road 102 and East Beamer Street, which is adjacent to the proposed project area.

Agriculture is an important source of employment and tax revenue for Yolo County. Agriculture employs two types of workers: migrant workers, who travel in for seasonal work, and permanent workers, who live in the area and work year-round. Together, these workers farm close to 540,000 acres of land within Yolo County (CDOC, 2016). The gross value of Yolo County’s agricultural production for 2017 was $635,246,000. This represents a decrease of $27,146,000 (4.1 percent) below 2016’s value of $662,392,000 (Yolo County Department of Agriculture, 2017). The majority of this decline is due to continued severe drought conditions coupled with overall lower commodity prices. Almonds have taken the number one spot with gross sales of $115,020,000. Tomatoes have moved to second place in the commodity list with a gross value of $86,800,000. Almonds, tomatoes, wine grapes, organic production, and walnuts are the top five commodities according to gross value. Rice, sunflower seed, alfalfa hay, nursery products, and cattle round out the top ten commodities for 2017 (Yolo County, 2017).

The county population is expected to grow at a rate higher than that of the state (U.S. Census, 2018), primarily due to the influx of people who work in Sacramento and the Bay Area. Since the counties are attempting to preserve agricultural land, future development is planned adjacent to existing urban areas. County plans include additional housing, schools, water systems, and other public facilities. This future growth would occur with or without a federally sponsored flood risk management project.

Woodland

The City of Woodland is the largest incorporated community within the study area. On average, the city is experiencing a 1% growth rate annually. The estimated population in 2010 was 55,468. In 2014, it was 57,354. In 2018, it was estimated to grow to 60,531, an increase of nearly 5,000 over the last 8 years (U.S. Census, 2018). The median household income in 2017 in the City of Woodland was $60,446. The poverty level was 13%.

Originating as an agricultural support community, Woodland remains surrounded by agricultural lands. As part of its current development planning, Woodland has directed separation of its residential development from existing and planned industrial development. Land use designations from the General Plan show most industrial development planned for the northeastern parts of the city, which are also within the FEMA 1 in 100 chance floodplain. Residential areas lie primarily in the west of downtown, with current developments to the south. There were an estimated 21,031 housing units of all types in Woodland as of 2017: 13,138 single-family homes, 7,108 multiple family homes, and 776 mobile homes (U.S. Census, 2017).

The police department and fire department within the City of Woodland are both located on the corner of Lincoln Avenue and Fifth Street. Woodland Memorial Hospital, the only hospital in Woodland, is located on Cottonwood Street near West Gibson Road. There are approximately 40 public facilities that lie within the most recent 2012 FEMA 1 in 100 chance flood plain. Included in this count are health facilities, schools (5 of the 20 are located within Woodland), a recycling center, community swim center, and firehouse (FEMA, 2012).

Environmental Consequences

This section evaluates the effects of the plan on the socioeconomic and environmental justice conditions in the project area. The discussion includes effects on population, housing, employment, economic conditions, minorities and low-income populations.

Methodology

This evaluation of environmental justice, socioeconomic, and community effects is based on professional standards and information cited throughout the section. NEPA requires that social and economic effects be considered if they are related to effects on the natural or physical environment, and the NEPA definition of effects includes social and economic factors (40 CFR 1508.8, 1508.14). The key effects were identified and evaluated based on the environmental characteristics of the LCP project area and the magnitude, intensity, and duration of activities related to the construction and operation of this project.

Significance Criteria

An effect would be considered significant if it would:

- Displace existing housing, especially affordable housing, without providing appropriate compensation and/or relocation assistance;
- Impede the economic development of the City of Woodland;
- Result in an inconsistency with the residential, commercial, industrial, and agricultural developments as outlined by the city and county General Plans;
- Cause changes in the ways members of the surrounding community live, work, relate to one another, or otherwise function as members of society; and

- Cause substantial environmental, human health, or economic effects on minority and low-income populations.

No Action Alternative

Proposed outcomes for the No Action Alternative have not changed since the 2003 DEIS-EIR. Refer to section 4.2.1 of the 2003 DEIS-EIR for relevant information.

Under the No Action Alternative, the LCP would not be constructed and therefore there would be no construction-related effects to Socioeconomics and Environmental Justice in the project area. However, the City of Woodland would be at risk of levee overtopping and flooding from Lower Cache Creek. Levee overtopping and resulting flooding in the City of Woodland could temporarily or permanently displace residents over a wide area. Flood depth calculations show that low-income or minority neighborhoods would not be disproportionately affected by flood inundation. Flooding could also result in temporary or long-term decreases in agricultural, industrial, and other economic enterprise in Woodland that could result in a loss of jobs.

Flood waters could release contaminants into the public water supply system. Flood events could cause breaks in water mains and pipes contaminating the entire city's water supply. Time required to make emergency repairs to flood damaged infrastructure would affect all residents, including those not directly flooded. Restoration of clean drinking water would take a significant amount to time, up to several months. The likelihood of significant mold production is high after a flood event. Mold threatens the integrity of structures, but also is a health risk for people exposed. Symptoms of mold exposure include lung infections, skin irritations, and other health dangers especially for children, elderly, and people with asthma, allergies, or suppressed immune systems.

Under the No Action Alternative, regular O&M of the levee system would continue as presently executed by the local maintaining entities. Such activities include hand and mechanical (mower) removal of weeds, spraying of weeds with approved pesticides, minimal tree or shrub trimming all up to four times a year, monthly control of burrowing rodent activity by baiting with pesticide, and reconditioning of levee slope and road with a bull dozer as needed. Normal O&M activities would short-term and small scale; therefore, impacts to socioeconomics from continued O&M activities would be less than significant.

Levee and Conveyance Plan

Socioeconomics

The proposed LCP would physically define the existing urban limit line, consistent with City and County General Plans. Residents south of the new levee would receive flood risk reduction of the basic public services including schools, medical facilities, fire protection services, and shopping. These residents and business owners are located in Economic Impact Area S8 and S9, shown in Figure 3-5. Approximately 283 acres of agricultural land north of the new levee would be permanently converted to the flood risk management project. The levee alignment would be geographically located to prevent the indirect loss of farmland, which could occur if agriculture real estate parcels are segmented. The depth and duration of flooding resulting from project implementation is not expected to result in property degradation, as it would hardly exceed existing conditions. During a large flood event (e.g. 1% AEP event) duration of flooding west of SR 113, near I-5 would be shorter than existing conditions, lasting only several days. The

implementation of the mitigation measures listed below would reduce this potentially significant effect to less than significant.

The new levee would result in localized areas of slight increases in flood depth north of the LCP levee and only impact approximately eight structures. An additional 14 structures north of the City would remain in the floodplain, but would not experience a change in depth or duration of flooding. One structure would experience increase in depth by up to 2 feet. The other seven structures would experiences increase of depth by up to 1 foot. As all of these structures would be flooded under existing conditions without the LCP, an increase of 1-2 foot flood depth is not considered a significant impact.

Approximately 2,700 acres would experience changes in flood depth and duration resulting from the LCP. All acreages would have experienced flooding under existing conditions without the proposed LCP. However resulting from the LCP, of those 2,700 acres, 450 acres primarily west of SR 113, would have a decrease in flood depth and duration. About half of the 2,250 acres would have an increase in flooding of up to 4 feet, and the other half (1,200 acres) would have an increase of up to 6 feet. The detention basin would experience flooding greater than 6 feet.

The induced flooding resulting from the LCP would not have significant impacts on land use and therefore there would be no impacts on the socioeconomics of Woodland or to the agricultural/industrial area to the north. The induced flooding would not cause structural damage beyond anticipated damage during a flood event without the LCP.

If the LCP were constructed, the City of Woodland would more easily be able to complete its General Plan goals to develop north up to the urban limit line. Development would include the land in the eastern part of the city zoned for industrial use but is currently vacant. These new businesses could bring increased revenue for the city and the county. The project would eliminate, or at least decrease, the need for flood insurance for residents and businesses south of the new project. The LCP would not increase future population growth and need for housing beyond what has already been projected and planned by the City of Woodland.

No businesses would be displaced by the project construction north or south of the new levee; however, businesses along Churchill Downs Road may be temporarily impacted. Disturbances could reduce business revenue by obstructing, or slowing customers; mitigation measures would be implemented to reduce these effects. Increased noise levels during construction may disturb customers and business owners.

The value of the land in the vicinity of the settling basin, totaling about 1,800 acres, would remain consistent over time. The implementation of the LCP would not change the current floodplain or floodway. Unincorporated lands north of the City and new levee would remain in the FEMA 1 in 100 floodplain. After the construction of the LCP, land values should remain constant as lands north of the city limit line would still be subject to flooding.

The LCP would convert 283 acres of farmland, directly and indirectly, for flood risk management purposes. This direct conversion resulting in farmland being taken out of production could result in slight county revenue declines. However, the overall percentage of farmland removed from production, as compared to the remainder of farmland in Yolo County, is extremely small, less than one tenth of one percent. Additionally, the loss of acreage to each individual farm would be minimized. Due to the intentional location of the LCP along major roads preventing intersection of large farmland parcels. Additionally, staging areas have been selected to border

roads for convenience of access for construction vehicles. Consequently, most landowners would have a reduction in acreages temporarily lost during construction. Real estate required for the LCP would be compensated at fair market value. Some of the loss of farmland is temporary due to staging areas and access roads, and has the potential to return to production after the project. Implementation of the mitigation measures listed below would reduce this potentially significant effect to less than significant.

Construction of the LCP could include removal, modification, and/or protection of existing gas, water, sewer, power, and communication lines. Disruptions would be temporary, lasting approximately 4 hours, during these routine activities. With the mitigation measures described below, the proposed project would cause a less-than-significant effect on social and economic resources.

Environmental Justice

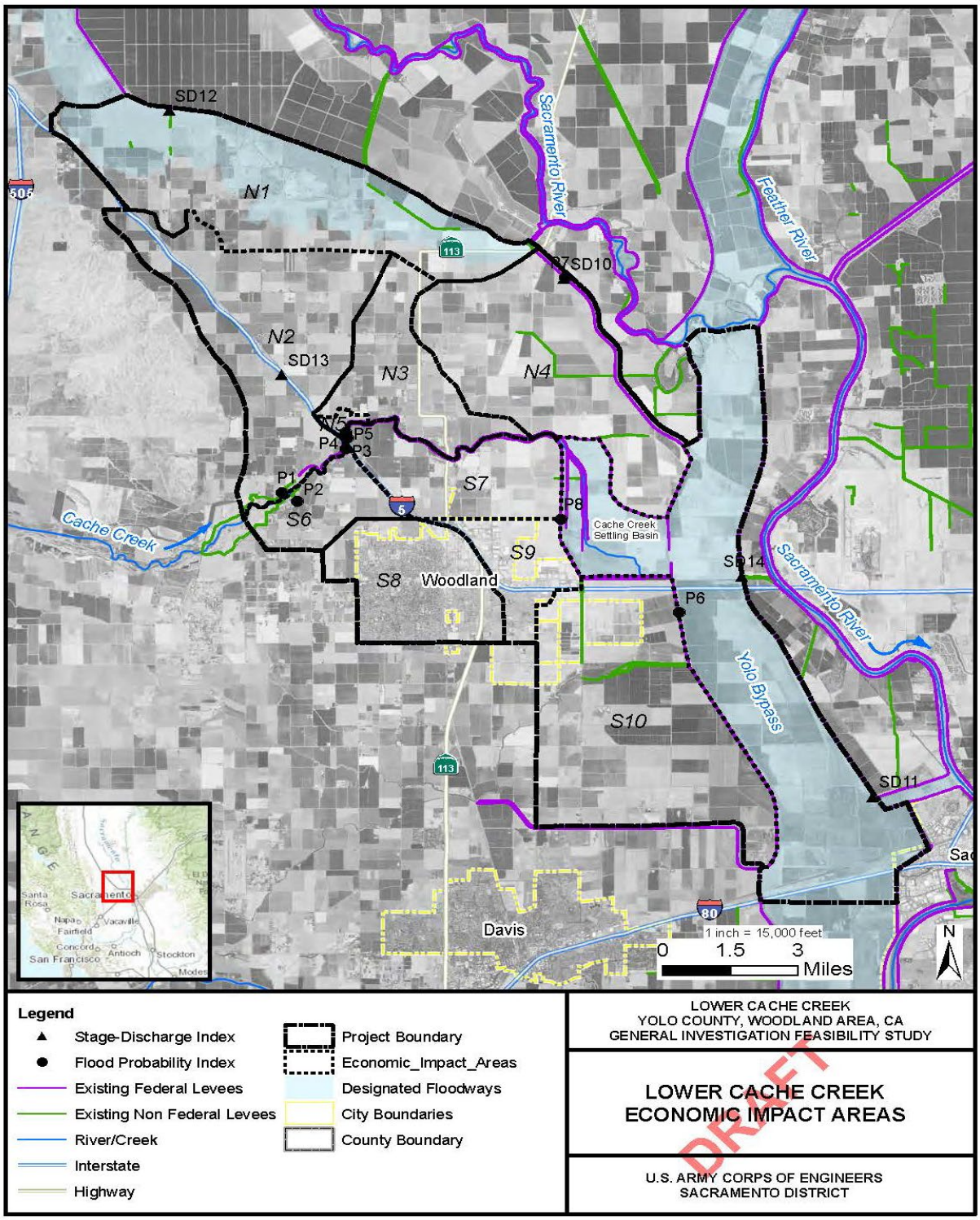
Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The following analysis is based on Environmental Justice, Guidance under the National Environmental Policy Act, prepared by the Council of Environmental Quality (CEQ) and the Executive Office of the President (CEQ 1997a). Executive Order 12898 established the responsibility of each Federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations."

Table 3-4. Minority and Poverty Status Comparison (U.S. Census 2017-2018)

	City of Woodland	Yolo County	State of California
Percentage of the Population with Minority Status 2018	63.8	57.7	67.1
Percentage of the Population with Hispanic or Latino	48.3	31.9	39.3
Percentage of the Population with Poverty Status 2017	13	17.5	13.3

Census data is only available for cities and towns with a population of 5,000 or more. Surrounding towns like Yolo and Knights Landing do not have census data to compare poverty and minority status.

Figure 3-5. Economic Impact Areas in the study area.



Thirteen percent of the population in Woodland are at or below the poverty status, which is only 0.3% below the poverty status for the state of California. Woodland experiences less poverty than Yolo County, as a whole (Table 3-2). For these reasons there are no environmental justice effects to the study area based upon income. The implementation of the LCP Plan would benefit the majority of the urban population, whose residents are typically wealthier than residents in rural agricultural areas. There are 22 structures in the floodplain to the north of the city limit line within the 100 AEP event floodplain. Based upon the small quantity of structures remaining in the floodplain versus those that would be protected by the proposed project, there is no disproportionate high or adverse EJ impacts.

In 2018, 48.3 percent of Woodland residents were Hispanic or Latino (U.S. Census, 2018). This is largely due in part to the large agricultural economy in the area. Since the amount of farmland removed from permanent production is low, a decrease in migrant seasonal labor would not be expected. Without a labor decrease or risk of unemployment, there would not be significant economic effects to minority populations. It is not anticipated that there would be a higher Hispanic or Latino population living in the agricultural/industrial area impacted by the LCP, as there are few structures in the area of induced flooding and near the anticipated construction footprint. Non-minority and minority status residents of Woodland are anticipated to minor impacts related to the LCP which would be minimized by the mitigation measures below.

Mitigation

Residential, commercial, industrial, and agricultural development would continue according to the City and County General Plans. Agricultural land with diminished value due to potential for project-induced flooding would be compensated through easement fees or direct purchase to the extent required by law. Real estate required for project implementation would be purchased at full value.

Real estate compensation for the loss of agricultural/industrial land in the project footprint would ensure that minority and low-income populations would get fair and equal treatment. The City of Woodland has lower percentages of populations of minority and poverty status people than the county and state. Due to careful project design and location selection, the loss of acreage to each individual farm would be minimized due to the LCP being placed along major roads preventing intersection of large farmland parcels. Most of the land parcels in the area are large and the project footprint hardly detracts from them. Staging areas would be selected to border roads for convenience of access for construction vehicles which also reduces real estate take. Full market value compensation would prevent farmers from losing profitable lands in production. These mitigation measures would help replace revenue lost and keep lands in production, preventing lost work days for both landowners and migrant farm workers.

To prevent a reduction of business along Churchill Downs and reduce environmental injustices to residents living near LCP construction, several measures would be implemented:

- Construction vehicles would use easements to the north of the road as much as possible when hauling materials.
- Flaggers would be stationed to slow approaching vehicles and redirect them as needed to avoid construction equipment.
- Construction equipment would be outfitted and maintained with noise-reduction devices such as mufflers to minimize construction noise. Use of noise-reduction devices would reduce noise by an average of 5 to 10 dBA at 50 feet.

- Wherever possible, noise-generating construction equipment would be shielded by the use of buffers such as structures or truck trailers.
- Construction would be limited to the hours established as part of the City of Woodland's Construction Noise Guidelines to the extent practicable to minimize noise effects on nearby residents, workers, and the general public during noise-sensitive periods.

Mitigation measures would be implemented to reduce impacts to residents during any potential utility relocations or temporary losses of service.

- Before starting construction, coordinate with utility providers in the area to locate existing lines and ensure appropriate clearance requirements are met.
- Avoid the relocation of utilities when possible and coordinate with utility companies and the California Public Utilities Commission, as needed, to ensure that any relocation plans for electric transmission facilities, if required by the project, are properly developed and approved. Provide notification of potential interruptions in services to the appropriate agencies and local landowners.
- Before starting construction, verify utility locations through field surveys and Underground Service Alerts. Clearly mark any buried utility lines in the area of construction before any earthmoving activity.
- Before starting construction, prepare a response plan to address potential accidental damage to a utility line. The plan should identify chain-of-command rules for notifying authorities and appropriate actions and responsibilities to ensure the safety of the public and the workers.
- Minimize service interruptions during any utility replacement or relocation activities.

3.3.2 Land Use and Agriculture

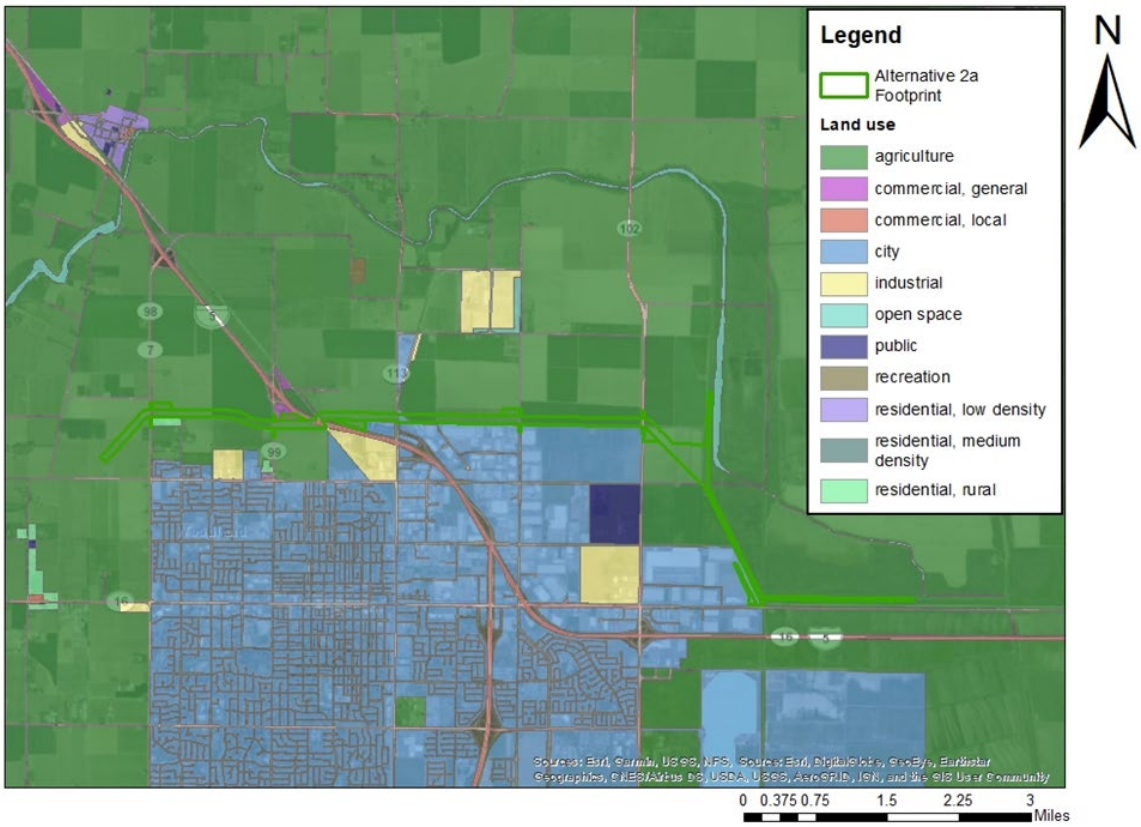
Most of the land use and agricultural conditions in the vicinity of the project area discussed in the 2003 DEIS-EIR has not changed, and is incorporated into this DSEIS by reference. Changes in land use pertinent to the current proposed alternative are discussed below.

Affected Environment

Agriculture comprises a majority of Yolo County land use. According to the 2017 Census of Agriculture, approximately 460,000 acres of land were in farms. Agriculture is the predominant land use, comprising over 70 percent of the total project area. Other land uses include urban and industrial, commercial, and residential (Figure 3-6). As of 2017, leading crops include almonds, walnuts, tomatoes, wine grapes, and organic production (Yolo County 2018).

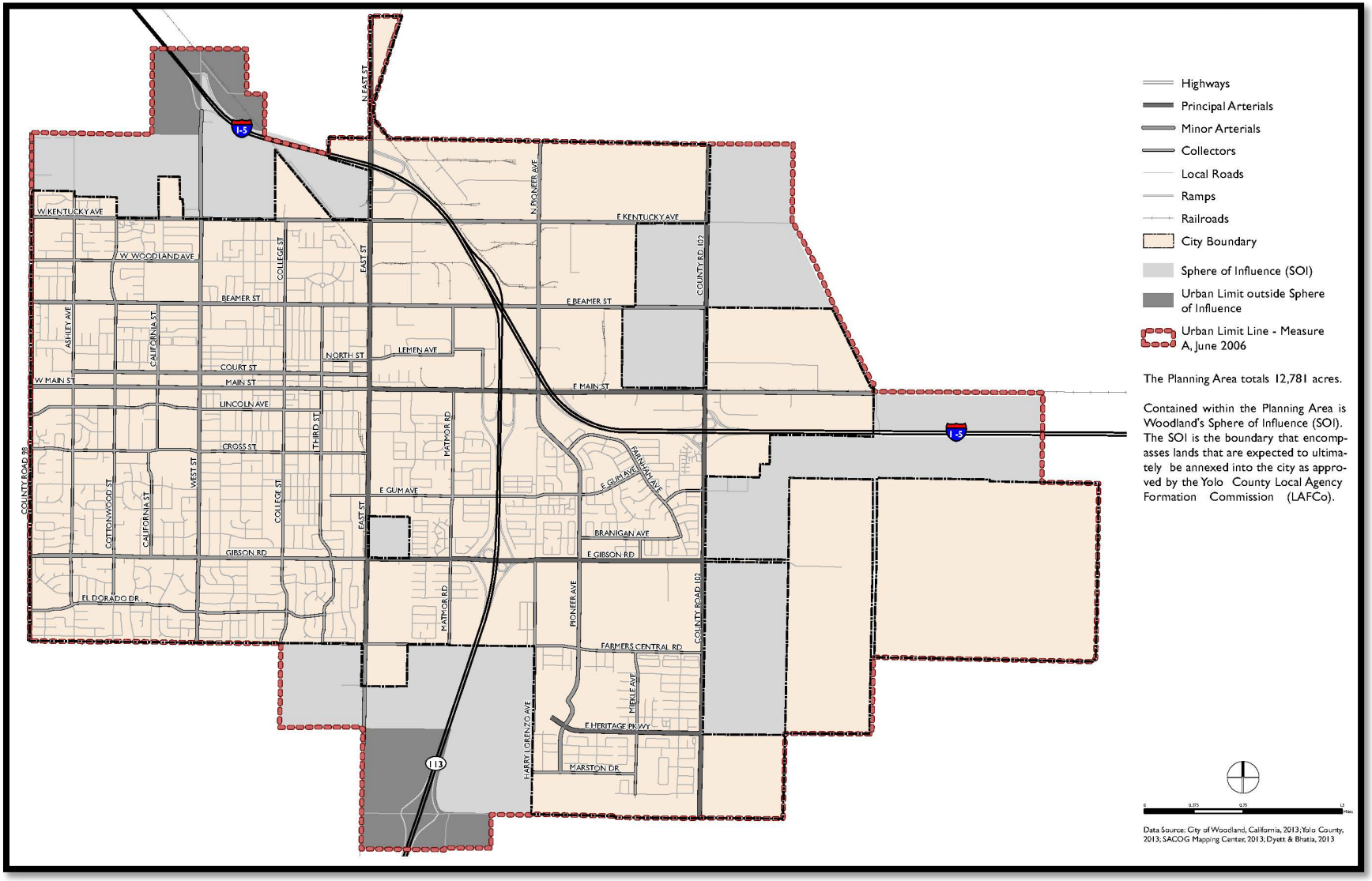
Land use south of the study area includes the city of Woodland and related residential, commercial, and industrial buildings and appropriate streets and roadways. Industrial land use is heavily concentrated near the northern Woodland city limits. Land use to the north of Cache Creek includes the unincorporated town of Yolo and a mixture of agricultural croplands, orchards, and individual residences. There is minimal development along Cache Creek.

Figure 3-6. Land Use in the Lower Cache Creek Study Area (Yolo County 2019)



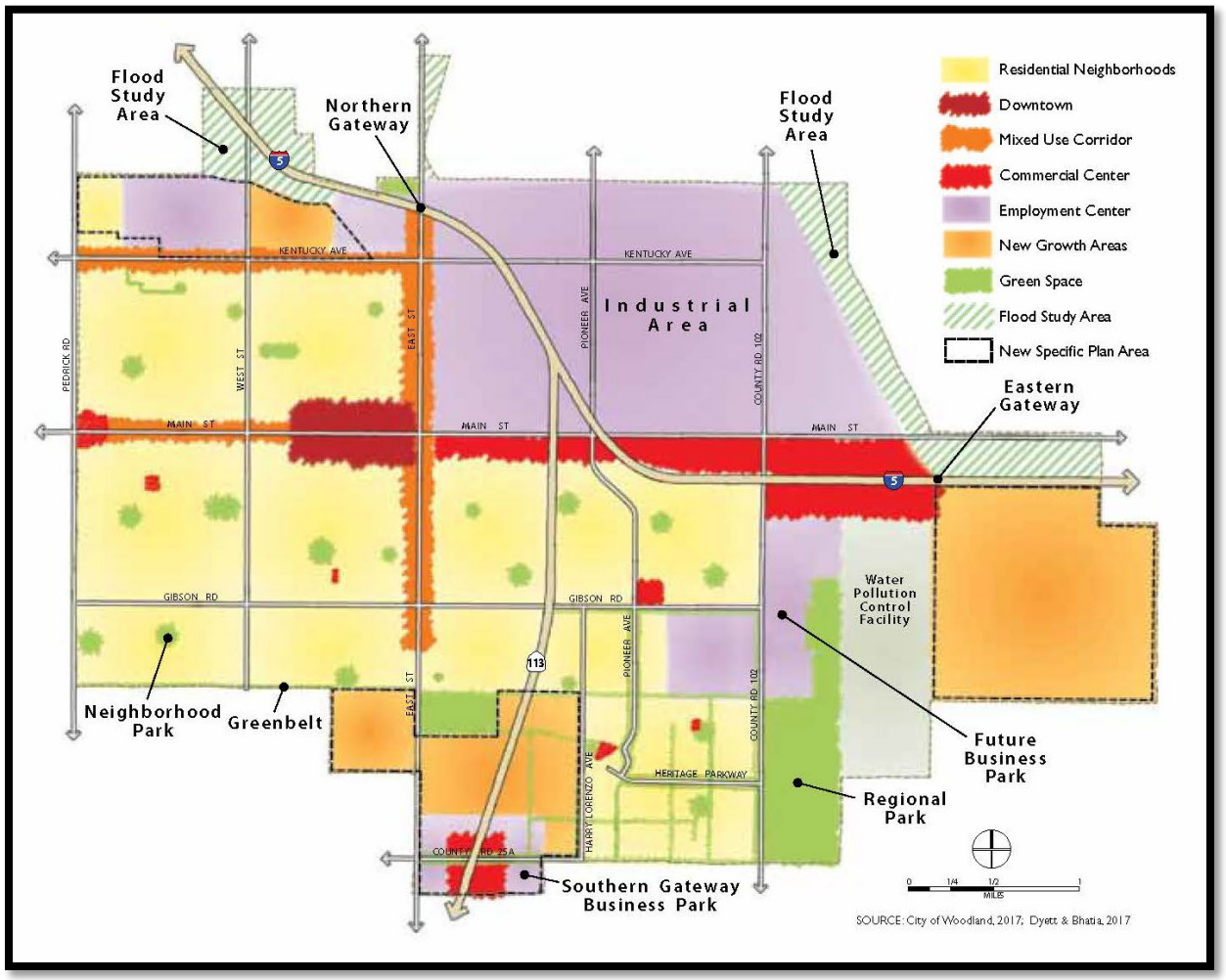
Prior to designation of the City of Woodland within the FEMA 1 in 100 chance flood plain, it was predicted that the eastern area of Woodland would continue to develop for industrial use and the area to the south for industrial and residential use. Growth would provide increased economic opportunities and generate a substantial need for new housing, additional water supply, increased sewage capacity, new schools, and other public infrastructure and services. The City of Woodland continues to facilitate the retention, expansion, and development of private businesses and industries. As of 2007, over 3,000 acres in Woodland are used for commercial and industrial purposes. The City of Woodland General Plan identifies an Urban Limit Line that encompasses all land to be considered for urban development within the timeframe of the General Plan; public services and facilities are not to extend beyond this permanent Urban Limit Line Figure 3-5 (City of Woodland 2017).

Figure 3-7. Urban city limits of Woodland (City of Woodland 2017)



In order to accomplish the vision laid out in the General Plan for long-term physical and economic development and community enhancement, the City of Woodland establishes a set of land use goals in its most recent General Plan, many of which are similar to previous land use goals described in the 2003 DEIS-EIR. Additional goals in the 2017 General Plan address promoting sustainable development and supporting efforts to reduce GHG emissions (Goal 2.C), fostering a cohesive, healthy community through active living, neighborhood interaction and the creation of balanced, sustainable new neighborhoods (Goals 2.E, 2.L, 2.M), promoting community design that enhances Woodland's unique historic, environmental, and architectural context and preserving sites that serve as reminders of the City's social, architectural, and agricultural history while promoting community awareness and appreciation of such history (Goals 2.F, 2.O, 2.P, 2.Q), and creating a connected system of parks and open space (Goal 2.N) (City of Woodland 2017).

Figure 3-8. Concept diagram of future expected land use boundaries (City of Woodland, 2017). The figure includes flood study areas which aligns with the land use in the LCP.



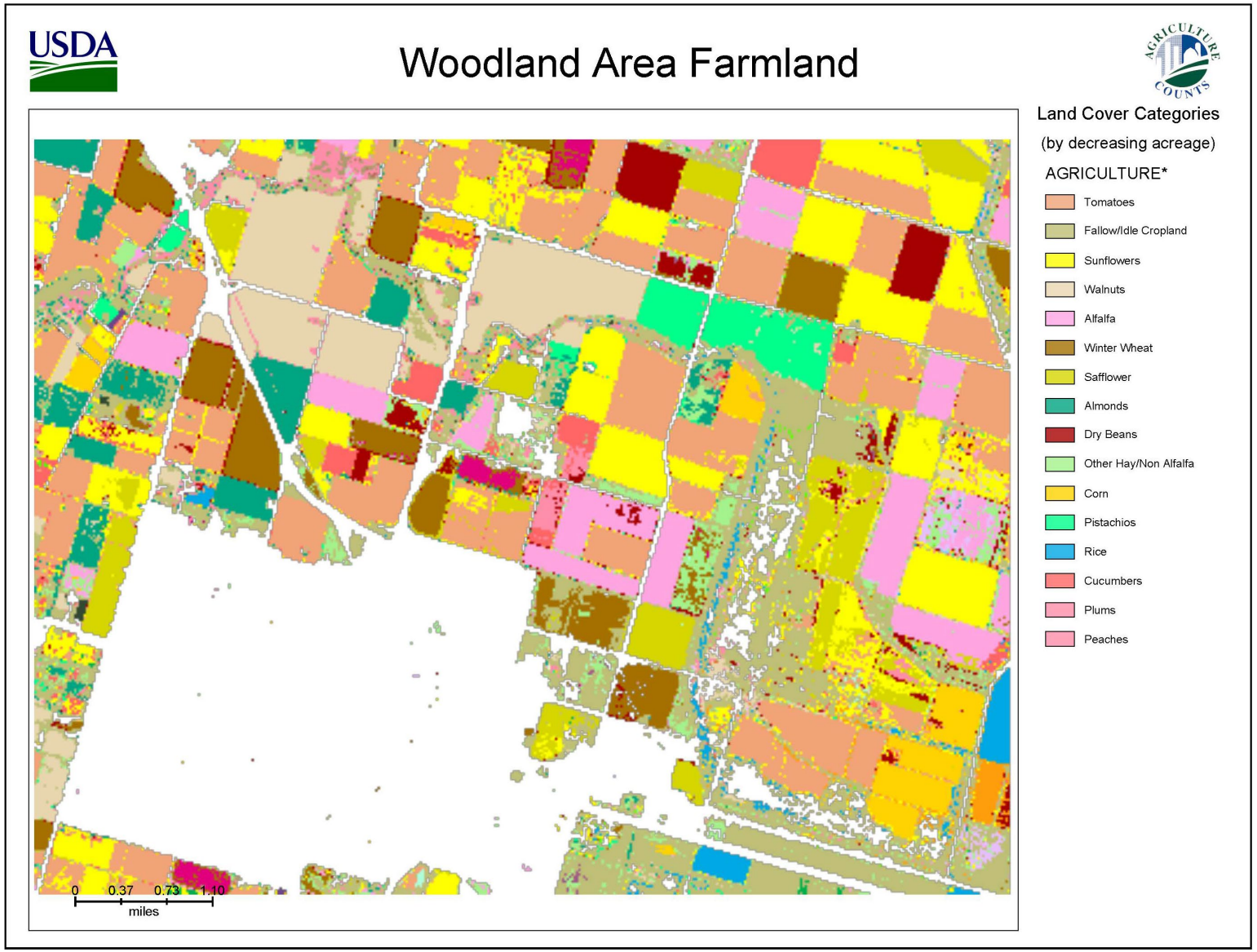
Yolo County highly values its agricultural and rural lands and places a strong focus on protecting the agricultural and open spaces, as evidenced by the multiple goals and policies within its general plan that address the issue. Goals LU-2 and CC-1 address the preservation of agricultural and rural character, and include policies such as LU-2.4, which aims to "vigorously conserve, preserve, and enhance the productivity of the agricultural lands" (County of Yolo 2009). The City of Woodland General Plan also "recognizes the importance of agriculture-related business and industries to the City and region, and supports the continuation and development of agriculture" in Woodland and the surrounding area (City of Woodland 2017).

Both General Plans also include numerous goals and policies relating to flood hazard control: Policy 4.C.11 – Continue to work with Army Corps of Engineers and responsible state and regional agencies to identify and implement a comprehensive flood solution to reduce risk of flooding in Woodland, especially in the northeast industrial quadrant and eastern portion of the city (City of Woodland 2017). Policy 8.B.9 – Actively engage with State and Federal agencies to develop and implement flood protection for Woodland from both Lower Cache Creek and the Yolo Bypass West Levee (City of Woodland 2017). Goal HS-2 – Protect the public and reduce damage to property from flood hazards (County of Yolo 2009).

Yolo County also outlines goals for land use policy. Again, many are similar to those listed in the 2003 DEIS-EIR and emphasize the importance of preserving the County's agricultural setting. Goals incorporated in the most recent version of the General Plan address ensuring inclusion and fair, equitable outcomes in local and regional land use decisions; protecting, enhancing, and redeveloping existing communities and ensuring that new growth addresses the challenges and opportunities unique to each community; and requiring project design that reflects the County's commitment to sustainable development (County of Yolo 2009).

In Yolo County, 81 percent of land is agricultural, and nearly 70 percent of that land is designated as Prime, Unique, or Locally or Statewide Important Farmland (CDOC 2016). These lands are generally located in the eastern half of the county (Figure 3-9). Within the project area, there is prime farmland and farmland of statewide importance. These farmlands can be found entirely surrounding the city of Woodland extending west to the Woodland Municipal Airfield and east, north, and south to the county line. In order to continue to preserve this valuable agricultural land, Yolo County has incorporated into its General Plan growth boundaries for every community and each of the four cities, which protect existing agricultural operations from impacts related to urban expansion.

Figure 3-9. Farmland in the greater Woodland area. The white area mostly represents traffic corridors and urban areas.



Environmental Consequences

This section evaluates the consistency of the LCP with the types and intensities of existing and planned land uses in the project area, and project-related effects on prime and unique farmland. Planned land uses are identified by the Yolo County and City of Woodland General Plans, and prime and unique farmland data are obtained from the California Department of Conservation.

Methodology

Effects on land use and agriculture were evaluated based on field observations and a review of the regulatory setting and the project local land use plans were reviewed to determine the effects to land use if the project were to be constructed. Each alternative was evaluated based on land use designations within the project area. This section also describes any changes to existing land use that would result if the project were to be implemented. This section evaluates the consistency of the project alternatives with local land use plans and policies as well as compliance with Federal regulations. Local land use plans include Yolo County General Plan and zoning code, Yolo County General Plan and zoning codes, and City of Woodland General Plan.

Basis of Significance

The thresholds of significance encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and intensity. NEPA requires consideration of possible conflicts between the proposed action and the objectives of Federal, regional, State, and local land use plans, policies, and controls for the study area.

For the purposes of this analysis, effects on land use and agriculture are considered significant if implementation of the proposed project would:

- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect;
- Conflict with any applicable habitat conservation plan or natural community conservation plan.
- Physically divide an established community.
- Convert a significant amount of prime farmland, unique farmland, or farmland of statewide importance to nonagricultural uses.

The project would be considered to have a significant effect on important farmland (i.e., prime farmland, unique farmland, farmland of statewide importance) if it would result in an irretrievable conversion of such land. An irretrievable conversion is one that involves the conversion of land to uses that would cause serious degradation of the quality of soils and/or result in expenditures of substantial development costs that likely would preclude the practicality of future conversion back to agriculture. A farmland conversion form from the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) has been filled out for this project and is included in Appendix D. There are no lands within the project area that are a part of a habitat conservation plan or natural community conservation. Therefore, the proposed project would not conflict with any applicable habitat conservation plan or natural community conservation plan, and this criterion is not being carried forward.

No Action Alternative

Under the No Action Alternative, the levee improvement project would not be constructed, therefore, there would be no construction-related effects to land use or agriculture in the project area, however, existing problems would continue along the levees encompassed within the Woodland study area which could potentially lead to a future flood event or levee failure. Current levels of levee protection and maintenance would continue. There would be no intentional conversion of important farmland, or other agricultural land to an incompatible use. Therefore, there would be no direct or indirect effects on land use or agriculture attributable to the No Action Alternative.

The risk of levee overtopping would continue under the No Action Alternative. A flood event could have severe ramifications for agriculture and land use in the City of Woodland, even south in Davis. Flooding may cause inundation, erosion or sedimentation from high flows, destruction or damage to agricultural equipment, outbuildings and processing facilities, all of which could lead to reduction in agricultural productivity. This damage may cause depression of the agricultural economy and cause abandonment of or prolonged delay in cultivation of productive lands, which could ultimately result in a change in the use of these lands that may be difficult to reverse.

Similarly, levee failure could significantly change the land uses in urban areas, both temporarily and permanently, and result in the physical division of established communities. A period of months or years would be required for clean-up and repair after a large flood event, during which time the affected parcels would be temporarily unable to support their designated land uses. Damages sustained by residential, commercial, civic, and industrial areas inundated by flooding could be so great as to render the properties permanently unusable. Additionally, the cost of cleanup and repair after flooding could be too great to make restoring the current land use worthwhile, resulting in permanent changes to land use in Woodland. As a result, the no action alternative would have a significant effect on land use, because it has the potential to permanently affect current land use in ways that are inconsistent with local land use policies.

Regular O&M of the Cache Creek levee system would continue as presently executed by the local maintaining entities (subject to revision of the governing O&M manual). Results of the annual levee inspections of vegetation and erosion would dictate to local maintaining agencies, necessary O&M as weather and climate conditions change.

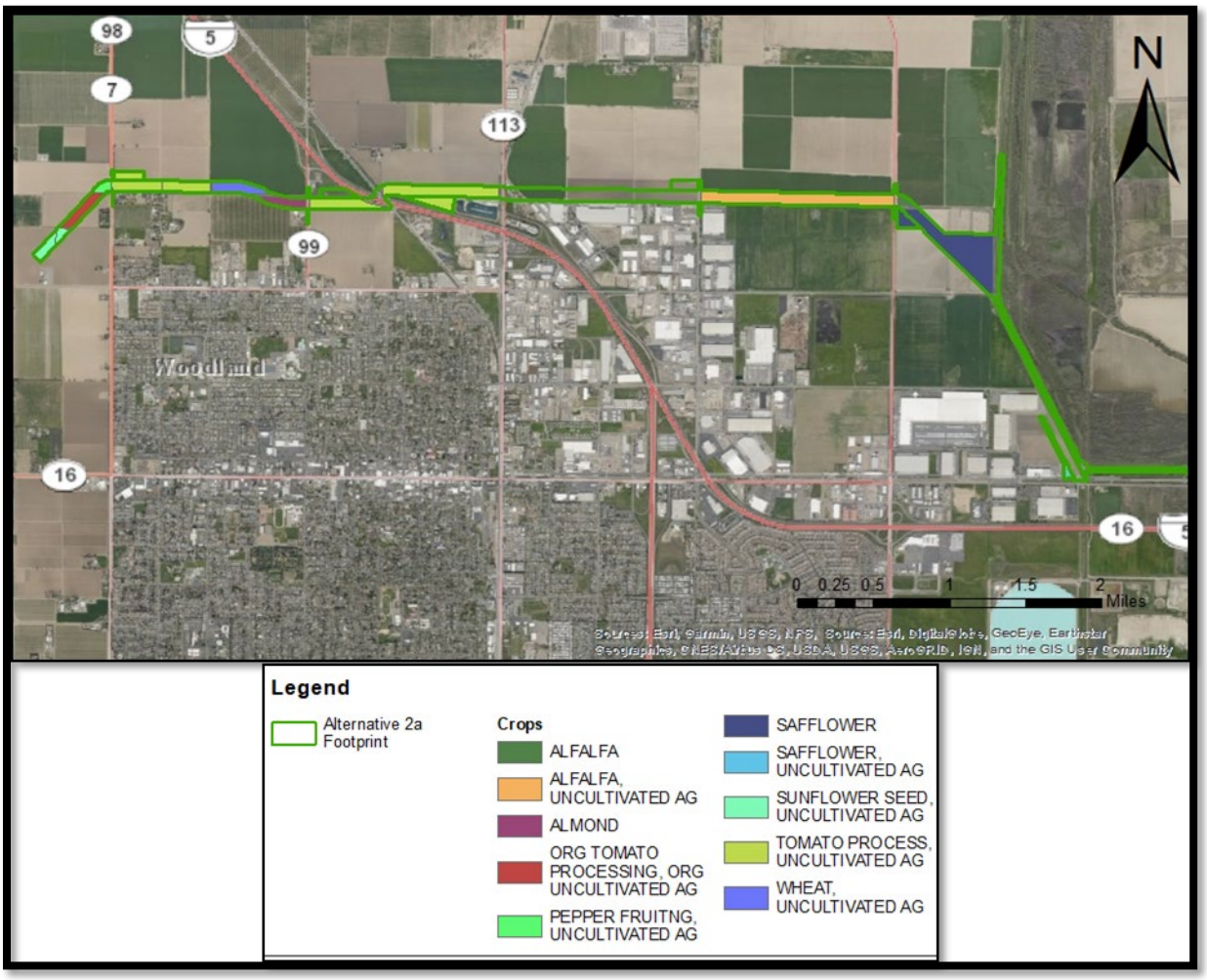
Levee and Conveyance Plan

The proposed levee would generally follow Woodland's Urban Limit Line (City of Woodland 2017). Approximately 283 acres of the 319 acres that would be converted for flood risk management purposes is currently designated for agricultural uses. An additional 21.7 acres of mixed agricultural and low-medium residential land would be converted. The levee footprint covers approximately 144 acres of row crops, 8 acres of almond orchards, and 54 acres of wheat and alfalfa fields (Figure 3-10). Other land uses affected by the project include uncultivated agricultural fields and undeveloped farmland habitat.

The LCP footprint would be placed at the northern extent of the City of Woodland. The lands north of the city are unincorporated parts of Yolo County. For this reason, the proposed project does not physically divide a community. While landowners to the north do access services available in the city proper, because all the county roads will be raised, residents would simply just drive over the new levee to access either side. Due to technological advances in the City of

Woodland's emergency system, all residents at risk of flooding from Lower Cache Creek would be notified and given time to evacuate south towards Sacramento if needed. With the shallow increases in flood depths north of the city, likely most residents would need not evacuate. Most structures are within the 1-2 foot depth increase, and would likely remain at their residence during a flood event, due to the inconveniences associated with emergency evacuation and lack of services at shelters. For these reasons, the proposed levee project would not cause a community division. Differences exist already between the city dwellers and the agricultural/industrial community to the north. Parcel sizes are much larger to the north consisting of agriculture and industrial zones, while most of the city is urban with small lots and businesses.

Figure 3-10. Crops within the LCCFS Footprint (Yolo County 2019)

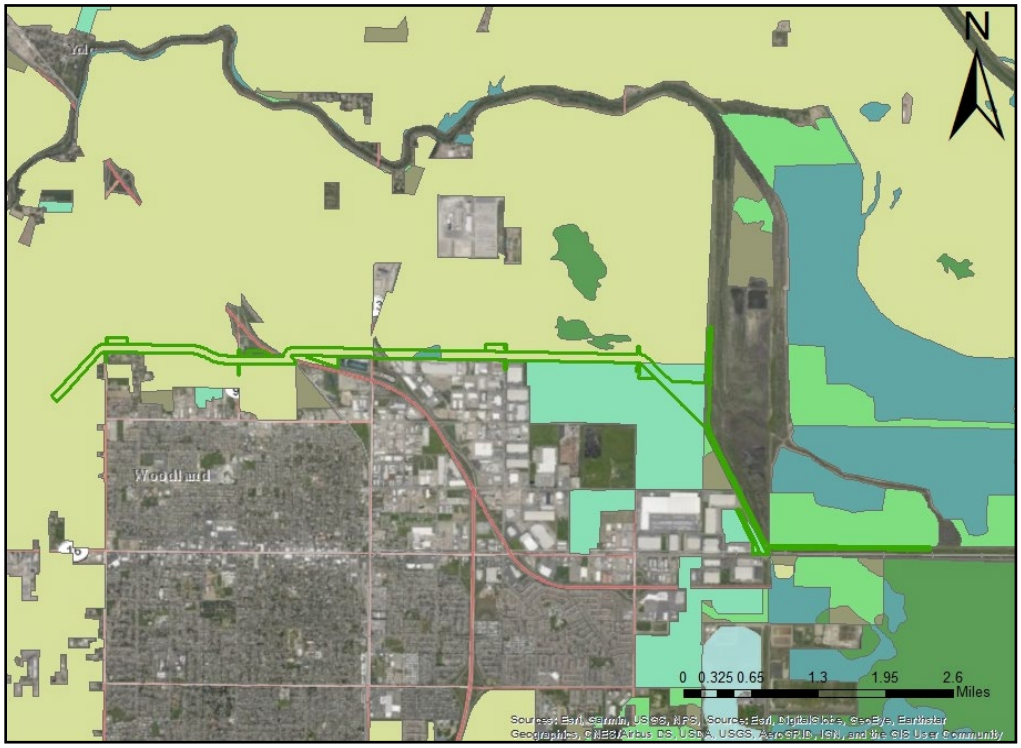


Nearly 75 percent of the farmland to be converted as a result of the implementation of the LCP is designated as Prime or Unique Farmland; the remainder is Farmland of Statewide or Local Importance or grazing land. The proposed levee would result in a direct or indirect conversion of 234.5 acres of Prime or Unique farmland, and 8 acres of Statewide or Locally important farmland. Generally the conversion of Prime, Unique, and Statewide and Locally Important Farmland represents a significant effect.

Projects that are subject to the requirements of the Farmland Protection Policy Act (FPPA) include any projects that may irreversibly convert (directly or indirectly) farmland to nonagricultural use, and are completed by or with the assistance of a Federal agency. If a project falls under this Act, a Farmland Conversion Impact Rating Form supplied by the NRCS must be completed. Information supplied by both the NRCS and the sponsoring federal agency results in a numeric score from which the alternative would be assessed. Higher point totals require additional alternatives to be evaluated.

NRCS has reviewed the proposed project footprint and provided a Farmland Conversion Impact Rating. The Relative Value of Farmland to be converted was scored 64 out of 100 possible points, while the Total Site Assessment scored 79 of 160 points, for a total of 143 of 260 possible points. According to the FPPA sites receiving a total score of less than 160 need not be given further consideration for protection and no additional sites need to be evaluated. The Farmland Conversion Impact Rating is found in Appendix D. It is likely the Farmland Conversion Impact Rating fell below the significance criteria because the LCP was geographically located to keep agricultural parcels intact to the greatest extent practicable and bordered the urban area of Woodland. The impacted parcels were primarily dry-farmed without significant structures for storage, irrigation or animal housing. For these reasons, impacts to Prime and Unique Farmland are deemed minor and less than significant.

Figure 3-11. Prime and Unique Farmland, Farmland of Statewide Important and local importance and potential within the study area.



Although the LCP would cause the conversion of agricultural land, it would do so for the purpose of public safety and flood risk reduction, which remain consistent with multiple goals in both the City's and County's General Plan. However, the proposed levee would create a land use incompatible with the existing land use designation, e.g. farming. However, the percentage of land converted to project features is small relative to the average property size, and consequently would cause negligible impacts to agricultural lands north of the city.

The proposed levee would be constructed along the existing Urban Limit Line. The City of Woodland would no longer have lands within the FEMA 1 in 100 chance floodplain, which is a beneficial effect to landowners. All lands south of the proposed levee would be developed as currently planned by the City of Woodland. These new structures would not be required to pay for federal flood insurance.

Much of the land north of the levee currently is and would continue to be in the FEMA 100 year floodplain. Land use north of the levee would generally remain unchanged and continue to be consistent with the County General Plan. Only would the lands within the proposed project footprint would be directly converted to project features for flood risk management land use.

A potential adverse hydraulic impact would be induced flooding or significant increase in velocities within the system or both. Induced flooding could result from a project increasing the depth, duration, or frequency of flooding. The potential for induced flooding was evaluated by comparing with-project and no action alternative throughout the system.

Highway 113 demarks a significant change in the duration of flooding and any induced flooding. During a large flood event (e.g. 1% AEP event) duration of flooding west of SR 113, near I-5 would be shorter than existing conditions, lasting only several days. East of Highway 113, the duration and depth of flood impacts would increase, with the highest depth increases and longest duration being near the CCSB inlet weir. It is estimated that the duration of flooding west of Highway 113 is less than on 1 week and the duration of flooding at the inlet weir would be around 1 month. A major factor for the duration of flooding near the inlet weir is the availability and capacity of the city pump station that would be used to pump the water into the Yolo Bypass.

The average change in flood depth during a 1% (1/100) AEP event (Figure 3-23) and a 0.5% (1/200) AEP event (Figure 3-28) from existing conditions is very similar. Flood depths near I-5 would increase between 0.1 to 4.0 feet. SR 113 would have a -1.0 to -0.1 foot flood depth allowing traffic to move north-south. Between SR 113 east to CR 101 flood depths generally increase by 0.1 to 1.0 foot. Between CR 101 and CR 102 flood depths increase from 2.0 to 6.0 feet above existing conditions. From CR 102 east to the CCSB inlet weir flood depths are between 4.0 to 6.0 feet. Flood depths increase generally from west to east, as floodwaters gravity spill over the new inlet weir in the CCSB. North-south travel on CR 101 and CR 102 would be prohibited until flood waters receded.

Figure 3-12. Land cover crops in the area of induced flooding for a 1% (1/100) AEP event.

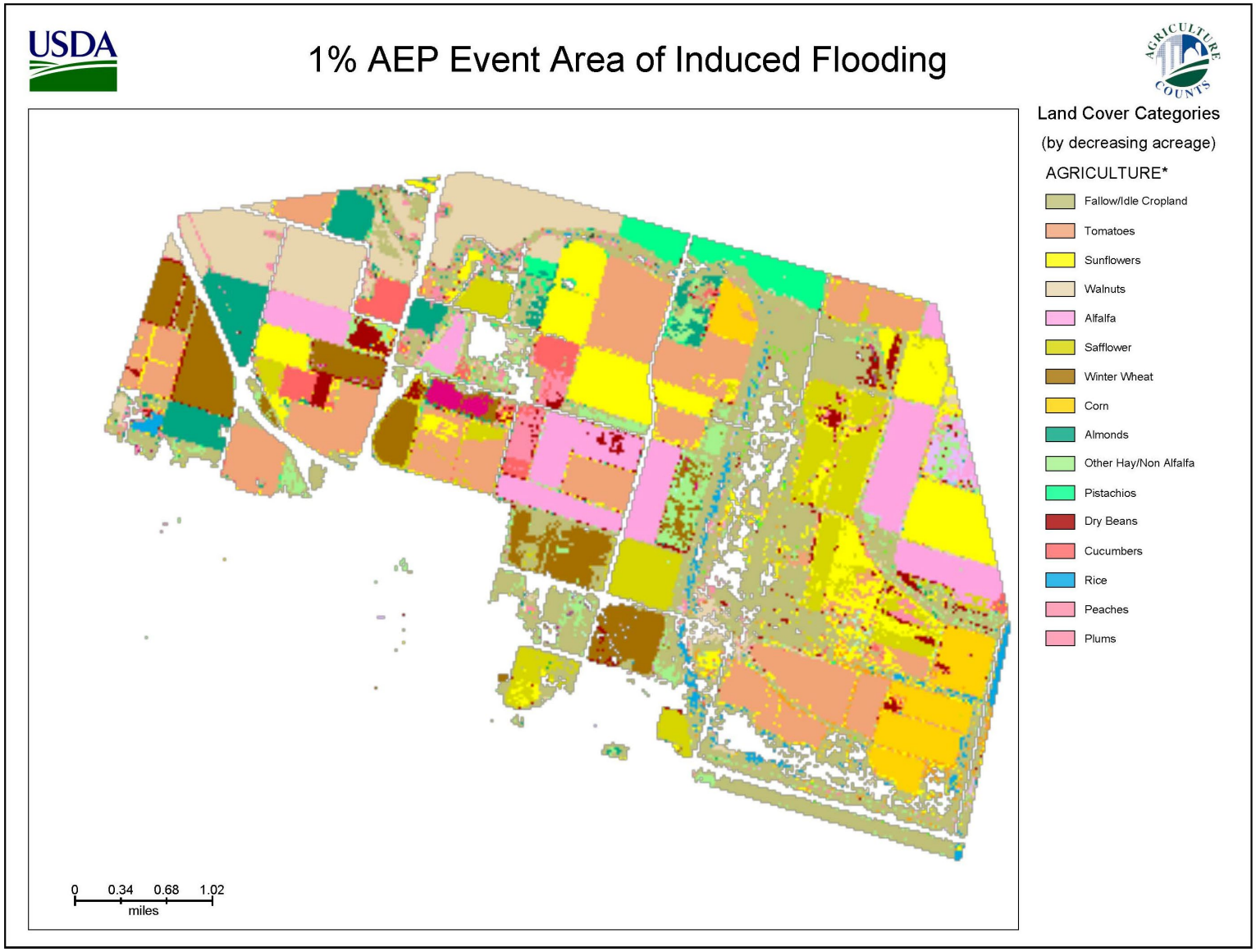
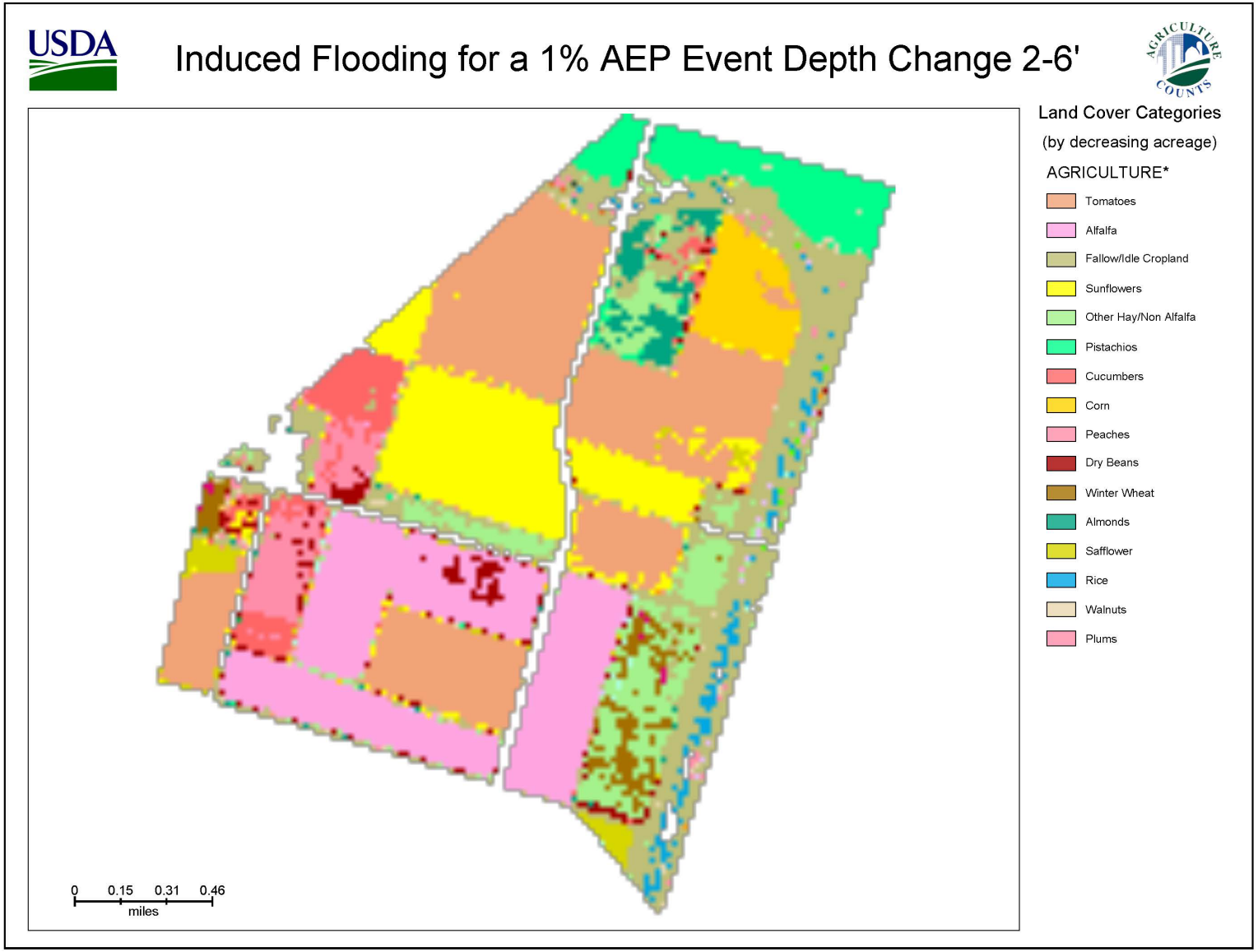


Figure 3-13. Induced flooding during a 1% AEP event with depth changes between 2-6 feet.



As can be seen in the above Figure 3-13, the most abundantly grown crops in the area with induced flooding as a result of the LCP above 2 feet are tomatoes, alfalfa, sunflowers, hay, cucumbers, and corn. There are smaller, scattered areas of dry beans, peaches, winter wheat, and almonds. With the exception of winter wheat, which is planted in fall for summer harvest the following year, all other crops are planted in the spring for summer harvest. Winter wheat accounts for 41.6 acres, approximately 1.9% of the induced flooding area. Flooding in Woodland would occur in winter, resulting from winter rains, therefore, flooding would not impact the majority of the crops.

Table 3-5. Crop abundance within the induced area of flooding.

Crop	Acreage	Percentage
Tomatoes	530.6	24.4%
Alfalfa	358.1	16.5%
Fallow/Idle Cropland	356.7	16.4%
Sunflowers	257.5	11.8%
Other Hay/Non-Alfalfa	145.4	6.7%
Pistachios	115.9	5.3%
Cucumbers	71.8	3.3%
Corn	68.5	3.2%
Peaches	63.8	2.9%
Dry Beans	42.7	2.0%
Winter Wheat	41.6	1.9%
Almonds	40.3	1.9%
Safflower	30.5	1.4%
Rice	27.4	1.3%
Walnuts	14.2	0.7%
Plums	9.1	0.4%
Total	**2174.1**	**100%**

Orchards of almonds and peaches occur in the study. Almonds account for 1.9% of the study area and peaches account for 2.9% of the study area (Table 3-5). As can be seen in Figure 3-12, pistachios are north of Cache Creek and would not be impacted by flooding caused by the LCP. There are about 14.2 acres (0.7%) of walnuts, and 9.1 acres of plums (0.4%) in the induced flooding study area. Orchards account for 6% of the study area. Figure 3-13 shows that orchards and winter wheat make up 7.9% of the study area farmland. Not all of the orchards to the north are impacted. It is approximated that less than 5% of the induced study area contains crops that would likely not survive induced inundation duration resulting from the LCP.

The lands planted with almond and peach trees are located on poorly drained soils, including Laugenour very fine sandy loam and Maria silt loam. Prolonged duration of flooded, saturated soils in the root zone can cause damage to perennial crops, including fruit and nut trees. These areas have very poor to poor ratings for groundwater recharge according to the University of California (UC), Davis Soil Agricultural Groundwater Banking Index (SAGBI 2015). In existing conditions these areas would likely be inundated with floodwaters for one weeks' time. With the LCP inundation near the almond orchard could reach one month duration.

Figure 3-14. Results of the SAGBI. The City of Woodland is at the center with the Yolo Bypass and the Sacramento River to the east.

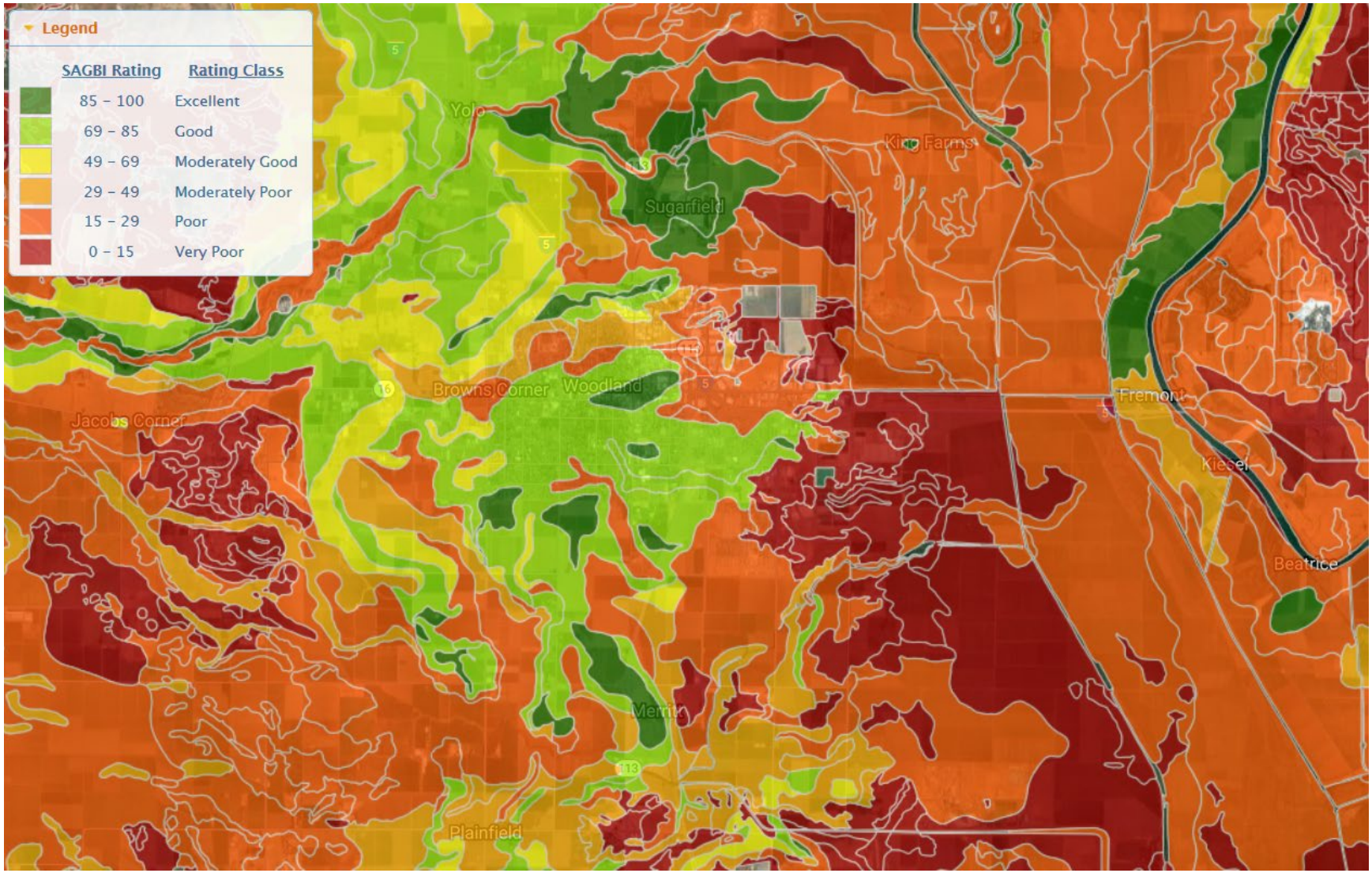
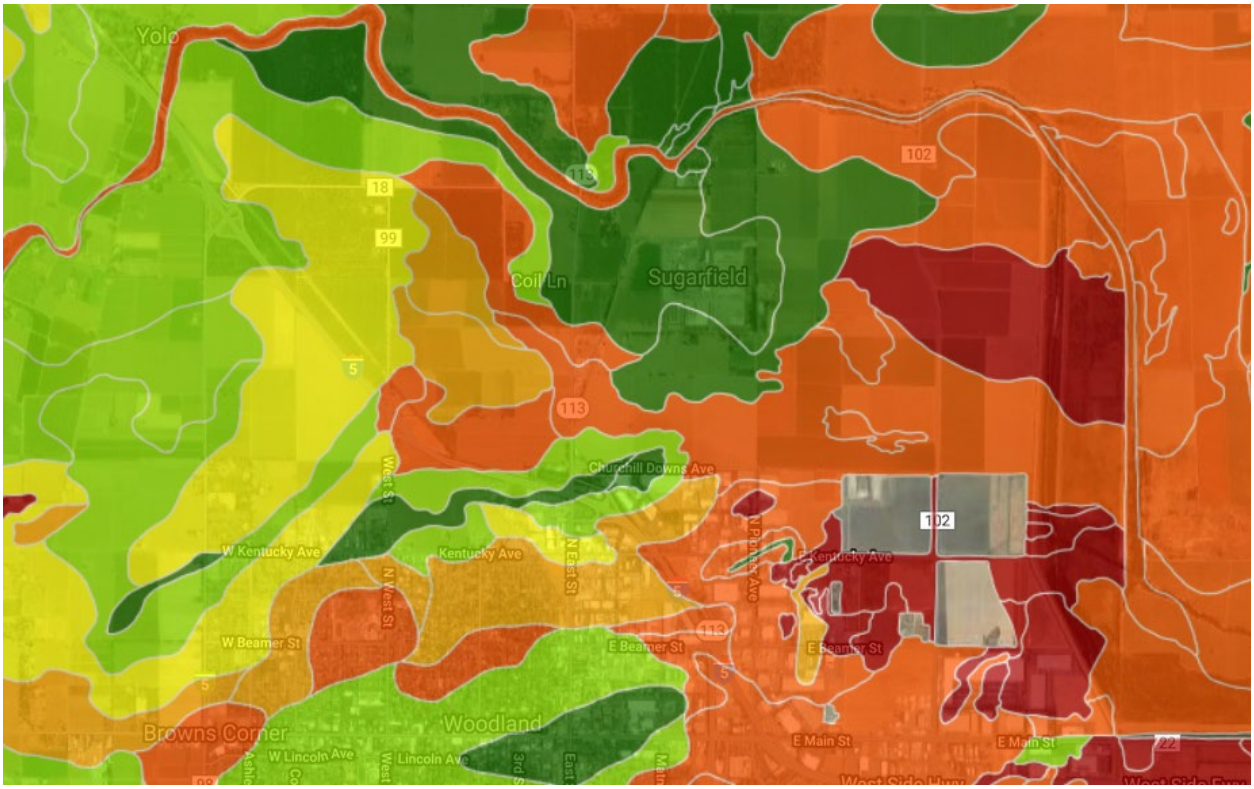


Figure 3-15. Results of the SAGBI in the project area with Cache Creek to the north.



UC Davis is currently experimenting on winter flooding of almond orchards to improve groundwater recharge. Sites with excellent and moderately good ratings on the SAGBI, benefited from 24” of water during the winter dormancy period. The site with moderately poor soil had to discontinue flooding due to overland flow, which would likely happen north of the LCP. Trees planted on suitable, well-drained soil, were not impacted by additional water during dormancy (Bernacchi 2018). However, orchards planted in poor soils impacted by the LCP would likely have detrimental effects.

Winter rains and standing water can allow Phytophthora fungus infestation in almond orchards in just 24 hours. This root rot causes tree loss at any time of year (Doll 2009). It is likely that the almond orchard near Lower Cache Creek and CR 102 would be impacted by a greater than 1% (1/100) ACE event in existing conditions due to poor soils which would not allow groundwater recharge and potentially spread disease and other contaminants. It is possible during a flood event in existing conditions some resilient trees could survive, although even a 25% loss may equate to the farmer losing all profits during the next season. During a 1% (1/100) ACE event with the LCP, nearly all almonds trees in that orchard would die.

Induced flooding caused by LCP would have negligible impacts on land use and agriculture in the proposed project area and surrounding indirectly impacted areas, whose soils are rated moderately good, good, or excellent. Many lands west of CR 102 are well drained and could have adequate groundwater recharge, preventing damage to overwintering fields. However, lands east of CR 102 to the CCSB, have poor soils, and perennial crops would be negatively impacted. With the proposed mitigation measures, impacts to land use and agriculture resulting from the LCP would be minor and less than significant.

Mitigation

Any private property that is required for the project would be mitigated through compliance with the requirements of the Uniform Relocation Assistance and Real Property Acquisition Act of 1970. Mitigation for the conversion of Prime and Unique Farmland and other agricultural lands would consist of paying fair market value for the real estate required.

Due to careful project design and location selection, the loss of acreage to each individual farm would be minimized due to the LCP being placed along major roads preventing intersection of large farmland parcels. Most of the land parcels in the area are large and the project footprint hardly detracts from them. Staging areas would be selected to border roads for convenience of access for construction vehicles which also reduces real estate take. Full market value compensation would prevent farmers from losing profitable lands in production. These mitigation measures would help replace revenue lost and keep lands in production, preventing lost work days for both landowners and farm workers.

Additional mitigation would be required for farmers growing perennial crops like orchards, who would lose valuable peach and almond trees to induced flooding resulting from the LCP. Farmers would be compensated for the value of their trees basing pay-out on annual revenues.

3.3.3 Transportation

Most of the transportation and traffic circulation information identified in the 2003 DEIS-EIR has not changed, and is incorporated into this SDEIS by reference. Changes in transportation and traffic circulation pertinent to the current proposed alternative are discussed below.

Existing transportation functions including city roadways and public transit are discussed below. For descriptions of major highways, county roads, bikeways, airports, and railways, see the 2003 DEIS-EIR.

Affected Environment

Roadways

See the 2003 DEIS-EIR for a description of major highways and country roads in the project area. South of the project area, Kentucky Avenue is a major city road within Woodland and runs east to west between SH 16 and CR 102. Construction was recently completed, widening the road from two lanes to four lanes along its entire length. Kentucky Avenue is designated as a truck route by the City of Woodland.

The following roadways within or near the project area are identified in the Yolo County General Plan as needing spot improvements for portions of the identified segment. The improvements may include but are not limited to intersection control and lane configuration improvements, passing lanes, and/or wider travel lanes and shoulders. According to the Plan, these improvements are needed to accommodate the anticipated land use through 2030.

- CR 102 between CR 13 and Woodland City Limit
- CR 102 between Woodland City Limit and Davis City Limit
- SR 16 between I-505 and CR 98

Public Transit

Yolo County Transportation District (YCTD) administers Yolobus, which operates local and intercity bus service in Yolo County and neighboring areas. Yolobus operates fourteen routes that pass within the project area, six of which run hourly.

Traffic Volumes

Roadways within the project area are traveled by automobiles, trucks, buses, motorcycles, emergency vehicles, and with the exception of I-5, agricultural equipment. The Caltrans Traffic Operations Program reports average daily traffic volumes (ADT) on interstates and state routes. Additional traffic volumes were obtained from the City of Woodland. Annual ADT (AADT) in 2017 for state highway sections through Yolo County and intersections of county roads in or near the project area are provided in Table 3-6 to Table 3-8. Note: *Post miles nearest the project footprint are shown in bold.

Table 3-6. Interstate 5 2017 AADT in the Vicinity of the Study Area (Caltrans 2017).

Post Mile*	Description	Peak Hr.	Peak Mo	AADT
0.520	Elkhorn Rd	5100	62,000	59,900
5.530	**CR 102**	**5300**	**67,000**	**61,000**
6.510	**Woodland, East Main St**	**4400**	**55,000**	**50,000**
7.086	**Woodland, Jct. Rte. 113**	**2600**	**32,500**	**28,600**
8.262	**Woodland, Jct. Rte. 113 N.**	**3400**	**45,000**	**39,400**
9.411	**CR 99/ West St.**	**3000**	**40,000**	**33,700**
10.807	Jct. Rte. 16, CR 18	3000	34,500	30,400
12.342	Yolo, CR 17	2300	28,000	25,500
17.616	Zamora, CR 13	2100	26,000	23,200
22.610	Jct. Rte. 505 South	2300	29,500	25,000
23.787	CR 8	3800	44,500	36,300
25.572	CR 6	3700	42,500	36,000
28.920	Yolo-Colusa County (County Line Rd)	3600	41,500	35,500

Table 3-7. Highway 113 2017 AADT in the Vicinity of the Study Area (Caltrans 2017).

Post Mile	Description	Peak Hr.	Peak Mo	AADT
7.666	CR 25	2350	30,500	26,000
9.228	Gibson Rd	2150	28,000	23,900
10.218	**Woodland, Main St**	**2250**	**22,900**	**20,600**
10.720	**Jct. Rte. 5**	**1200**	**9700**	**8400**
12.330	**CR P18C**	**430**	**4200**	**3500**
14.089	CR P100	380	4200	3650
18.660	CR P13	180	2350	1950
21.200	**CR 102**	**220**	**2800**	**2400**

Table 3-8. Highway 16 2017 AADT in the Vicinity of the Study Area (Caltrans 2017).

Post Mile	Description	Peak Hr.	Peak Mo	AADT
36.710	CR 94B	770	9200	7800
39.558	CR 97	8500	10,100	8600
40.570	**West Main St**	**1000**	**11,400**	**9700**
41.303	West Woodland Ave	650	7500	6600
41.567	**Kentucky Ave/CR 20**	**550**	**7100**	**6100**
43.420	**Jct. Rte. 5**	**400**	**4700**	**4000**

Table 3-9. 2011 ADT on Roadways in the Vicinity of the Study Area (City of Woodland 2014).

Intersection	ADT
CR 102 and CR 22*	43,532
Kentucky Ave and CR 102	8,772
CR 101 and Churchill Downs	1,972
Churchill Downs and SH 113	13,065
Kentucky Ave and N. East St	34,072
Kentucky Ave and CR 99	36,162

The Yolo County General Plan establishes level of service (LOS) thresholds for roadways throughout the county. LOS is a letter grade (A through F) to describe traffic operating condition on a given roadways. In general, roadways are required to maintain LOS C or better. Exceptions to this rule for roadways within or near the project area are detailed in Table 3-10.

Table 3-10. Yolo County Acceptable LOS for Major Roadways (City of Woodland 2017).

Highway	Acceptable LOS
I-5 (Woodland City Limit to Sacramento County Line)	F
SH 16 (I-505 to CR 98)	D
SH 113 (CR 102 to Woodland City Limit)	D
CR 102 (CR 17 to Woodland City Limit)	E
CR 102 (Woodland City Limit to Davis City Limit)	D

Emergency Services

Law enforcement services are provided by the City of Woodland Police Department, located at 1000 Lincoln Ave., near the intersection of Main St. and East St. Police Department response time standards vary depending on the severity of the call, with a standard of five minutes for first level priority incidents, six minutes for the second priority level, down to 45 minutes for the fifth and lowest priority level.

The Woodland Fire Department provides fire and emergency medical services (EMS) to an area of 56 square miles, which includes 41 square miles of rural area located north, east, and south of the City Limits. Currently, the Fire Department is only staffed to meet National Fire Protection Association standards for low hazard fires, and rely heavily on mutual aid partners for support to meet standards for higher risk fire incidents. There are three fire stations that serve the area, all within the City Limits, west of I-5. For both fire suppression incidents and emergency medical incidents, travel time should be four minutes or less at least 90% of the time.

Dignity Health Medical Foundation medical offices and emergency room are located towards south Woodland, on W. Gibson Road and Cottonwood Street. Dignity Health also has offices in east Woodland off CR 102 and Bronze Star Drive, just south of I5.

Environmental Consequences

This section identifies potential adverse project-related effects on transportation in the project area. The evaluation includes direct effects such as increased traffic due to haul trucks traveling to/from construction areas and indirect effects such as road closures due to project-related induced flooding.

Methodology

The proposed project comprises the construction of levee alternatives along multiple separate reaches throughout Woodland. Because of the earthwork involved and the need for material deliveries, construction would intermittently generate substantial volumes of traffic. Once construction is completed, maintenance needs would be very limited. Analysis of traffic effects therefore concentrated on the construction.

For the purposes of analysis, the effects of these project activities were composed of truck and worker trip effects on roadway operation and circulation. Because the construction site would vary on any given period and the construction phase of any specific site is expected to be short-term, no quantitative LOS analysis was performed.

Significance Criteria

The project-related effects on transportation would be considered significant if they cause any of the following:

- An increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections).
- Failure to meet a LOS standard established by the county congestion management agency for designated roads or highways.
- Substantial increase in hazards to a design feature (i.e., sharp curves or dangerous intersections) or incompatible uses.
- Inadequate emergency access, including a considerable increase in the response times of fire, police, or emergency medical services.
- Inadequate parking capacity.
- Conflict with adopted policies supporting alternative transportation.

There would be no direct adverse effects to parking availability since there are no parking lots or on-street parking located in the project area. Additionally, there would be no hazards due to a design feature since roadways would maintain their basic footprint, but would be widened and/or raised.

No Action Alternative

Under the No Action Alternative, the proposed project would not be constructed. No road modifications, including the raising of new roads, and placement of culverts would occur under the No Action Alternative. No construction related closures or delays would occur; therefore, there would be no construction-related effects to the regional transportation system or the local roadways in and around the city of Woodland. It is likely that the levee roads in the study area would continue to be maintained by Yolo County and the City of Woodland in a manner consistent with the approved Corps O&M manual.

Without levee improvements, there is a continued risk of levee overtopping, which would trigger widespread flooding and damage to the city's utilities, roadways, major interstate transportation corridors, and other infrastructure systems. The severity and magnitude would depend on the location of the levee overtopping, severity of the storm, and river flows at the time of a potential levee failure. Following a flood event, there would likely be an increase in traffic due to emergency services and cleanup activities. A catastrophic flood event in Woodland would disrupt state and interstate highway, rail, and shipping traffic, causing long-term effects on the region's and state's economy and ability to move people and goods in normal circulation patterns. Interstate-5, the California Northern Railroad and the Union Pacific Railroad would be subject to disruption and flood damage.

Under the No Action Alternative, regular O&M of the levee system would continue as presently executed by the local maintaining entities (subject to revision of the governing O&M manual). Such activities include hand and mechanical (mower) removal of weeds, spraying of weeds with approved pesticides, minimal tree or shrub trimming all up to four times a year, monthly control of burrowing rodent activity by baiting with pesticide, and reconditioning of levee slope and road with a bull dozer as needed. Normal O&M activities would short-term and small scale; therefore, impacts to transportation and navigation from continued O&M activities would be less than significant.

Levee and Conveyance Plan

Personnel, equipment, and imported materials would reach the project site primarily via I-5, Highway 113, County Road 102, and County Road 22. Once on site, haul trucks would use the embankment footprint to transport material between borrow and staging areas and the levee construction area. Staging would occur within the construction footprint at defined staging areas (Figure 2-8).

Construction would occur in two phases of five months each over a 24 month period during the spring, summer, and fall construction windows (non-rainy season). Work would generally occur Monday through Saturday during normal working hours (7 a.m. to 7 p.m.). Equipment maintenance could occur before and after working hours and on Sunday. If necessary to complete construction before the flood season for the CCSB, work may occur on a 24-hour basis in some areas. Coordination with the Resource Agencies, like USFWS, would be required and their approval granted prior to the initiation of 24-hour construction work, to ensure avoidance with special-status species. During this time there would be an increase in traffic volume on roads used as haul routes and roads accessed by construction workers. During peak construction periods, up to 350 truck trips and up to 50 construction worker personal vehicles per day would be on different roads throughout the study area. Prior to construction, it is estimated that 15 trailer truck trips would be required to transport the contractor's plant and equipment to the site, and a similar number of trips would be required when the project is completed.

Appendix E includes the project-related construction and personal vehicle trips and vehicle miles traveled. Figure 3-16 shows existing versus project-related Average Annual Daily Traffic (AADT) at key intersections. In all cases, the additional project-related traffic volume would be 1 percent or less of the existing traffic volumes. This small percentage would not be considered a substantial increase in traffic and would therefore be a less-than-significant effect.

The construction schedule has been generally divided for the first season to account for all construction requiring completion before flood season, which primarily focuses on the CCSB inlet weir, detention basin and degrading the CCSB training levee. Season 2 focuses of construction towards the west, starting with trapezoidal channel excavation for levee and seepage berm fill. Site stabilization and restoration would occur at the end of each season.

Year 1.

- Construct Reach P Channel, Detention Basin, Levee, and seepage berm. Construct South gated culvert from detention basin and integrate into levee. This levee is constructed first because it mitigates flood risk associated with later CCSB levee degrade for inlet weir.
- Degrade 3000 feet of Cache Creek Settling Basin west levee along alignment of inlet weir and stockpile at detention basin site. (Outside flood season)
- Degrade 3000 feet of Cache Creek Settling Basin training levee adjacent to inlet weir and stockpile at detention basin site. (Outside flood season)
- Construct CCSB inlet weir. (Outside flood season)
- Construct Reach Q Channel, levee and closure structures. Use CCSB levee degrade material as levee fill.

Year 2.

- Construct Reach R Channel, Levee, Seepage Berm, and closure structures
- Construct Reach S Channel, Levee, Seepage Berm, and closure structures
- Construct Reach O improve levee with cutoff wall (Outside flood season)
- Improve Reach N levee with cutoff wall. (Outside flood season)

During the first year of construction, a maximum of nearly 400 vehicle trips per day would be required. The grubbing and land clearing phase of the project would last approximately one month and require approximately 50 trips per day. During the levee degradation phase approximately 280 trips per day would be required to transport degraded training levee material to the staging area between County Road 102 and the new concrete inlet weir. If the training levee is constructed of high quality soils, the material would be transported to the main staging area for fill material in the new levee or seepage berm. If the soils do not meet Corps engineering standards, the material would be transported to the landfill, approximately 11 miles one-way along County Road 102 and County Road 28H. For the purpose of this analysis, the assumption is the material would be reused on site for a LCP feature. The other vehicle trips during this time are disposing material from reaches P and Q, near the CCSB, and the detention basin at the landfill (70 trips per day), as well as water trucks transporting water to the site and workers commuting to and from the site, at the start and end of each work day.

During the second year of construction, a maximum of approximately 165 vehicle trips per day would be required in the grubbing and land clearing phase for approximately one month. Most of the trips in the land clearing phase are required to transport material from the site to the landfill,

along County Road 102 (approximately 105 trips). During the paving phase, most trips are required to import aggregate base for the levee and easement roads. The paving phase would last a half month with approximately 135 trips daily.

Roadways that would be the most frequently used by project-related vehicles include County Road 102 from Cache Creek south to County Road 28H, Highway 113 north of I-5, Kentucky Ave, and County Road 22.

Table 3-11. Potential Increase in ADT at Intersections near the Study Area.

Map Mark	Intersection	Current ADT	Potential % Increase
1	Kentucky Ave & SH 16	6100	6.4
2	Kentucky Ave & CR 99	36,162	1.1
3	Kentucky Ave & N. East St.	34,072	1.1
4	SH 113 & I-5	8400	4.7
5	Churchill Downs Ave & SH 113	13,065	3.0
6	CR 101 & Churchill Downs Ave	1972	19.8
7	CR 102 & Kentucky Ave	8772	4.5
8	CR 102 & CR 22	43,532	0.9

Figure 3-16. Map Mark Locations for Traffic Study.

Approximately 60 truckloads would be needed to bring dry bentonite from the local source, likely from the Sacramento area via I-5.Approximately 100 truckloads would be needed to bring aggregate base and asphalt materials from the local sources to Highway 16 and along the construction easement for levee work west of I-5. For construction east of I-5, trucks would travel on County Road 20 to Kentucky Avenue to Highway 113 and then along the construction easement. Riprap would be brought in from a quarry approximately 60 miles away via State Route

113 and State Route 70 to the City of Marysville and the construction easement. The details of the earthwork quantities as shown in Table 3-12.

Approximately 600 haul truck trips per day for approximately 60 days would be required to transport material between the on-site borrow areas or off-site borrow sources and the levee construction reach. Approximately 500 total haul truck trips would be needed to transport demolition debris, construction debris, and other materials to the Yolo County Central Landfill. Assumptions include a 16 cubic yard (CY) haul truck capacity.

Table 3-12. Estimated earthwork quantities for the Levee and Conveyance Plan.

Estimated LCP Earthwork Quantities						
Reach	**Levee Degrade (CY)**	**Excavation[1] (CY)**	**Stockpile and Reuse Suitable Material (CY)**	**Unsuitable Material Disposal (CY)**	**Select Levee Fill Needed[2] (CY)**	**Berm Fill Needed[2] (CY)**
Reach N	111,357	-	89,086	22,271	115,812	-
Reach O	76,129	-	60,903	15,226	79,174	-
Reach P	-	96,806	91,965	4,840	166,001	38,269
Reach Q	-	266,592	253,262	13.330	323,658	105,388
Reach R	-	82,806	78,666	4,140	57,467	32,735
Reach S	-	274,226	260,515	13,711	161,886	108,406
Det. Basin	-	366,667	348,333	18,333	-	-
Total	**187,486**	**1,087,097**	**1,182,731**	**91,852**	**903,998**	**284,798**

Given the increase in project-related traffic volume, the LOS on roadways in the project area is expected to change from their existing states, particularly CR 101 and CR 102. CR 102 has a maximum LOS rating of D, meaning traffic can be unstable with vehicles spaced about 160 ft. apart. An example of a LOS D roadway includes an urban highway during commuting hours. Currently CR 102 is used by large semi-trailer trucks transporting goods to and from the warehouses in east Woodland. Haul trucks generally are the same size, or smaller, as these vehicles. The roadways used by construction vehicles in the project area are mainly rural in nature, without stoplights, pedestrian crossings, and large intersections. The traffic on these county roads would increase at most by 500 trips a day. A lot of traffic would remain off-road on the project easement; however, many trips would require trips to the landfill. This effect on transportation resulting from construction related traffic would be a temporary significant impact. However, it is not expected that the LOS rating would increase to level E, which constitutes unstable flow where traffic speeds cannot be full reached due to congestion. Level E equates to no usable gaps to maneuver into the traffic stream. Because haul trucks would only be filled one or two at a time, trucks entering the roadway would be staggered and not cause unstable flow. However, during peak hours traffic could become LOS level E.

Due to the construction of a new levee, County Roads 98, 99, 101, and 102 would need to be raised in locations where the roadways intersect with the levee. Churchill Downs Avenue would likely require modification as well. Culverts would be installed at each raised crossing and underneath Highway 113, to direct flows into the trapezoidal drainage canal. In each of these cases, traffic patterns would be temporarily altered as construction occurs. As the roads are being raised, the northbound and southbound lanes would be closed alternately, letting traffic flow through one lane as construction proceeds on the other. County Road 102 would require approximately two months to construct. Each of the other roads that would need to be raised would require less construction time than County Road 102. The only bike lane in the project area, along County Road 102, would be affected in the same manner as the roadway. One lane would be closed at a time, allowing for traffic to pass in the open lane. The alternating lane closures would allow for passage through the construction zone but would likely cause delays, including possible delays in the response time of emergency vehicles. Keeping only one lane open during road raising would be of greatest concern on the heavier traveled roadways such as County Road 102 and Highway 16. Implementation of the mitigation measures discussed below would facilitate safe passage of bicycles, automobiles, trucks, and agricultural equipment traveling the roadways. Construction of each roadway would take approximately two months; therefore, this would only be a temporary effect. While temporary, a two month long one-lane road closure is a significant effect.

Closure structures would be constructed where the proposed levee crosses major roads and railroads that cannot be raised, specifically I-5, Highway 113, and the Union Pacific Railroad. While there are many types of closure structures, likely flood gates would be installed. The exact specifications would be determined following coordination with the regulating agencies, like Union Pacific and Caltrans. The closure structures would consist of permanent components and temporary components to be installed during high water events. Construction of the permanent components are anticipated to be performed within available track curfews or roadway closures without physically altering the tracks or roadways. Excavation and construction would occur in close proximity to the tracks, but the tracks are not anticipated to be removed, modified, or disturbed as part of the construction effort. Closure structures would be routinely inspected annually when the railroad is not in use.

Closure structures would be inspected and maintained by the City of Woodland. In the event of a flood requiring closure of flood gates, the City of Woodland would have emergency personnel responsible for operating the structures. These additional responsibilities would be described in the O&M Manual which will require many updates for the construction of the LCP.

Indirect transportation effects of the LCP would include increased depth and duration of flooding on some roadways traversing the project area north of the new levee. A flood warning system is in place to warn residents to evacuate, and alternate evacuation routes would be made available.

The average change in flood depth during a 1% (1/100) AEP event (Figure 3-27) and a 0.5% (1/200) AEP event (Figure 3-28) from existing conditions is very similar. Flood depths near I-5 would increase between 0.1 to 4.0 feet. SR 113 would have a -1.0 to -0.1 foot flood depth allowing traffic to move north-south. Between SR 113 east to CR 101 flood depths generally increase by 0.1 to 1.0 foot. Between CR 101 and CR 102 flood depths deepen from 2.0 to 6.0 feet above existing conditions. From CR 102 east to the CCSB inlet weir flood depths are between 4.0 to 6.0 feet. North-south travel on CR 101 and CR 102 would be prohibited until flood waters receded.

Traffic between the north and south of the new levee would be affected during flood events due to road closures. Highway 113 demarks a significant change in the duration of flooding and any induced flooding. During a large flood event (e.g. 1% AEP event) duration of flooding west of SR 113, near I-5 would be shorter than existing conditions, lasting only several days. East of Highway 113, the duration and depth of flood impacts would increase, with the highest depth increases and longest duration being near the inlet weir. It is estimated that the duration of flooding west of Highway 113 is less than on 1 week and the duration of flooding at the inlet weir would be around 1 month. A major factor for the duration of flooding near the inlet weir is the availability and capacity of the city pump station that would be used to pump the water into the Yolo Bypass.

Generally, the duration of flooding decreases moving west from the CCSB, west of SR 113, there is little to no impact from flooding duration. Highway 113, County Road 102, and County Road 101 are heavily traveled routes for travelers moving between Woodland and the north. During periods of inundation, closures of these roads would likely be required and traffic would be rerouted. Road closure signs would be placed to warn travelers.

Local traffic would be slightly reduced during the winter, when flood events occur, due to lessened transportation of crops. Regardless, traffic and congestion on typically less-traveled, smaller roads would likely be affected. Of all the north-south travel routes north of Woodland, County Road 102 has the potential to experience the lengthiest closure. After the initial threat during a flood event has subsided and travel is determined to be safe, alternate routes would be available to enable residents to travel between their homes and/or businesses while County Road 102 remained flooded. CR 102 has the potential to remain flooded for up to a month during a 1% AEP event.

I-5 north of Woodland would remain closed during the flood event with inundation up to 2 feet greater compared to existing conditions. Culverts under I-5 would likely reduce the flooding duration to the interstate by several days. However, I-5 south of Woodland would no longer be flooded with the implementation of the LCP. Figure 3-22 shows a reduction in flooding on I-5 south just prior to passing over the Yolo Bypass into Sacramento. Depth on I-5 would be reduced by 4-6 feet, allowing travel from Woodland to Sacramento during a flood event, a beneficial effect of the LCP.

Emergency vehicles would be impacted by flooding and the LCP construction. The LCP improves emergency access throughout the City of Woodland, including businesses to the east which would have flooded under existing conditions. During flood events, the flood warning system would be used to allow residents extra time to evacuate before roads become flooded. Within a few days following the flood event, all access ways would be open except for County Road 102, a major access road for emergency vehicles traveling north from Woodland. Alternate routes could include Highway 113 and I-5 South, neither of which would be expected to undergo lengthy closures due to flooding. Emergency vehicles operating during the flood event could be delayed by road closures due to flooding, which is a similar impact in the No Action Alternative.

During construction-related road closures, the amount of time required for emergency vehicles to respond could be increased by several minutes, due to detours. People living in the agricultural/industrial area north of the LCP, would ordinarily have longer wait times (10-15 minutes) for emergency services due to the rural nature of the area. Emergency services, like police, fire and hospitals, would be made aware of construction locations of time in order to incorporate any new detours into their response paths. County roads would be constructed start to finish so that all other access roads would remain open. The use of detours to circumvent the flooding would reduce the adverse impact of restricted access of County Road 102.

With or without the proposed project, road closures would occur in the northern agricultural/industrial area of Woodland due to flooding. The LCP would eliminate the need for road closures in the City of Woodland, particularly to the east. After the emergency is over, detours would be identified for any remaining flooded roadways, minimizing impacts to transportation.

Mitigation

There would be no adverse effects on parking since construction equipment would be based at staging areas constructed specifically for the project. The following best management practices would be implemented to reduce the direct construction effects associated with project activities.

- The Corps would implement a traffic management plan;
- Residents would be sent notices of road closures;
- Trucks would use construction easements as much as possible when hauling materials to the construction site;
- Contractors would avoid public roads to the greatest extent practicable;
- Traffic would be rerouted when necessary to avoid construction areas; and
- Flaggers would be stationed to slow or stop approaching vehicles to avoid conflicts with construction vehicles or equipment.

To reduce temporary significant impacts regarding changes in LOS ratings and one-lane road closure, only one north-south road would be closed at a time. Detours would be available to divert traffic to other north-south access points, using Churchill Downs and Kentucky Road along the northern extent of Woodland. Detours may increase travel time by less than 5 minutes. Travel time from Highway 113 to CR 101, and CR 101 to CR 102 is 2 minutes each. Wait times for passing over the one-way road where the new levee is being constructed may take 5 minutes during non-peak hours, and 20 minutes during peak traffic times.

Road raising on Highway 113 may cause temporary significant impacts. However, most people drive from Woodland to Davis and back, which wouldn't be affected by the road raising north of there. Highway 113 is driven to access Highway 99 which takes 52 minutes driving directly from Woodland to Yuba City, and 52 minutes driving I5 to CA-70N. Detour signs would be located near the road raising construction to offer traffic alternate routes.

Additionally, all proposed activities involving encroachments within, under, or over county or city road rights-of-way must be covered by an encroachment permit. Appropriate local agencies would be consulted by the non-Federal sponsor as necessary to obtain encroachment permits. Encroachment permits would also be required for State highways and railroads.

While construction traffic and road closures would have temporary significant impacts on local transportation, the mitigation measures and numerous routes available to travelers would reduce significant transportation impacts to negligible. The mitigation measures discussed above would reduce the effects associated with the LCP, reducing the significant impacts in existing conditions to minor impacts.

3.3.4 Noise

Most of the noise information identified in the 2003 DEIS-EIR remains unchanged, and thus is incorporated into this DSEIS by reference. Changes in the existing noise environment pertinent to the current proposed alternative are discussed below. Refer to section 4.6 of the 2003 DEIS-EIR for more information on the aspects of sound, and the rating scales used to analyze the effect of community noise.

Affected Environment

As discussed in 2003, major noise sources in the project area are from traffic on major area roadways, particularly I-5; California Northern and Southern Pacific Railroads operations, which generally operate between 7:00 a.m. and 7:00 p.m.; planes from the Yolo County Airport, the University airport at Davis, and the Sacramento Metropolitan Airport; agricultural activities; and fixed-noise sources.

Noise is defined as sound that is loud, disagreeable, or unexpected. The decibel (dB) scale is used to quantify sound intensity. The human ear is not equally sensitive to all frequencies in the entire spectrum, so noise measurements are weighted more heavily for frequencies to which humans are sensitive in a process called “A-weighting”. Since humans are less sensitive to low frequency sound than to high frequency sound, A-weighted decibel (dBA) levels de-emphasize low frequency sound energy to better represent how humans hear. A-weighted sound levels are summarized in Table 3-14.

Existing background noise levels vary within the project area depending on the proximity to noise sources. I-5 and county roads can produce average noise levels of approximately 70 decibels at 100 feet. Agricultural fields, while in production, produce noise levels of approximately 78 decibels at 100 feet. Railroads can create noise levels of 75 decibels at 100 feet.

Table 3-14. Typical sound levels (City of Woodland, 2017).

Common Indoor Activities	Noise Level (dBA)	Common Outdoor Activities
Rock Band	110	Thunder
	100	Jet Flyover at 1000 ft.
Food blender at 3 feet	90	Diesel truck at 50 feet at 50 mph
Garbage disposal at 3 feet	80	Noisy urban area, daytime
Vacuum cleaner at 10 feet	70	Gas lawnmower at 100 feet
Normal speech at 3 feet	60	Heavy traffic at 300 feet, Commercial area
Large business office	50	Bird calls, quiet urban daytime
Dishwasher in next room	40	Quiet urban daytime
Theater	30	Quiet urban nighttime, Wilderness Area
Library, Bedroom at night	20	Quiet rural nighttime
Recording Studio	10	

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (Leq), the minimum and maximum sound levels (Lmin and Lmax), percentile-exceeded sound levels (Lxx), the day-night sound level (Ldn), and the community noise equivalent level (CNEL). Below are brief definitions of these measurements and other terminology used in this section:

- **Ambient noise.** The composite of noise from all sources near and far in a given environment exclusive of particular noise sources to be measured.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- **A-weighted decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent sound level (Leq).** The average of sound energy occurring over a specified period. In effect, Leq is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period.
- **Exceedance sound level (Lxx).** The sound level exceeded XX percent of the time during a sound level measurement period. For example, L90 is the sound level exceeded 90 percent of the time, and L10 is the sound level exceeded 10 percent of the time. L90 is typically considered to represent the ambient noise level.
- **Maximum and minimum sound levels (Lmax and Lmin).** The maximum or minimum sound level measured during a measurement period.
- **Day-night level (Ldn).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

The primary sources of noise related to farming activity in Woodland include tractors, harvesters, farm cannons, and crop-dusting aircraft. Most farming activities are seasonal, but can exceed the local noise performance standards (Table 3-15).

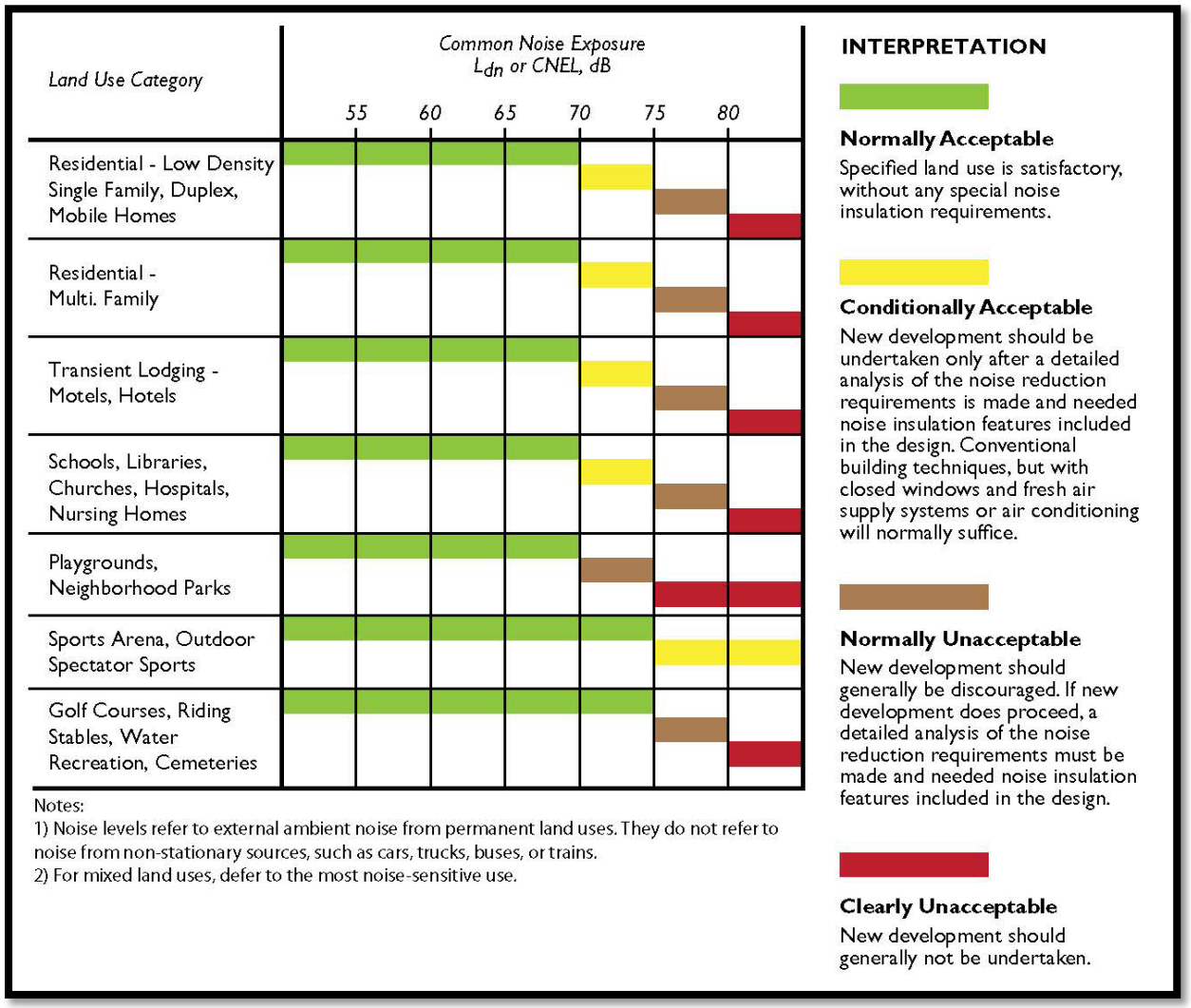
Table 3-15. Noise exposure from Operation of Farming Equipment

Distance from Source (feet)	Calculated Noise Level (dB)
50	84
100	78
200	72
400	66
800	60
1600	54

The Woodland General Plan Noise Element is based on recommendations by the California State Office of Noise Control, as contained in the Model Community Noise Control Ordinance and the Guidelines for the Preparation and Content of Noise Elements of the General Plan. The Noise Element contains exterior noise-level performance standards for locally regulated noise sources. These noise sources are typically referred to as stationary noise sources or non-transportation related noise sources.

The City of Woodland identifies noise sensitive land uses where the presence of unwanted sound could adversely affect the use of the land (Figure 3-17). The General Plan specifically defines sensitive receptors as residentially designated areas, nursing homes, schools, libraries, and places of worship (City of Woodland 2017). Within the project area, residences are the predominant sensitive noise receptors. Noise sensitive periods are generally from 10:00 p.m. to 7:00 a.m.; the day-night average noise level (Ldn) adds a penalty for noise during this time period since people have greater sensitivity to sound in the evening.

Figure 3-17. Land Use Noise Compatibility Standards (City of Woodland 2017).



The City of Woodland has established Noise Construction Guidelines that specifically apply to all projects within or near residential areas. The Noise Construction Guidelines specifically identify that on weekdays and Saturdays, no construction noise shall occur before 7am or after 6pm. On Sundays, no construction noise shall occur before 9am or after 6pm (City of Woodland Municipal Code 9.28.090). These would generally be the hours of operation for project construction.

The perceptibility of a new noise source that intrudes into a background noise environment depends on the nature of the intruding sound compared to the background sound. In general, if the intruding sound has the same character as the background sound (e.g., an increase in continuous traffic noise compared to background continuous traffic noise), human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level. However, if the intruding sound is of a character different from the background sound (e.g., construction noise in an otherwise quiet neighborhood), the intruding sound can be clearly discernible even if it raises the overall dBA noise level by less than 1 dB.

For a point source such as a stationary compressor, sound attenuates based on geometry at rate of six dB per doubling of distance. For a line source such as free- flowing traffic on a freeway, sound attenuates at a rate of three dB per doubling of distance. Atmospheric conditions including wind, temperature gradients, and humidity can change how sound propagates over distance and can affect the level of sound received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface such as grass attenuates at a greater rate than sound that travel over a hard surface such as pavement. The increased attenuation is typically in the range of one to two dB per doubling of distance. Barriers such as buildings and topography that block the line of site between a source and receiver also increase the attenuation of sound over distance.

Environmental Consequences

This section evaluates the effects of the plans on noise levels in the project area. While the Noise Control Act of 1972 still remains in effect, the Environmental Protection Agency (EPA) no longer coordinates federal noise control activities through its Office of Noise Abatement and Control. Noise control policy has since transferred to state and local governments. The City of Woodland establishes the noise standards of 70 dBA as being in the “normally acceptable” range in outdoor areas.

Table 3-16. Noise Level Performance Standard for New Projects and Existing Non-Transportation (City of Woodland 2017)

	Daytime (7 am to 10 pm)	Nighttime (10pm to 7 am)
Hourly Equivalent Sound Level (Leq), dBA	60	45
Maximum Sound Level (Lmax), dBA	75	65

Methodology

Construction activities (including construction equipment used for long-term maintenance) are the predominant source of noise and vibration associated with the project. Construction noise impacts have been assessed using an analysis method recommended by the U.S. Department of Transportation for construction of large public works infrastructure projects (FTA, 2006). Based on anticipated construction equipment types and methods of operation, construction noise levels for various elements of the construction process have been calculated. These predicted levels were compared to significance criteria to determine whether significant impacts are predicted to

occur. Where significant noise impacts have been identified, mitigation measures to reduce noise impacts have been specified.

The magnitude of construction noise impacts at noise-sensitive land uses depends on the type of construction activity, the noise level generated by various pieces of construction equipment, the distance between the activity, and noise-sensitive land uses. For this analysis noise levels at various distances from the construction equipment were estimated using calculation procedures recommended by the Federal Transit Administration (FTA, 2006). The calculations used for this analysis include distance attenuation (6 dB per doubling of distance) and attenuation from ground absorption for both hard ground and soft ground.

Significance Criteria

For the purpose of this analysis, the project-related noise would require mitigation if:

- A substantial temporary or permanent increase in ambient noise levels in the study area in excess of standards established in the local general plan or noise ordinance.
- Exposure of sensitive receptors to noise levels in excess of applicable standards.
- The noise exceeds 70 decibels at sensitive receptor locations.

As the distance from the noise source increases, the decibel level decreases such that for every doubling of distance, the decibel level is reduced by 6 dBA. Assuming that average levee construction noise is 88 dBA unmitigated at 50 feet, a radius of approximately 1,600 feet would be affected with noise at 58 dBA, less than the allowable 70 dBA.

No-Action Alternative

Proposed outcomes for the No Action Alternative have not changed since the 2003 Draft EIS-EIR. Refer to section 4.6.1 of the 2003 DEIS-EIR for relevant information. Future development and predicted increased population may result in a slight increase in ambient noise levels.

Levee and Conveyance Plan

Project construction noise would result from engine exhaust, fans, transmissions, and other mechanical equipment. Construction noise would be more heavily concentrated during the new levee construction as excavation, compacting, and hauling would occur simultaneously, requiring multiple pieces of large equipment. Construction related noise, not discussed in the 2003 DEIS-EIR, would occur during the improvements of the CCSB south and west levee and during the degradation of the training levee. Construction noise would be compounded upon along heavily trafficked roads like State Route 113 and County Road 102.

Adjacent land uses to the construction area is primarily industrial agricultural, and commercial. There are several residences towards the west end of the project, and some of these areas are considered noise-sensitive. Noise-sensitive land uses are generally defined as locations where the presence of unwanted sound could adversely affect the use of the land. Places where people live, sleep, recreate, worship, and study are generally considered to be sensitive to noise because intrusive noise can be disruptive to these activities.

Areas within a 1,600 foot (0.3 mile) radius are likely to experience noise levels above 60 dBA. Noise sensitive locations within this radius are listed below:

Table 3-17. Locations with potentially sensitive receptors within the 1,600 foot radius of the project area.

Type	Name, Address	Distance from Project Site
Residential	West St	0.03 miles
Residential	Carter Ln	0.03 miles
Residential	Hanging Oak Way	0.04 miles
Residential	N Country Road 98	0.12 miles
Lodging	Valley Oaks Inn, 600 N East St	0.13 miles
Residential	N Ashley Ave	0.17 miles
Lodging	Best Western Shadow Inn, 584 N East St	0.24 miles
Residential	Cherry Ln	0.26 miles
Worship	Grace and New Hope Ministries, 546 Kentucky Ave	0.36 miles

The City of Woodland measured average noise levels throughout various locations within the city in 2013. The survey results indicate that typical noise levels in areas with noise-sensitive receptors range from 51 dBA to 69 dBA. Traffic on local roadways and I-5, distant industrial activities, and neighborhood activities contribute to background noise levels in the majority of the project area (City of Woodland 2017). Given that many of these noise sensitive locations are already exposed to significant noise sources, construction noise from the LCP may be somewhat masked by the already elevated ambient noise levels.

Agricultural fields, while in production, create noise during farming. Typical noise levels from tractors, as measured at a distance of 50 feet, range from about 75 dBA to 95 dBA with an average of about 84 dBA. These noise levels should be reasonably representative of noise levels from other wheeled and tracked farm equipment (City of Woodland 2017).

Personnel, equipment, and imported materials would reach the project site via I-5, Highway 113, County Road 102, and County Road 22. Given that sensitive receptors occur on either side of these roadways, project-related noise levels were evaluated. Noise levels increase about 3 dBA for each doubling of roadway traffic volume, given that the speed and vehicle types remain constant. Since there are several haul routes, as opposed to one, the impact would be dispersed and thus reduced. Further, because many of these roadways are already haul routes traveled by trucks, additional project-related truck volume would not alter the vehicle type on the roadway. The project would not add enough truck trips to double the existing truck traffic. Since the traffic of haul trucks in the project would not double the existing semi-truck traffic, mobile noise effects would result in less than a 3-dBA increase surrounding these roadways. Traffic-related noise would not result in a significant noise effect.

Table 3-18. Summary of Predicted Construction Noise Levels in Leq (USACE and WSAFCA 2015)

Construction Activity	Cumulative Noise Levels at 50 Feet
Stripping	88 dBA
Levee Degrading	93 dBA
Cutoff Wall Installation	83 dBA
Soil Placement/Compaction (slope work, levee raise)	95 dBA
Rip Rap Installation	88 dBA
Roadway Construction	87 dBA

According to the estimates shown in Figure 3-19, noise effects to sensitive receptors would be significant during construction of the LCP for receptors within 1600 feet of daytime construction activities and 25,600 feet during nighttime activities. Most residences are a greater distance away from the construction areas, and the noise would attenuate with distance and physical buffers such as vegetation. In addition, since construction activities would occur linearly along the segment and would not occur over a prolonged period of time in any one area, these effects would be further reduced. There is the potential for noise effects to be significant and unavoidable in areas where sensitive receptors are in close proximity to the construction sites. The proposed mitigation implemented would reduce these noise levels to the greatest extent practicable.

Table 3-19. Noise levels during construction of levees including maximum noise levels associated with compaction.

Distance Between Source and Receiver (feet)	Calculated 1-Hour Lmax Sound Level (dBA)
50	95
100	89
200	83
400	77
800	71
1600	65
3200	59
6400	53
12,800	47
25,600	41

Note: Compaction was chosen for the analysis as the construction activity generates the most noise (95 dBA).

There are approximately 20 residences just south of the proposed levee are within 100 ft. of construction activities. During daytime hours residents along Carter Way, N. Ashley and Hanging Oak Lane would be exposed to outdoor noise levels that exceed 70 dBA. Noise levels could easily be nearly 90 dBA. Even though these residents are exposed to regular agricultural practices between 75 and 95 dBA, the construction related noises are above the City of Woodland threshold of 70 dbA for outdoor noise levels. Most residents with day jobs would not be present during the construction period.

Generally construction would occur according to the City of Woodland Municipal Code 9.28.090, between the hours of 7:00AM to 6:00PM on weekdays and Saturdays, and between 9:00AM and 6:00PM on Sundays. If emergency work was deemed necessary, short-term 24-hour construction work may occur. This work would be expected near the CCSB to ensure all existing levees are completed prior to flood season starting. Construction occurring during these hours would be subject to a Leq 45 dBA threshold. Table 3-19 shows that at a maximum dBA of 95 would be reduced to the 45 dBA threshold between 12,800 and 25,600 feet. Approximately 17,000 feet away which is over 3 miles away. The nearest residences to the CCSB are approximately one mile away. Therefore, if night work did occur, the noise related impacts would be significant to sensitive groups.

Temporary traffic related noise including approximately 600 haul truck trips per day for approximately 2 months on county roads throughout the project area would result in temporary significant impacts. Even with all of these existing noise sources and the mitigation measures described below, the construction of the LCP would produce noise above the significance threshold for some sensitive receptors temporarily during construction. This represents a temporary significant effect. Additionally, temporary traffic related noise increase would cause a significant effect.

Operation and Maintenance

Long-term O&M activities under the LCCFS would result in temporary noise from activities such as one to two persons driving trucks on the levees for inspection, maintenance, and patrol actions. Possible limited heavy duty earth-moving equipment may be used to repair and maintain the embankment, drainage canals and levees, as needed. Noise thresholds may be exceeded during day time hours if heavy machinery was operated near sensitive receptors. These temporary ambient noise exceedances would be limited to a very temporary timeframe once or twice a year. Long-term O&M activities would not be expected to exceed local or Federal noise thresholds and are anticipated to be less than significant.

Mitigation

Construction equipment would be outfitted and maintained with noise-reduction devices such as mufflers to minimize construction noise. Use of noise-reduction devices would reduce noise by an average of 5 to 10 dBA at 50 feet. Wherever possible, noise-generating construction equipment would be shielded by the use of buffers such as structures or truck trailers. Construction would be limited to the hours established as part of the City of Woodland's Construction Noise Guidelines to the extent practicable to minimize noise effects on nearby residents, workers, and the general public during noise-sensitive periods.

- Provide written notice to residents within 1,000 feet of the construction zone, advising them of the estimated construction schedule. This written notice would be provided within one week to one month of the start of construction at that location.

- Display notices with information including, but not limited to, contractor contact telephone number(s) and proposed construction dates and times in a conspicuous manner, such as on construction site fences.
- Locate stationary noise-generating equipment as far as practicable from sensitive receptors.
- Limit unnecessary engine idling (i.e., more than 5 minutes) as required by State air quality regulations.
- Employ equipment that is specifically designed for low noise emission levels, when feasible.
- Employ equipment that is powered by electric or natural gas engines, as opposed to those powered by gasoline fuel or diesel, when feasible.
- Locate construction staging areas as far as practicable from sensitive receptors.
- Design haul routes to avoid sensitive receptors, to the extent practical.

Even with the combination of the measures discussed above construction noise impacts to sensitive receptors would remain significant.

3.3.5 Air Quality

Much of the air quality information identified in the 2003 DEIS-EIR has not changed, and is incorporated into this SDEIS by reference. Changes in air quality pertinent to the current proposed alternative are discussed below.

Affected Environment

The air quality of a given area is determined by the amount of pollutants released into the atmosphere and the atmosphere's ability to transport and dilute the pollutants. The most important determinants of air pollution transport are wind, atmospheric stability, terrain, and isolation.

Woodland is located in the Yolo-Solano Air Quality Management District (YSAQMD) within the Sacramento Valley Air Basin (SVAB), a broad, flat valley bounded by the coastal ranges to the west, the Cascade Range to the north, and the Sierra Nevada to the east. For more information on general air quality in Woodland and the entire SVAB, refer to the 2003 DEIS-EIR.

In accordance with the Clean Air Act (CAA), the Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, suspended particulates (PM_{10}, $PM_{2.5}$), and lead (Table 3-20). Primary standards provide public health protection, while secondary standards provide public welfare protection, including protection against decreased visibility and damage to resources such as animals and crops.

Table 3-20. USEPA National Ambient Air Quality Standards.

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon monoxide (CO)		primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		primary and secondary	Rolling 3 month average	0.15 µg/m^3	Not to be exceeded
Nitrogen dioxide (NO_2)		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentration, averaged over 3 years
		primary and secondary	1 year	53 ppb	Annual mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	Annual mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide (SO_2)		primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

As of May 2019, Yolo County is designated by the EPA as “moderate” non-attainment for both the 2015 ozone standard and the 2006 $PM_{2.5}$ 24-hour standard (partial county, project area included), and attainment for all other criteria pollutants. The YSAQMD monitors and regulates air quality in the Woodland area and regulates air pollution emissions of commercial and industrial operations by maintaining six permanent monitoring sites within the district, including one in Woodland near the intersection of County Road 24 and County Road 102. Between 2008 and 2017, air quality data collected at this station revealed that the federal NAAQS for ozone was exceeded 8 of the 10 years, and the NAAQS for $PM_{2.5}$ was exceeded in 6 of the years.

Sensitive air receptors are people that are more susceptible to the effects of air pollution than are the general public, such as children, the elderly, and asthmatics. Locations where sensitive receptors are likely to occur in higher densities include schools, child-care centers, rehabilitation centers, elderly care facilities, hospitals, and residential areas. Sensitive receptor locations in the vicinity of the project area are largely concentrated on the eastern side of the

project, in the area bounded by County Road 98, I-5, and West Main St. The area is largely residential, and has several senior living facilities and health care centers.

Environmental Consequences

This section includes an analysis of potential short-term construction and long-term operational-source air quality impacts of the proposed alternatives.

Methodology

The Handbook for Assessing and Mitigating Air Quality Impacts (YSAQMD, 2007) and Guide to Air Quality Assessment in Sacramento County (Sacramento Metropolitan Air Quality Management District, 2009) were used in preparation of this air quality analysis. SMAQMD Road Construction Emissions Model (RCEM) was used to calculate emissions.

Construction emissions from the project would result in localized, short-term effects on ambient air quality in the area. These short-term emissions, especially PM10, ROG, and NOX, have the potential to represent a significant air quality effect. Fugitive dust emissions are associated primarily with site preparation, excavation, and levee reconstruction earthwork, and vary as a function of factors such as soil silt content, soil moisture, wind speed, acreage of disturbance area, and vehicle miles traveled on site and off site. For the construction of the project, ROG and NOX emissions are associated primarily with diesel equipment exhaust and asphalt paving.

Basis of Significance

This assessment of potential effects takes into consideration the significance of an action in terms of its context and its intensity as required under NEPA. For the purposes of this analysis, impacts are considered significant if emissions would:

- Conflict with, or obstruct implementation of, the applicable air quality plan;
- Violate any air quality standard or substantial contribution to existing or projected air quality violation;
- Result in a net increase of any criteria pollutant for which the project region is a non-attainment area under NAAQS;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

An air quality effect is considered to be significant if the project's construction emissions would exceed federal General Conformity or YSAQMD local emissions thresholds.

No Action Alternative

Under the No Action Alternative, the levee improvement project would not be constructed, therefore, there would be no construction-related effects to air quality in the project area. No construction-related effects relating to air quality from construction activities such as earthmoving would result in increased emissions of criteria pollutants. Therefore, there would be no direct or indirect effects on air quality resources attributable to the No Action Alternative.

Without levee improvements, there is the continued high risk of levee failure. If a catastrophic flood were to occur, emergency flood fighting and clean-up actions would require the use of a considerable amount of heavy construction equipment. If the flooding event disrupts the power grid, generators may be required as an additional power source, which would also increase emissions. Timing and duration of use would directly correlate with flood fighting needs, but it is likely that pollutants emitted would violate air quality standards for pollutants (including those for which the area is already considered non-attainment), and expose sensitive receptors to toxic air emissions.

Levee and Conveyance Plan

The air quality emissions analysis for the LCP was based on several interrelated assumptions and constraints:

- The project would require 2 separate years to construct the required features;
    - Year 1 would consist of degradation of 3000 feet of Cache Creek Settling Basin levee for the inlet weir, degradation of 3000 feet of the training levee adjacent to the inlet weir and detention basin site, as well as construction of Reach P, Reach Q, and the inlet weir.
    - Year 2 would consist of construction of Reach R and Reach S, improvements to Reach O and Reach N, as well as road raises to grade along the construction site.
- A construction season is 6 months (May 1 to October 1);
- Construction would begin in 2025 (this date was used for analysis purposes, however Construction would not occur until the project is authorized by Congress);
- Project compliance with Federal and local standards have been evaluated based on a “worst case scenario” construction year.

The Road Construction Emissions Model (RCEM) was developed by Sacramento Metropolitan Air Quality Management District (SMAQMD) to estimate air pollution emissions from linear construction projects. The RCEM was used to calculate air pollution emissions from construction-related activities for the proposed Levee and Conveyance Plan, as recommended by YSAQMD. Modeling was based on project-specific information (e.g., estimated round-trip mileage, maximum acres disturbed) where available, reasonable assumptions based on typical construction activities, and default values in the RCEM that are based on soil type and duration of the construction period. The RCEM accounts for known policies and regulations that may affect emissions calculations, such as current state and federal emissions factors for both on-road and off-road diesel equipment (SMAQMD 2018).

During the first year of construction, a maximum of nearly 400 vehicle trips per day would be required. The grubbing and land clearing phase of the project would last approximately one month and require approximately 50 trips per day. During the levee degradation phase approximately 280 trips per day would be required to transport degraded training levee material to the staging area between County Road 102 and the new concrete inlet weir. If the training levee is constructed of high quality soils, the material would be transported to the main staging area for fill material in the new levee or seepage berm. If the soils do not meet Corps engineering standards, the material would be transported to the landfill, approximately 11 miles one-way along County Road 102 and County Road 28H. For the purpose of this analysis, the assumption is the material would be reused on site for a LCP feature. The other vehicle trips during this time are disposing material from reaches P and Q, near the CCSB, and the detention basin at the landfill

(70 trips per day), as well as water trucks transporting water to the site and workers commuting to and from the site, at the start and end of each work day.

During the second year of construction, a maximum of approximately 165 vehicle trips per day would be required in the grubbing and land clearing phase for approximately one month. Most of the trips in the land clearing phase are required to transport material from the site to the landfill, along County Road 102 (approximately 105 trips). During the paving phase, most trips are required to import aggregate base for the levee and easement roads. The paving phase would last a half month with approximately 135 trips daily.

Approximately 60 truckloads would be needed to bring dry bentonite from the site, likely from the Sacramento area via I-5; approximately 100 truckloads would be needed to bring aggregate base and asphalt materials from the local sources to Highway 16 and along the construction easement for levee work west of I-5. For construction east of I-5, trucks would travel on County Road 20 to Kentucky Avenue to Highway 113 and then along the construction easement. Riprap would be brought in from a quarry approximately 60 miles away via State Route 113 and State Route 70 to the City of Marysville and the construction easement.

Approximately 600 haul truck trips per day for approximately 60 days would be required to transport material between the on-site borrow areas or off-site borrow sources and the levee construction reach. Approximately 500 total haul truck trips would be needed to transport demolition debris, construction debris, and other materials to the Yolo County Central Landfill. Assumptions include a 16 cubic yard (cy) haul truck capacity. Additional details can be found in the Transportation Section 3.3.3 and the Transportation Calculations in Appendix E. The fill material for levee construction would be moved directly adjacent from the excavation of the new trapezoidal drainage ditch and placed for compaction in the new levee footprint. There would also be up to 100 additional truck trips associated with worker commute each day.

The results of the construction emissions analysis are shown for the LCP in Table 3-21 for evaluation of compliance with Federal General Conformity and local YSAQMD standards.

Total annual emissions are estimated in tons per year of construction for ROG, CO, NO_x, PM_{10}, and $PM_{2.5}$ in Table 3-20. ROG, NO_x, PM_{10}, and $PM_{2.5}$ emissions are primarily associated with gas and diesel equipment exhaust. CO emissions are formed from the incomplete combustion of carbon fuels from both on-road and off-road vehicles.

According to the RCEM results, annual construction emissions for the LCCFS would not exceed *de minimis* thresholds. However, YSAQMD local thresholds for NO_x and PM_{10} may be exceeded due to short-term construction activities in Year 2. Therefore, implementation of mitigation measures and best management practices would be implemented to reduce both NO_x and PM_{10} emissions to less than significant levels.

Table 3-21. Construction Emissions

	ROG	CO	NO_X	PM_{10}	$PM_{2.5}$
Year 1: Total Emissions Estimates (Tons/Year) (Reach Q, P, Inlet Weir, Training Levee Degrade)	0.75	6.30	8.01	9.90	2.27
Year 1: Total Emissions Estimates (Pounds/Day) (Reach Q, P, Inlet Weir, Training Levee Degrade)	14.83	120.54	161.20	170.05	39.58
Year 2: Total Emissions Estimates (Tons/Year) (Reach S, R, O, N)	1.15	9.91	11.31	19.91	4.46
Year 2: Total Emissions Estimates (Pounds/Day) (Reach S, R, O, N)	21.29	179.04	211.95	340.97	76.78
YSAQMD Threshold	10 tons/year	10 9.0 ppm/8-hour**	10 tons/year	14.6* tons/year 80 Pounds/Day	15 µg/m/year**
Exceed Threshold?	No	No	Yes	Yes	No
de minimis Threshold	25	100	25	100	100
Exceed Threshold?	No	No	No	No	No

**No annual thresholds for PM_{10} emissions exist in YSAQMD, however the daily threshold for PM_{10} is 80 pounds per day. Therefore, the annual limit of emissions used for the purposes of this analysis was calculated as follows:*
$\left(80\frac{lbs}{day}\right)\left(\frac{1\ ton}{2000\ lbs}\right)\left(365\frac{days}{year}\right)$ *= 14.6 annual tons of PM_{10}.*
***National Ambient Air Quality Standards*

Fugitive Dust

Construction of the proposed project would result in short-term fugitive dust (primarily PM_{10}) emissions from grading and earth moving activities both at the project construction sites and the soil borrow sites. The amount of dust generated would be highly variable and dependent on the size of the disturbed area at any given time, amount of activity, soil conditions, and meteorological conditions.

Nearby land uses, especially those residences and schools located downwind of the project site could be exposed to dust generated during construction activities, indirectly resulting in potential adverse health effects. This indirect effect may be significant, but implementation of mitigation measures would reduce dust emissions during construction to a less-than-significant level. Common mitigation measures to reduce fugitive dust emissions include watering, chemical stabilization of soils or stockpiles, and reducing surface wind speeds with windbreaks (YSAQMD 2007).

Odors

Construction of the proposed project would not produce any changes or increases in odors compared to existing conditions for the surrounding sensitive receptors. Thus, odor impacts would be less than significant.

Operation and Maintenance

Long-term O&M activities under the LCCFS would result in limited emissions of criteria pollutants from activities such as one to two persons driving trucks on the levees for inspection, maintenance, and patrol actions. Possible limited heavy duty earth-moving equipment may be used to repair and maintain the embankment, drainage canals and levees, as needed. These emissions would be limited to a very temporary timeframe once or twice a year. Any emissions that result from long-term O&M activities should not exceed local or Federal thresholds and are anticipated to be less than significant.

Mitigation

As described above, some emissions from the project would exceed applicable and NEPA significance criteria. Therefore, the Corps would implement mitigation measures to reduce the potential air quality effects of the project, which have been identified in the YSAQMD 2007 Handbook for Assessing and Mitigating Air Quality Impacts.

YSAQMD's Construction Dust Equipment Exhaust Mitigation Measures

The YSAQMD encourages construction projects to implement basic construction emission control practices to control fugitive dust and diesel exhaust emissions (YSAQMD 2007). The contractor would be required to implement the following control measures for the project:

- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes [required by California Code of Regulations, Title 13, sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the site entrances.
- Maintain all construction equipment in proper working condition according to the manufacturer's specifications. The equipment must be checked by a certified mechanic

and determined to be running in proper condition once at the beginning of the construction season. If equipment is needed for more than one season, a certified mechanic would check condition prior to operation.

- Locate stationary diesel powered equipment and haul trucks staging areas as far as practicable from sensitive receptor.
- Use a modern equipment fleet meeting CARB's 1996 or newer certification standard for off-road heavy duty diesel engines.
- Install emission control devices on older equipment and haul trucks to reduce CO, ROG, and NOX emissions to level equivalent to CARB's 1996 or newer certification standard.
- Use alternative fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane, or biodiesel.
- Use existing power sources (e.g. power lines) or clean fuel generators rather than conventional diesel generators, when feasible.
- Use CARB and/or EPA-verified particulate traps and other appropriate controls where feasible to reduce emissions of NOX, DPM, and other pollutants at the construction site.
- Monitor and ensure that emissions from all off-road diesel powered equipment used on the project site do not exceed 40 percent opacity for more than three minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) shall be repaired immediately. Non-compliant equipment would be documented and a summary provided to the Corps and YSAQMD monthly. A visual survey of all in-operation equipment shall be made at least weekly, and a monthly summary of the visual survey results shall be submitted throughout the duration of the project, except that the monthly summary shall not be required for any 30-day period in which no construction activity occurs. The monthly summary shall include the quantity and type of vehicles surveyed as well as the dates of each survey.
- Off-road diesel-powered construction equipment greater than 50 horsepower shall meet Tier-4 off-road emission standards at a minimum under the barge delivery scenario. In addition, if not already supplied with a factory-equipped diesel particulate filter, all construction equipment shall be outfitted with Best Available Control Technology (BACT) devices certified by CARB. Any emissions control device used by the Contractor shall achieve emissions reductions that are no less than what could be achieved by a Level 3 diesel emissions control strategy for a similarly sized engine as defined by CARB regulations.
- On-road heavy-duty diesel trucks or equipment with a GVWR of 19,500 pounds or greater shall comply with EPA 2007 on-road emission standards for PM and NOX (0.01 g/bhp-hr and at least 1.2 g/bhp-hr, respectively) under the barge delivery scenario. Use of these trucks would provide the best available emission controls for NOX and PM emissions.

YSAQMD Fugitive Dust Emission Mitigation Measures

Fugitive dust mitigation would require the use of adequate measures during each construction activity and would include frequent water applications or application of soil additives, control of vehicle access, and vehicle speed restrictions. The contractor would be required to implement all feasible fugitive dust control measures required by YSAQMD including those listed below.

- Water exposed soil at least twice daily for continued moist soil.
- Suspend excavation, grading, and/or demolition activity when wind speeds exceed 20 mph to the greatest extent practicable.
- Install wind breaks, solid fencing) on windward side(s) of construction areas.

- Plant vegetative ground cover (fast-germinating native grass seed) in disturbed areas as soon as possible.
- Treat site access point to a distance of 100 feet from the paved road with a 6 to 12-inch layer of wood chips, mulch, or gravel to reduce generation of road dust and road dust carryout onto public roads.
- Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The phone number of the District shall also be visible to ensure compliance.

With the implementation of the above measure, daily fugitive dust emission along with the diesel exhaust emission would reduce PM10 to below YSAQMD thresholds. As described in the General Conformity regulation, the mitigated fugitive dust emissions (PM10 and PM2.5) are required to meet the General Conformity applicability thresholds, which would also be reduce to a less-than-significant level with the implementation of above mitigation.

NO_x Mitigation Fee to YSAQMD

The Corps would consult with the YSAQMD in good faith to enter into a mitigation contract for an emission reduction incentive program (e.g., Carl Moyer Program). The 2016 emissions limit was $17,080/weighted ton of criteria pollutants (NOX + ROG + [20*PM]). That amount is expected to be currently $20,000/weighted ton of criteria pollutants. An administrative fee of 5 percent would be paid by the Contractor to each management district to implement the program once the proposed LCP is authorized and funded. Any required air mitigation fees would be awarded through the contract, and air mitigation funds would be paid by the state and/or local sponsor. The contractor would conduct daily and annual emissions monitoring to ensure onsite emissions reductions are achieved and no additional mitigation payments are required. The contractor would be required to ensure the requirement is met. This requirement would be incorporated into the construction contracts as part of the project's specifications.

3.3.6 Climate Change

It is USACE policy to integrate climate change preparedness and resilience planning and actions in all activities for the purpose of enhancing the resilience of our built and natural water-resource infrastructure and the effectiveness of our military support mission, and to reduce the potential vulnerabilities of that infrastructure and those missions to the effects of climate change and variability (USACE 2014). Engineering and Construction Bulletin No. 2018-14 enhances USACE climate preparedness and resilience by requiring the incorporation of relevant information about observed and expected climate change impacts to inland hydrology of civil works projects. Pursuant to ECB No. 2018-14, USACE performed qualitative analysis of the impacts of climate change on the inland hydrology of the Cache Creek Watershed, Appendix K. Climate change information for hydrologic analyses includes direct changes to hydrology through changes in temperature, precipitation, evaporation rates, and other climate variables, as well as dependent basin responses to climate drivers, such as sedimentation loadings. Climate change impacts can also be analyzed by identifying air quality impacts, specifically greenhouse gases (GHG).

Affected Environment

Calculations of without a flood risk management project expected annual flood damages amount to $22.7 million, mostly in Woodland. Recent surface observations of temperature and

precipitation in the southwest United States including California's Central Valley suggest a significant warming trend since 1970. Current trends indicate warmer winter temperatures and changes to precipitation in the Central Valley, leading to an increased risk of flooding from large storms.

A 2015 USACE climate literature report synthesized literature for 2-digit hydrological unit code (HUC-2) Region 18 (California Region), which encompasses the proposed project area. In general, there is an increasing trend in temperature in the region and it is widely believed that this trend would persist, increasing by an additional 3°F by the middle of the current century. There appears to be no consistent trend in the region's historical precipitation data, but in the future extreme precipitation events are projected to intensify. Much of the population and economic activity within the region would be in areas vulnerable to floodwaters (at least the 1/500 ACE year floodplain). Additionally, droughts are expected to become more common and severe which could heighten the likelihood of wildfires burning significant acreage in the watershed, leading to increased runoff from the burned areas. Higher air temperatures are also associated with the growth of harmful algal blooms.

The most oft-cited causes of this warming trend include natural global oscillations, increased atmospheric GHGs, land use changes, and urban heat island effects. CEQ has published a Draft NEPA Guidance on Consideration of Greenhouse Gas Emissions (signed on June 21, 2019 and submitted for publication into the Federal Register; publication pending) (FR Vol. 84, No. 123). The guidance directs Federal agencies to attempt to quantify a proposed action's projected direct and reasonably foreseeable indirect greenhouse gas (GHG) emissions as a proxy for assessing potential climate effects. GHGs are commonly quantified by metric tons of a unit referred to as carbon dioxide equivalent (CO_2E) which measures pollutants by their heat-trapping ability, or "global warming potential."

Under current conditions, anticipated consequences of climate change that may affect the City of Woodland include:

- Shrinking Sierra snowpack that would threaten the state's water supply;
- Public health threats caused by higher temperatures, more severe storms and other weather events,
- Amount of precipitation will increase during winter storms and water runoff during extreme floods will increase;
- Worsened air quality and more smog;
- Damage to agriculture due to reduced water storage capacity, rising temperatures, increasing salt water intrusion, flooding, and pest infestations;
- Agricultural capacity shift to hot season crops;
- Critical habitat modification and destruction;
- Increase in severity and length of droughts which may increase wildfire risk; and
- Increased electricity demand due to summertime cooling.

The City's Climate Action Plan (CAP) outlines its compliance with California AB 32 Scoping Plan that seeks to bring California to a low carbon future, reducing emissions to 1990 levels by 2020, and to 40% below 1990 levels by 2030. The CAP analysis identified a need for local GHG reductions of 60,226 metric tons of carbon dioxide equivalent per year (MT CO2e/yr.) by 2020 and 111,645-112,265 MT CO2e/yr. by 2035 in order to achieve Woodland's GHG targets (City of Woodland 2017b).

Environmental Consequences

This section includes a climate change analysis based upon study area hydrology and greenhouse gas impacts of the proposed alternatives.

Methodology

The key sources of data and information used in the preparation of this section are listed below:

- *Handbook for Assessing and Mitigating Air Quality Impacts* (YSAQMD 2007).
- *Guide to Air Quality Assessment in Sacramento County* (SMAQMD 2009).

The Sacramento Roadway Construction Emissions Model was used for quantitative determination of effects. The results of the modeling can be found in Appendix F. GHG emissions from project construction would result from fuel usage by off-road equipment, on-road vehicles, and electricity consumption by office trailers. For the GHG analysis, the project alternatives were evaluated using conservative construction scenarios referred to as “worst-case scenarios” to estimate the maximum construction emissions generated by each alternative. The delivery and placement task was also calculated using the assumption that same amount of material to be barged to the project site, would be trucked to the site in the same period of time. The primary GHG emissions generated from these sources would be CO2, CH4, and N2O. Models, tools, and assumptions used to calculate the GHG emissions are described below.

- Off-Road Equipment: CO2 emissions generated from onsite construction equipment were estimated using the SMAQMD Roadway Construction Emissions Model (Version 7.1.3) emissions model.
- On-Road Vehicles: CO2 emissions generated from the on-road vehicle trips were estimated.

Basis of Significance

There is no established federal criteria to compare climate change impacts of the alternatives against. The 2019 Draft NEPA Guidance on Consideration of Greenhouse Gas [GHG] Emissions was considered in this analysis. Executive Order 13783 Promoting Energy Independence and Economic Growth issued by President Trump in 2017 directed CEQ to rescind 2016 Final Guidance regarding GHG emissions. An effect was considered significant if it would:

- Generate GHG emissions that may have a significant impact on the environment.
- Conflict with an applicable plan adopted for the purpose of reducing GHG emissions.

The YSAQMD has local jurisdiction over the project area. The local air district does not recommend a GHG emission threshold for construction-related emissions (YSAQMD 2007).

No Action Alternative

Under the No Action Alternative, the levee improvement project would not be constructed, therefore, there would be no construction-related effects to climate change in the project area, however, existing problems would continue along the levees encompassed within the City of Woodland study area which could potentially lead to a future flood event or levee failure. Current

levels of levee protection and maintenance would continue. No construction-related effects relating to climate change from construction activities such as earthmoving would result in increased emissions of GHGs. Therefore, there would be no direct or indirect effects on climate change attributable to the No Action Alternative.

Without the proposed levee improvements, there is the continued high risk of levee failure. If a catastrophic flood were to occur, emergency flood fighting and clean-up actions would require the use of a considerable amount of heavy construction equipment. If the flooding event disrupts the power grid, generators may be required as an additional power source, which would also increase GHG emissions. Timing and duration of use would directly correlate with flood fighting needs, but it is likely that pollutants emitted would increase GHG emissions. Depending on the magnitude of the flood, flood fighting could last for weeks or even months. Furthermore, because of the unpredictable nature of an emergency response, no BMPs to manage emissions would be in place. All of these effects could be considered significant. However, the timing, duration, and magnitude of a flood event are speculative and unpredictable, and therefore a precise determination of significance is not possible.

Potential climate change effects in California and the Sacramento area include, but are not limited to, Delta salt water intrusion, extreme heat events, increased energy consumption, increase in infectious diseases and respiratory illnesses, reduced snowpack and water supplies, increased water consumption, and potential increase in wildfires. Global climate change could expose the No Action Alternative to increased rainfall runoff and flood flows in the Cache Creek watershed. The effects of increased flood flows would be most severe for the No Action Alternative, which does not include any flood risk management measures.

Levee and Conveyance Plan

The general consensus in the scientific community is that global effects of climate change in the near future would include warmer surface temperatures, increased sea levels, and changes in local precipitation patterns. Since the project area lies 40 miles north of the California Bay-Delta and 75 miles east of the Pacific coastline, changing sea levels would not have an effect on the area. Increased temperatures would cause the snowpack line to recede to higher elevations, and a greater percentage of drainage areas within individual watersheds would incur rainfall instead of snowfall; snow would also begin to melt earlier in the season. The Cache Creek Watershed does not have significant snowpack, so changes in snowpack are not expected to have an effect on its hydrology. The USACE Nonstationarity Detection Tool has not identified any significant nonstationarities in either of two data sets analyzed (North Fork Cache Creek at Hough Springs and Kelsey Creek at Kelseyville), and the Climate Hydrology Assessment Tool has not identified any trends in the recorded peak flow data at either location. Nonstationarities are abrupt and slowly varying changes. Changes in hydrologic processes can occur either abruptly or gradually, depending upon the characteristics of the nonstationarity factors affecting relevant physical processes (USACE 2017).

During USACE's climate analyses, the Sacramento River Watershed was consistently identified as being relatively vulnerable to increased flooding due to climate change. While no significant nonstationarities were detected in the Cache Creek watershed, trends indicate the study area is susceptible to warmer and wetter conditions, increasing the likelihood of large runoff events, or atmospheric rivers. While existing levees on Cache Creek offer some lowered risk of flooding in the City of Woodland, there are no plans to raise or strengthen existing levees in the future. Since the Cache Creek watershed does not have significant snowpack and changes in the snowline, it is not expected to have significant hydrologic changes. However, even small

magnitude changes in the local hydrology could overwhelm the existing flood risk management system protecting the City of Woodland. The increasing flood threat posed by climate change supports the need for this proposed project in the Lower Cache Creek Watershed, Appendix K.

The estimated construction GHG emissions, which include CO2, CH4, N2O, and other GHG emissions, are shown in Table 3-21. As shown in Table 3-21, project-wide GHG emissions would be well below draft NEPA Guidance published by CEQ which suggest an analysis be conducted if the proposed project would yield at least 25,000 metric tons of carbon-dioxide-equivalent emissions per year, indicating that project-generated GHG emissions would not indirectly contribute to climate change. This indirect effect is less than significant. Implementation of mitigation measures would further reduce GHG emissions during construction.

Mitigation

The following measures could be considered to lower GHG emissions during the construction. Implementation of these mitigation measures would reduce the impacts to a less-than-significant level.

- Continue to coordinate with YSAQMD.
- Comply with all applicable future GHG regulations at the time of project-level permitting and construction.
- Encourage and provide carpools, shuttle vans, transit passes and/or secure bicycle parking for construction worker commutes.
- Recycle construction waste and demolition debris.
- Purchase at least 20% of the building materials and imported soil from sources within 100 miles of the project site.
- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to no more than 3 minutes (5 minute limit is required by the state airborne toxics control measure [Title 13, sections 2449(d)(3) and 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site.
- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked once by a certified mechanic and determined to be running in proper condition prior to the start of the construction season. If the equipment is used during more than one season, a mechanic would check condition prior to operation on Site.
- Use equipment with new technologies (repowered engines, electric drive trains).
- Perform on-site material hauling with trucks equipped with on-road engines (if determined to be less emissive than the off-road engines).
- Use a California Air Resource Board (CARB) approved low carbon fuel for construction equipment.

3.3.7 Water Quality

This section describes the affected environment and environmental consequences relating to water quality. Most of the information on water quality identified in the 2003 DEIS-EIR has not changed, and is incorporated into this DSEIS by reference. Changes in water quality conditions pertinent to the current proposed alternative are discussed below.

The Cache Creek watershed drains a large area with a wide variety of land uses. These land uses have the potential to contribute to water quality problems such as fecal coliform from septic systems and cattle, boron, mercury, and other minerals from geothermal springs and abandoned mines; fertilizers, pesticides, and herbicides from agricultural activities; and sediment from erosion.

Affected Environment

Cache Creek originates from and is the sole outlet of Clear Lake, the largest natural freshwater lake located entirely in California and among the world's oldest lakes. North Fork Cache Creek originates at Goat Mountain in the Mendocino National Forest and runs 16 miles before flowing into Indian Valley Reservoir. The North Fork joins the mainstem below Highway 20. Bear Creek, the other main tributary, flows through Bear Valley before it joins Cache Creek. The water parallels State Route 16, then enters Capay Valley in Yolo County. The creek winds its way through a predominantly agricultural setting before entering the Cache Creek Settling Basin, designed to capture sediment and enhance groundwater recharge before ultimately releasing water into the Yolo Bypass. Although Cache Creek is not used as a municipal drinking water supply, water quality problems do affect wildlife, recreation, and agricultural uses along the creek.

The intrusion of saline or brackish water into fresh water aquifer systems is generally associated with coastal areas. However, the intrusion of saline or brackish water from the Delta area may occur in the Sacramento Valley, including eastern Yolo County if overdrafting of deep wells lowers the water levels in the groundwater basin (subsidence). If salt water intrusion were to occur on a widespread basis in this area, the local water supply would be adversely affected.

Erosion and groundwater discharge from marine sediments and marine sedimentary rocks have resulted in release of high boron and mercury concentrations to the Cache Creek watershed. The Yolo County Flood Control and Water Conservation District monitors boron and mercury at seven locations throughout the watershed (Yolo Habitat Conservancy, 2018) Elevated boron levels are the result of naturally occurring mineral spring sources, whereas mercury presence results from mercury mining and natural minerals. Boron concentrations typically range from 0.7 mg/l in the spring to 2.2 mg/l in the winter, and the average concentration during the irrigation season is less than 1.0 mg/l. For reference, average boron concentrations in fresh surface water across the United States ranged from 0.01 to 15.0 mg/l, with most values clear below 0.4 mg/l (World Health Organization, 2003). Many fruit and nut tree crops are sensitive to boron concentrations as low as 0.5-1.0 mg/l, although some of these crops are successfully grown in the Capay Valley. During periods of lower stream flow in Cache Creek, boron precipitates along the banks of the creek.

Clear Lake and Cache Creek are both listed as impaired for mercury on the Clean Water Act 303(d) state List of Impaired Waters. These drainage basins are an identified source of mercury and contribute a substantial portion of total mercury load delivered to the Sacramento-San Joaquin Delta. Mercury contamination originates from past mining activities, geothermal springs, erosion of naturally occurring mercury-containing soils, and atmospheric deposition near Clear Lake and at tributaries to Cache Creek. Mercury remains in creek bottom sediments and is a sediment of concern for reuse of stream bank soil and creek bottom sediments. Consequently, high concentrations of mercury have been detected during high flows in the Cache Creek channel and even in the Yolo Bypass, prior to the construction of the CCSB. The natural elevated levels of mercury under the right conditions may readily be transformed into methyl mercury, a developmental toxin for both humans and wildlife. Methylmercury has been demonstrated to move

into aquatic food chains and bioaccumulate in fish and other organisms, resulting in unacceptably high mercury levels in edible fish.

The Cache Creek Settling Basin, as previously discussed, was constructed to prevent sediment carried by Cache Creek from adversely affecting the hydraulic capacity of the Yolo Bypass through excessive sediment deposition and thereby increase the flood risk of the City of Sacramento. Water from the CCSB flows through either a 400 cubic feet per second (cfs) low-flow culvert in moderate flow conditions, or the overflow concrete weir, during high flow events. Those waters are discharged into the Yolo Bypass, which flow directly into the Sacramento River. The settling basin has a TMDL for total mercury and is discussed in the Mitigation section below.

Numeric targets for methylmercury have been established in an effort to protect the health of humans and wildlife from eating fish from Clear Lake and its drainage basin. A mercury Total Maximum Daily Loads (TMDL) plan was approved for Clear Lake in 2003. The mercury TMDLs for Clear Lake and its drainage basin include an implementation plan that presents a strategy and proposes actions to reach established numeric targets to reduce the mercury load. In addition, Clear Lake is listed as impaired for nutrients and a TMDL for nutrients was approved in September of 2007. Cache Creek is also impaired for unknown toxicity, however, no TMDL is pending (Yolo Habitat Conservancy, 2018). In 2005, the Central Valley Regional Water Quality Control Board (RWQCB) adopted a TMDL for mercury in Cache Creek and tributaries. Cache Creek is also listed on the Clean Water Act Section 303 (d) list as impaired for unknown toxicity.

The groundwater in the Yolo subbasin is generally high in calcium (generally over 180 milligrams per liter [mg/L] CaCo3) and magnesium, with localized areas of high selenium and boron. In the east Yolo subbasin, beneath the City of Davis and UC Davis, average concentration of arsenic in the Tehama formation are 0.04 mg/L, which exceeds the U.S. Environmental Protection Agency (EPA) maximum contaminant level of 0.01 mg/L (County of Yolo 2009). Elevated concentrations of selenium, nitrate, and boron have been detected in groundwater along Cache Creek and the Cache Creek Settling Basin. Based on available data, groundwater in the project area is not affected by manmade chemicals, but there are localized areas of elevated boron concentrations due to naturally occurring soil minerals.

Environmental Consequences

This section is intended to identify any potential adverse project-related effects on water quality.

Basis of Significance

For the purposes of this analysis, the effects of the proposed project on water quality would be considered significant if it resulted in any of the following:

- Result in an increase of mercury or methylmercury contamination into the Sacramento River and Delta systems
- Result in an increase of mercury or methylmercury contamination into the Cache Creek system
- Substantially degrade surface-water or groundwater quality such that it would violate criteria or objectives identified in the Central Valley RWQCB basin plan, or otherwise substantially degrade water quality to the detriment of beneficial uses.

- Substantially deplete groundwater supplies or interfere with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.
- Create or contribute runoff water that would exceed the capacity of existing or planned storm water drainage systems.

No Action Alternative

Under the No Action Alternative, the proposed project would not be constructed, and therefore, there would be no construction related effects to water quality in the study area. Water quality would likely remain generally the same as under current conditions, assuming no significant changes in land use upstream from the project area. The current source of impairment, mercury, and high concentrations of boron would persist unless mitigated.

Without the levee improvements, there is the continued risk of levee overtopping and failure. If a levee overtopping or breach were to occur, flooded areas could contain contaminants from stored chemical, septic systems, and flooded vehicles. These contaminants would be released into the floodwaters, carried into CCSB, and potentially contaminate the Sacramento River and Delta. Additionally, levee overtopping and failure could result in the collapse of miles of levee slopes resulting in increases in erosion and sedimentation. Cache Creek could experience increased turbidity and reduced water quality.

Levee and Conveyance Plan

The LCP could temporarily increase turbidity in Cache Creek and the Cache Creek Settling Basin during earthmoving activities. Temporary increases in mercury loading could possibly occur due to this increased turbidity, but is not likely. A trap efficiency study conducted by UC Davis supports this conclusion. The UC Davis study determined that trap efficiencies increase for all flood events under the LCP scenario (DWR, 2016). The models UC Davis used predicted that LCP results in better trap efficiency in the settling basin. So after construction, less sediment transport is predicted into the Yolo Bypass, and since mercury is typically sediment bound, less mercury loading would occur into the Delta.

Construction would require a large amount of earthmoving, which could result in the release of pollutants from various construction equipment and materials. Furthermore, non-vegetated areas in the construction zone would be more susceptible to erosion. Appropriate measures would be implemented to mitigate for Clean Water Act requirements and an NPDES permit would be obtained prior to construction activity. For any discharges that would be exempt from the NPDES permit, waste discharge requirements would be followed. Required monitoring and BMP's, as discussed below, would be enforced to ensure that the project is within compliance throughout the duration of construction.

If required under the basin plan, a mercury control study may be conducted to comply with TMDL requirements for Cache Creek, the Cache Creek Settling Basin, or the Yolo Bypass. This would be required if the methylmercury fish tissue objectives were not met, following construction of the LCP. There are no anticipated permanent adverse impacts from construction of the LCP. Sediment loads into the Yolo Bypass are expected to decrease over time.

Groundwater quality, similar to surface water quality, is not likely to show adverse effects during or after construction. Groundwater infiltration and recharge, as evaluated in the Agriculture and Hydrology and Hydraulics sections are not anticipated. The areas east of SR 113 towards

the CCSB with increased flood duration lasting up to a month, have poorly draining soil and other factors that reduce the ability for floodwaters to percolate through and recharge the groundwater aquifers (SAGBI 2015). The LCP would not have a negative impact on groundwater recharge, and it will likely not differ greatly from existing conditions.

Potential stormwater impacts to existing drainage systems will be mitigated in the design phase such that sediment loading will not increase following construction. Potential stormwater impacts during construction are discussed in the mitigation section below.

Mitigation

The settling basin may be used to mitigate mercury contamination originating from the upper reaches of Cache Creek, along with potential turbidity impacts from any in-water construction activities. Mercury is typically highly affiliated with sediments, and the sediment deposition in the settling basin could potentially remove significant amounts of mercury from the water column. Mitigation was discussed during a 24 June 2015 meeting between USACE, the City of Woodland, DWR and the Water Board with the conclusion that only a decrease in the volume of the settling basin would require an equivalent design volume elsewhere. The LCP would increase the amount of floodwaters entering the CCSB. Without the proposed project, floodwaters that overtop Cache Creek would have laminar flow into the City of Woodland and further south. This change in flow quantity would not have impacts of the trapping efficiency of the CCSB (DWR 2018). Incidental potential impacts would be within the design capacity of the settling basin.

In order to reduce potential effects to water quality, the following BMP's would be implemented:

- Preparation of a storm water prevention plan in accordance with local and state policy by the lead agency. A portion of this plan would specifically address erosion and sediment control;
- Installation of erosion controls such as hay bales, water bars, covers, sediment fences, and sensitive-area access restrictions where necessary and appropriate before initiating extensive clearing and grading;
- Preparation of a Hazardous Substance Control and Emergency Response Plan by the lead agency; and
- The lead agency would comply with all Sections 401 and 404 requirements of the Clean Water Act.

Application of the above mitigation measures would reduce effects on water quality to a less than significant level.

3.3.8 Vegetation and Wildlife

Most of the vegetation and wildlife information identified in the 2003 DEIS-EIR has not changed, and is incorporated into this SDEIS by reference. Temporary effects would result from construction activities, while permanent effects would result from new flood risk management structures. Changes in vegetation and wildlife pertinent to the current proposed alternative are discussed below.

A Habitat Evaluation Procedures (HEP) analysis was conducted by USFWS for the 2003 DEIS-EIR in the project area to determine project-related effects on vegetation that support a variety of wildlife resources. The USWFS Coordination Act Report (CAR) was updated and the complete results of the analysis are in the Draft CAR (Appendix A). Mapped vegetative communities and land use types can be found in Appendix B, the Biological Assessment.

Affected Environment

Lower Cache Creek primarily runs through agricultural fields that are occasionally interspersed with rural residential lots and Valley oak woodland windrows. Agricultural crops grown in the study area include alfalfa, tomatoes, squash, sunflowers, wheat, soybeans, and tree crops (orchards). Most agricultural fields in the study area are actively planted and harvested. The majority of the study area footprint occurs in active farmland. No rice fields occur within the LCP study area.

Agricultural fields provide foraging and resting areas for Swainson's hawk, red-tailed hawk, Brewer's blackbird, and black-tailed hare. Agricultural fields also provide habitat for western fence lizards, gopher snakes, California ground squirrel, California quail, coyote, skunk, and fox. These species often nest in nearby riparian areas and feed on agricultural field and annual grassland.

Riparian vegetation along Cache Creek largely consists of willow, elderberry, cottonwood, blackberry, and the nonnative tamarisk and giant reed. Vegetation between the existing Cache Creek levees consists of wild rose, tamarisk, giant reed, sandbar willow, elderberry, wild grape, and cottonwoods. In low water years, Lower Cache Creek is dry part of the year resulting from the Capay Diversion Dam upstream of the study area. Water availability in the channel limits the amount of riparian vegetation. The riparian corridor widens and narrows and can range from 30 feet to 200 feet wide on either side of the channel. Generally, the vegetation grows in relatively narrow strips of less than 100 feet. The riparian canopy consists of willow, Fremont and black cottonwoods, valley oak, and interior live oak. The riparian vegetation is dense, with vines like grape and blackberry, snaking up the tree canopy.

The land within the CCSB is multi-purpose. While primarily constructed as wetland/riparian swales and berms to slow Cache Creek velocities, allowing sediments to deposit in the settling basin, currently some of the lands are farmed. Land cover within the CCSB portion of the study area is comprised primarily of a matrix of Fremont's cottonwood (*Populus fremontii*), red willow (*Salix laevigata*) riparian woodlands; seasonal marshes dominated by smartweed (*Persicaria* sp.), barnyard grass (*Echinochloa crus-galli*), prickly cocklebur (*Xanthium strumarium*), swamp pricklegrass (*Crypsis schoenoides*), western golden rod (*Euthamia occidentalis*), and annual sunflower (*Helianthus annuus*); and open water. A few small isolated patches of tamarisk (*Tamarix* sp.) riparian scrub are also present. A broad corridor of sandbar willow (*Salix exigua*) riparian scrub occurs along the irrigation canal to the south of the CCSB.

The irrigation canals that border the CCSB are a matrix of open water, cattails (*Typha* sp.), tules (*Schoenoplectus acutus*), and northern water plantain (*Alisma triviale*). A number of shallow seasonal wetlands and seasonal wetland swales occur just west of the CCSB, and a larger depressional wetland with an extended hydroperiod occurs to the south of the CCSB. This depressional wetland is a seasonal wetland that has a mix of seasonal marsh and seasonal wetland species along the upper fringes, including tubered bulrush (*Bolboschoenus glaucus*), water plantain (*Alisma lanceolatum*), burhead (*Echinodorus berteroi*), hyssop loosestrife (*Lythrum*

hyssopifolium), slender popcorn flower (*Plagiobothrys stipitatus*), bird's foot trefoil (*Lotus corniculatus*), and broad-leaved pepperweed (*Lepidium latifolium*).

Typically, riparian forest, valley oak woodland, and freshwater marsh are highly productive wildlife areas. Avian species found in these areas include house finch, scrub jay, acorn woodpecker, egret, owl, red-tailed hawk, and Swainson's hawk. Mammalian species found here include deer, coyote, opossum, gray fox, raccoon, western gray squirrel, and muskrat. Migratory waterfowl and raptors use the study area during the winter. Grassland and riparian scrub areas are used by species that feed on seed and vegetation such as the California ground squirrel, California vole, California quail, and American goldfinch. Vertebrate predators in the area include the gopher snake, red-tailed hawk, striped skunk, and fox. Reptilian species include garter and gopher snakes and western fence lizards.

Waters of the United States Including Wetlands

The project area contains numerous habitat features that are, or have the potential to be waters of the United States, including wetlands. Jurisdictional wetlands may occur in the project area. On the east end, pedestrian surveys were conducted to collect sub-meter accurate GPS data for the Ordinary High Water Mark (OHWM) of aquatic resources. Following the field survey, the sub-meter GPS OHWM data was overlaid on LiDAR data, and the aquatic resources boundaries were mapped at the OHWM elevations. Aquatic resources are mapped in the Biological Assessment, Appendix B. Most wetlands in the study area occur within the CCSB. A wetlands delineation would be completed in the PED phase prior to construction. The results of the wetland delineation would determine the path forward for regulatory compliance, if wetland avoidance is not feasible.

Land Cover Types

A survey was conducted in March 2019 of all publicly accessible portions of the project footprint, as well as a 200 foot buffer from the project footprint. The majority of these surveys were vehicular, as most of the publicly accessible areas were roadways. During the field surveys, vegetation communities were mapped, a list of wildlife species was generated, and any special-status species habitat or individuals were mapped with a GPS unit.

There are numerous land cover types in the project area. Seven land cover types are considered natural communities: cottonwood willow riparian habitat, non-native annual grassland/ruderal, tamarisk riparian scrub habitat, seasonal marsh, open water and valley oak woodland. Five land cover types are associated with human activities: developed areas, fallow farmland, high intensity agriculture, levee, and orchards. Table 3-22 shows the acreages of each land cover type within the project area. General descriptions of each land cover type is discussed below.

Table 3-22. Study area acreages for land use types and vegetation communities.

Land Use and Vegetation Communities	LCP Footprint (acres)
Cottonwood Willow Riparian	0.05
Developed	21.48
Fallow	9.58
High Intensity Agriculture	233.54
Levee	70.95
Non-Native Annual Grassland	1.44
Open Water	1.64
Orchard	8.28
Ruderal	9.26
Seasonal Marsh	9.95
Tamarisk Riparian Scrub	0.05
Valley Oak Woodland	1.97

Natural Communities

Cottonwood Willow Riparian Habitat. The overstory of the riparian habitat consists primarily of mature, well-established trees: Fremont cottonwood valley oak (*Quercus lobata*), and box elder (*Acer negundo var. californicum*). The shrub layer consists of smaller trees and shrubs; representative species observed were poison oak (*Toxicodendron diversilobum*), sandbar willow, and Himalayan blackberry (*Rubus discolor*). Elderberry shrubs (*Sambucus mexicana*), the host plant of the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), which is federally listed as threatened, were observed in the riparian habitat along Cache Creek. There are 0.05 acres of cottonwood willow riparian habitat in the study area.

Non-Native Annual Grassland/Ruderal. The non-native annual grassland is dominated by naturalized annual grasses with intermixed perennial and annual forbs. Grasses commonly observed in the study area are foxtail barley (*Hordeum murinum* ssp. *leporinum*), ripgut brome (*Bromus diandrus*), Italian ryegrass (*Lolium multiflorum*), and soft chess (*Bromus hordeaceus*). Other grasses observed were wild oats (*Avena* spp.), Bermuda grass (*Cynodon dactylon*), and rattail fescue (*Vulpia myuros* var. *myuros*). Forbs commonly observed in annual grasslands in the study area are yellow star-thistle (*Centaurea solstitialis*), bristly ox-tongue (*Picris echioides*), and sweet fennel (*Foeniculum vulgare*). Other forbs observed are perennial peppergrass (*Lepidium latifolium)*, Italian thistle (*Carduus pycnocephalus), horseweed (Conyza canadensis), and black mustard (Brassica nigra). There are approximately* 1.44 acres of non-native annual grassland and 9.26 acres of ruderal habitat. The annual grasslands in the study area contain a relatively large proportion of ruderal species, likely because of substantial disturbance from human activities.

Tamarisk Riparian Scrub Habitat. There are approximately 0.05 acres of tamarisk riparian scrub habitat located with the study area in the CCSB. Tamarisk sppis a non-native shrub that dominates riparian habitats. These habitat type also includes giant reed (*Arundo donax*).

Seasonal Marsh and Open Water. Seasonal wetland habitat can be found within the CCSB totaling 9.95 acres. This habitat can contain emergent vegetation including tules (*Scirpus sp.*), cattails (*Typha sp.*), and rushes (*Juncus sp.*). Seasonal marshes dominated by smartweed, barnyard grass, prickly cocklebur, swamp pricklegrass, western golden rod, and annual

sunflower. Within the seasonal marshes of the CCSB there exists about 1.64 acres of open water habitat.

Valley oak woodland. Small patches of valley oak woodland are found throughout the study area including at the intersection of SR 113, the I-5 overpass, and CR 98 and the new levee alignment. Oak woodlands comprise 1.97 acres in the study area. Woodlands have an open canopy with few shrubs in the understory.

Other Land Cover Types

Developed areas. There are approximately 21.48 acres of developed land in the study area that generally include roads, interstates, and structures. Some of these lands area vacant or lacking vegetation.

Fallow farmland. There are 9.58 acres of fallow farmland in the study area. These areas were once row crops. These lands have not been farmed in the last few years, but can be planted and harvested at any time.

High intensity agriculture. Agricultural crops observed during the field surveys included alfalfa, tomatoes, squash, sunflowers, wheat, and soybeans. In addition, a number of fields had been freshly disked or freshly planted. Most of the land cover in the study area consists of high intensity, active farmland. There are approximately 233.54 acres of farmland in the study area. No rice fields occur within the study area.

Levee. There are approximately 70.95 acres of levee in the study area. This land cover type consists of the levee crown, prism, and the levee toes maintenance roads. Levees occur along Cache Creek and within the study area along the CCSB.

Orchards. Deciduous orchards are confined to just south of the I-5 overpass towards the west end of the study area. Orchards encompass approximately 8.28 acres and likely consist of almonds, walnuts, pears, peaches, or plums.

Conservation Policies

The City of Woodland has developed 39 conservation policies in its 2017 General Plan (City of Woodland, 2017). These policies aim to protect water supply and quality, maintain and protect biological and mineral resources, preserve farmland, improve air quality, reduce greenhouse gas emissions, and preserve prehistoric, cultural, and archaeological resources.

Woodland is now included in the countywide 2018 Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP) (Yolo Habitat Conservancy 2018), and is working to implement it fully in the coming years. With this plan, the community hopes to mitigate the impacts of their projected growth on plant and wildlife habitats.

This HCP/NCCP provides take authorization for 12 listed and non-listed species, selected from a larger pool of 175 special status species in the region. Species were selected based on their occurrence in the Plan Area. While the Plan encompasses all of Yolo County, all of the species listed here have potential to occur in the LCP study area. Special Status species are discussed in Section 3.3.9.

Table 3-23. Species included in the Woodland HCP/NCCP.

Common Name	Scientific Name	Status
Palmate-bracted bird's beak	*Chloropyron palmatum*	E/E/1B
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T/-/-
California tiger salamander (Central California DPS	*Ambystoma californiense*	T/T/-
Western pond turtle	*Actinemys marmorata*	-/CSC/-
Giant garter snake	*Thamnophis gigas*	T/T/-
Swainson's hawk	*Buteo swainsoni*	-/T/-
White-tailed kite	*Elanus leucurus*	-/FP/-
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	T/E/-
Western burrowing owl	*Athene cunicularia hypugaea*	-/CSC/-
Least Bell's vireo	*Vireo bellii pusillus*	E/E/-
Bank swallow	*Riparia*	-/T/-
Tricolored blackbird	*Agelaius tricolor*	-/C/-

Federal:
C = Candidate for listing under FESA, E = Listed as endangered under FESA
PT = Proposed as threatened under FESA, T = Listed as threatened under FESA
State:
CSC = California species of special concern, C = Candidate for listing under CESA, a candidate for listing is afforded the status of a listed species, E = Listed as endangered under CESAFP= fully protected under California Fish and Game Code, T=Listed as threatened under CESA
Other: 1B = California Native Plant Society (CNPS) designation for species rare or endangered in California and elsewhere

Invasive Species

Non-native invasive species are species that, once they are established, outcompete others that have evolved specifically to live there, (i.e., native species). Invasive species degrade soil, leading to erosion that can lower water quality. They crowd out and can kill important tree species that provide shade, carbon storage, and habitat for native wildlife. Additionally, they can increase the risk of wildfire (TNC, 2013). Invasive species are primarily spread by human activities. Some ornamental plants can escape into the wild and become invasive. Some invasive animal species were originally pets that have been purposefully or accidentally introduced. In addition, higher average temperatures and changes in rain and snow patterns caused by climate change would enable some invasive plant species to move into new areas.

Within the Lower Cache Creek area, non-native invasive plant species occur in all vegetation communities found along the study area. Areas dominated by non-native vegetation are generally associated with recent human disturbance and include: abandoned, fallow, and active agricultural fields; frequent flood inundation, or scour. Invasive plants are also found in nearby plant communities including: riparian, riparian forest, riparian scrub, oak woodland, agriculture and grassland, oak-grassland, and shrub grassland.

Non-native and invasive plant species seen in the study area include terrestrial, wetland and riparian species: giant reed (*Arundo donax*), tamarisk, perennial pepperweed, Himalayan blackberry, oat grass, foxtail brome mustard sp., yellow starthistle, purple loosestrife (*Lythrum salicaria*), and Russian thistle or tumbleweed (*Salsola tragus*). Table 3-24 details abundant non-native plant species likely found in the study area.

A study conducted for the Cache Creek Resources Management Plan (CCRMP) in the spring-summer of 2016 found a suite of similar invasive species in their study area. A total of 1,794 individual plants and 876 patches were mapped. The most widespread species were tamarisk, tree tobacco, arundo, Ravenna grass, perennial pepperweed, Himalayan blackberry, thistles, edible fig, poison hemlock and yellow starthistle.

The reach closest to the LCP project area is the CCMRP Rio Jesus Maria Reach. While invasive species were relatively uncommon in this reach, scattered arundo and tamarisk were present. Ravenna grass was absent. Large patches of perennial pepperweed, thistles, and yellow starthistle were observed, with individual plants and smaller patches of tree tobacco also common (Rayburn 2016).

Table 3-24. Invasive Plant Species Present in Yolo County.

Scientific Name Common Name	Cal-IPC Rating	Plant Type	Preferred Habitat
Acroptilon repens Russian knapweed	M	Perennial herb	Grassland, shrub land, riparian woodland, disturbed areas
Agrostis avenacea Pacific bentgrass	L	Perennial grass	Wetlands
Agrostis stolonifera Redtop	L	Perennial grass	Wetlands
Ailanthus altissima Tree of heaven	M	Tree	Grassland, oak woodland, riparian
Arctotheca calendula Cape weed	M	Annual, Perennial herb	Rangelands, pastures, disturbed areas
Arundo donax Giant reed	H	Perennial grass	Riparian forest/scrub
Avena barbata Slim oat	M	Annual, Perennial grass	Coastal scrub, grassland, oak woodland, forest
Brassica nigra Black mustard	M	Annual herb	Disturbed areas, fields
Brassica rapa Common mustard	L	Annual herb	Disturbed areas
Brassica tournefortii Mustard	H	Annual herb	Desert, desert dunes, coastal scrub, disturbed areas
Bromus diandrus Ripgut brome	M	Annual grass	Dunes, scrub, grassland, woodland, forest
Carduus pycnocephalus Italian thistle	M	Italian thistle	Forest, scrub, grasslands, woodlands
Centaurea solstitialis Yellow starthistle	H	Annual herb	Grassland, woodlands, occasionally riparian
Chondrilla juncea Skeleton weed	M	Perennial herb	Grassland
Cirsium vulgare Bullthistle	M	Perennial herb	Riparian areas, marshes, meadows
Conium maculatum Poison hemlock	M	Perennial herb	Riparian areas

Scientific Name Common Name	Cal-IPC Rating	Plant Type	Preferred Habitat
Cortaderia selloana Pampas grass	H	Perennial grass	Coastal, riparian
Cynodon dactylon Bermuda grass	M	Perennial grass	Riparian scrub, common landscape weed
Dipsacus fullonum Wild teasel	M	Perennial herb	Bog and fen, riparian scrub, marsh
Egeria densa Brazilian water weed	H	Perennial herb	Lakes, ponds, reservoirs
Eichhornia crassipes Water hyacinth	H	Perennial herb	Wetlands
Elymus caput-medusae Medusa head	H	Annual grass	Grassland, scrub, woodland
Erodium cicutarium Coastal heron's bill	L	Annual herb	Many upland habitats
Festuca perennis Italian rye grass	M	Annual, Perennial grass	Riparian scrub
Foeniculum vulgare Fennel	M	Perennial herb	Grassland, scrub
Geranium dissectum Wild geranium	L	Annual herb	Grassland, disturbed areas
Hirschfeldia incana Mustard	M	Perennial herb	Disturbed areas
Holcus lanatus Common velvetgrass	M	Perennial grass	Wetlands
Hordeum murinum Foxtail barley	M	Annual grass	Grassland
Hypericum perforatum Klamathweed	L	Perennial herb	Many habitats, disturbed
Lepidium draba Whitetop	M	Perennial herb	Disturbed areas
Lepidium latifolium Perennial pepperweed	H	Perennial herb	Tidal and non-tidal marsh, riparian scrub
Lythrum salicaria Purple loosestrife	H	Perennial herb	Tidal and non-tidal marsh
Mentha pulegium Pennyroyal	M	Perennial herb	Marsh, bog and fen, riparian forest
Myriophyllum spicatum Water milfoil	H	Perennial herb	Lakes, ponds, reservoirs
Nicotiana glauca Tree tobacco	M	Tree, Shrub	Lakes, disturbed areas
Oxalis pes-caprae Bermuda buttercup	M	Perennial herb	Agricultural areas, disturbed areas
Plantago lanceolata Ribwort	L	Perennial herb	Wetlands, disturbed areas
Poa pratensis Kentucky blue grass	L	Perennial grass	Meadows, dry hills, marshes, coastal areas, disturbed areas
Raphanus sativus Jointed charlock	L	Annual, Biennial herb	Fields, disturbed areas

Scientific Name Common Name	Cal-IPC Rating	Plant Type	Preferred Habitat
Rubus armeniacus Himalayan blackberry	H	Shrub	Riparian areas, marshes, oak woodlands
Rumex crispus Curly dock	L	Perennial herb	Grassland, vernal pools, meadows, riparian
Saccharum ravennae Ravennagrass	M	Perennial grass	Wetlands
Sesbania punicea Rattlebox	H	Shrub	Riparian
Tamarix ramosissima Tamarisk	H	Tree, Shrub	Riparian forest/woodland, marsh
Verbascum thapsus Woolly mullein	L	Perennial herb	Meadows, riparian, sagebrush, pinyon-juniper woodland
Verbena bonariensis Purple top vervain	H	Annual, Biennial herb	Disturbed areas

Cal-IPC Inventory Categories:
High (H) - Severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Widely distributed ecologically.
Moderate (M) - Substantial and apparent ecological impacts on physical processes, plant and animal communities, and vegetation structure. Reproductive biology and other attributes are conducive to moderate to high rates of dispersal, although generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
Limited (L) - These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Common invasive wildlife likely to occur in the study area include American bullfrogs (*Lithobates catesbeianus*), brown-headed cowbirds (*Molthrus ater*), and red-eared slider (*Trachemys scripta elegans*). Nutria (Myocastor coypus) have not been discovered in Yolo County or neighboring counties.

Table 3-25. Invasive wildlife species present in Yolo County.

Scientific Name Common Name	Group	Native Habitat
Xenopus laevis African clawed frog	Amphibians-Frogs	Freshwater
Lithobates berlandieri Rio grande leopard frog	Amphibians- Frogs	Freshwater
Lithobates catesbeianus American bullfrog	Amphibians- Frogs	Freshwater
Molothrus ater Brown-headed cowbird	Birds	Grasslands, shrub lands, woodlands
Faxonius virilis Virile crayfish	Crustaceans- Crayfish	Freshwater

Scientific Name Common Name	Group	Native Habitat
Procambarus clarkia Red swamp crayfish	Crustaceans- Crayfish	Freshwater
Lepomis cyanellus Green sunfish	Fishes	Freshwater
Lepomis macrochirus Bluegill	Fishes	Freshwater
Micropterus dolomieu Smallmouth bass	Fishes	Freshwater
Micropterus salmoides Largemouth bass	Fishes	Freshwater
Tilapia zillii Redbelly tilapia	Fishes	Freshwater
Cyprinella lutrensis Red shiner	Fishes	Freshwater
Cyprinus carpio Common carp	Fishes	Freshwater
Notemigonus crysoleucas Golden shiner	Fishes	Freshwater
Pimephales promelas Fathead minnow	Fishes	Freshwater
Gambusia affinis Western mosquitofish	Fishes	Freshwater
Nerodia fasciata Southern watersnake	Reptiles- Snakes	Freshwater
Chelydra serpentine Snapping turtle	Reptiles- Turtle	Freshwater
Chrysemys picta Painted turtle	Reptiles- Turtle	Freshwater
Trachemys scripta Pond slider	Reptiles- Turtle	Freshwater
Trachemys scripta elegans Red-eared slider	Reptiles- Turtle	Freshwater

Environmental Consequences

This section is intended to identify any potential adverse effects on vegetation and wildlife resources. Project effects on these resources would be both temporary and permanent. Temporary effects would result from construction activities, while permanent effects would result from the presence or operation of new flood management structures.

Significance Criteria

The proposed project would be considered to have a significant effect on vegetation and wildlife if it would result in any of the following:

- A substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations, or by USFWS;

- A substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, and coastal) through direct removal, filling, hydrological interruption, or other means;
- Substantial interference with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- A conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; and
- A conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or State habitat conservation plan.

No Action Alternative

Under the No Action Alternative, the proposed flood risk management project would not be constructed, and therefore, there would be no construction related effects to vegetation and wildlife in the study area. However high flows in Cache Creek, could lead to overtopping of the existing levee system. Erosion would likely occur in the riparian corridor, reducing vegetation and wildlife habitat. Emergency flood fighting consisting of levee stabilization and rock placement would damage existing vegetation. These impacts could be long-term. Additionally, during a levee failure, contaminants could enter the floodwaters. These potentially contaminated floodwaters could harm, and even kill native wildlife.

Regular O&M of the levee system would continue as currently executed. O&M generally consists of vegetation removal on the levees, which can reduce available foraging and denning habitat.

Levee and Conveyance Plan

This section is intended to identify any potential adverse effects on vegetation and wildlife resources. Project effects on these resources would be both temporary and permanent. Temporary effects would result from construction activities, while permanent effects would result from land use changes from new flood risk management structures, like the new levee alignment. These effects are summarized in Tables 3-26.

The USFWS CAR identified three resource categories that occur within the study area. These include:

- Scrub-shrub. Riparian cover-type defined as mixed trees and shrubs averaging less than 16 feet tall, predominately comprised of cottonwoods and willows.
- Agricultural/Ruderal. Common cover type over much of the study area which provides habitat varying with the season and crop, primarily foraging habitat for birds of prey.
- Orchard. Less common cover type consisting of plum, walnut, pistachio, and olive orchards which provides cover-type for raptors and passerines.

The 2019 draft CAR contains remnant cover-type acreages from the 2003 DEIS-EIR preferred alternative, and are therefore not considered in this DSEIS. The Biological Assessment (Appendix B) contains up-to-date acreages of project impacts.

The study area footprint used for the BA contains all project features as well as proposed staging areas and hauling roads within the project area. The loss of cottonwood willow riparian, orchard, seasonal marsh, and valley oak woodland habitat would be mitigated. Any loss of developed lands, fallow farmlands, and high intensity agricultural would not be mitigated as they do not represent suitable habitat. The levee, non-native annual grassland, and ruderal habitat would be migrated by seeding areas with a native grass and forb mix. Open water was not mitigated for as the acreages would not be impacted and can be accounted for in the GIS layers. Most of the open water habitat would not be affected as it represents the bridge over CR 102 and the pond south of the drainage ditch that would not be disturbed. The 0.05 acres of tamarisk riparian scrub would not be mitigated for as the removal of invasive tamarisk is a benefit to native vegetation communities.

Table 3-26. Lower Cache Creek LCP Effects and Mitigation on Vegetation

Habitat Type	Potential Impacts	Basis of Mitigation	Duration of Impact	Mitigation
Cottonwood Willow Riparian	0.05 acres	3:1	Permanent	0.15 acres
Oak Woodland	2 acres	3:1	Permanent	6 acres
Orchard	8 acres	1:1	Permanent	8 acres
Seasonal Marsh	10 acres	1:1	Permanent	10 acres
Grassland/ Ruderal	82 acres	1:1	Single Construction Season	82 acres Hydroseed with native mix

Construction activities could have effects on wildlife, such as birds, ground squirrels, rabbits, snakes, and lizards. Effects may include direct mortality through being struck by equipment or vehicles or the crushing of burrows and dens. Wildlife could be temporarily disturbed and abandoned their occupied habitat, causing increased competition for resources in adjacent areas. Since construction effects are short-term and temporary, any displaced wildlife would be expected to return to the area after construction. Effects from construction activities and long-term project-related effects would be potentially significant. Implementation of the mitigation measures listed below would reduce these effects to less than significant.

As can be seen in Table 3-22, the majority of the land impacted permanently by the construction of the LCP is high intensity agriculture, levee, and developed lands (about 89%). Ruderal, non-native annual grassland, and tamarisk riparian scrub already are composed of non-native and invasive species. New levee slopes would be hydroseeded with a native grass and forb mixture, densely planted to prevent invasive plant species from colonizing newly exposed bare ground. Levee crowns would be graveled for levee patrol roads which would prevent invasive plant species from being able to thrive. Revegetation of impacted lands following construction would benefit the vegetation community by removing abundant invasive plants, and replacing them with native species.

Vegetation communities at risk of non-native plant invasion include cottonwood willow riparian, seasonal marsh and valley oak woodland. Impacts to these lands would be fully compensated for. Mitigation measures would be in place to prevent the spread of invasive species. These measures would reduce the likelihood of spread of invasive species to a relatively minor level. Examples include:

- All vehicles and equipment would be washed prior to entering the work site.
- Tires would be dry brushed when entering sensitive vegetation communities to remove seeds, mud, and dried vegetation.
- Stripping and grubbing of existing vegetation would occur on days with winds less than 10 mph.

Table 3-27. Impacts to Aquatic Resources

Aquatic Resource	Impact (acres)	Direct/Indirect Impact	Quality
Cache Creek	0.19	Direct	High
Cache Creek Settling Basin	5.17	Direct	Low
Irrigation Canal	0.94	Direct	Medium
Irrigation Ditch	0.19	Direct	Medium
Pond	0.33	Direct	Low
Riparian Wetland	0.003	Direct	High
Roadside Ditch	0.02	Direct	Low
Seasonal Marsh	9.94	Direct	Low
Seasonal Wetland (agricultural)	6.82	Direct	Low
Seasonal Wetland (natural)	0.65	Indirect	High
Total	**24.25**		

As can be seen in Table 3-27, the majority of aquatic habitat impact acreages comes from low-quality open water and seasonal marsh habitat impacts to the CCSB, as well as impacts to low-quality agricultural wetlands. There is riparian habitat adjacent to the CCSB, but this habitat would not be impacted by the LCP. Agricultural wetlands are ranked low quality because they are subject to periodic disturbance for cultivation, and do not provide significant function and value as habitat or other ecosystem services (Appendix I).

The nearly 10 acres of seasonal marsh impact would be temporary, as they would result from construction equipment driving on the levee toe roads to transport training levee material to the staging area. The training levee degrade would result in the creation of additional seasonal marsh habitat within the CCSB, as the levee would be removed to existing grade which may develop into wetland habitat once regularly inundated with winter rain.

The impacts in Table 3-27, from Appendix I the Clean Water Act 404(b)(1) analysis, represent the greatest level of impacts possible. Currently the impacts to the CCCB, 5.17 and 0.19 acres, would not be impacted by construction of the proposed inlet weir. The levee would not be degraded down to the ordinary high water mark and so impacts to aquatic resources would not occur. Irrigation ditches and canals would be avoided to the greatest extent practicable. The

6.62 acres of agricultural wetlands would be mitigated for as they are suitable habitat for the Palmate-Bracted bird's beak.

Construction related impacts on vegetation and wildlife related the LCP are minimal, as most of the impacted lands are agricultural, industrial, levee, or previously developed. The proposed mitigation measures would reduce impacts to less than significant.

Hydraulic Related Impacts

A potential adverse hydraulic impact would be induced flooding or significant increase in velocities within the system or both. Induced flooding could result from a project increasing the depth, duration, or frequency of flooding. The potential for induced flooding was evaluated by comparing with-project and No Action Alternative throughout the system. Increases and decreases to flood depths within the model domain are provided in Figure 3-20 through Figure 3-22. Differential changes to the velocities due to the proposed TSP are presented in Figure 3-19.

Highway 113 demarks a significant change in the duration of flooding and any induced flooding. During a large flood event (e.g. 1% AEP event) duration of flooding west of SR 113, near I-5 would be shorter than existing conditions, lasting only several days. East of Highway 113, the duration and depth of flood impacts would increase, with the highest depth increases and longest duration being near the inlet weir. It is estimated that the duration of flooding west of Highway 113 is less than on 1 week and the duration of flooding at the inlet weir would be around 1 month. A major factor for the duration of flooding near the inlet weir is the availability and capacity of the city pump station that would be used to pump the water into the Yolo Bypass.

The average change in flood depth during a 1% (1/100) AEP event (Figure 3-21) from existing conditions is very similar. Flood depths near I-5 would increase between 0.1 to 4.0 feet. SR 113 would have a -1.0 to -0.1 foot flood depth allowing traffic to move north-south. Between SR 113 east to CR 101 flood depths generally increase by 0.1 to 1.0 foot. Between CR 101 and CR 102 flood depths deepen from 2.0 to 6.0 feet above existing conditions. From CR 102 east to the CCSB inlet weir flood depths are between 4.0 to 6.0 feet. North-south travel on CR 101 and CR 102 would be prohibited until flood waters receded.

The hydraulic impacts caused by the LCP are slight compared to existing conditions. Some land cover types east of SR 113 would be inundated for up to one month. Inundation for that length of time may alter the existing land type. There are several areas of fallow farmland with wetland soil types. If these fallow/ruderal lands are inundated for a full month, there is a potential for suitable lands to be converted into seasonal wetland. Depending upon how long the new detention basin is inundated, and the frequency of O&M, the basin may convert into wetland habitat. Existing wetland habitat in the CCSB may be reduced or expand if the inlet weir changes the flow path of flood waters. While there would likely be land cover type alterations based on the LCP, these hydraulic effects would be less than significant.

Mitigation

Compensation measures are based on the current footprint. If design refinements are made that result in increased or reduced impacts to vegetation and wildlife, compensation would be coordinated with the appropriate resource agencies and adjusted accordingly. Compensation for the riparian, seasonal marsh, oak woodland and orchard would include restoring or enhancing in-kind habitat at a mitigation bank, on site, or in the setback area at a ratio of 3:1 or 1:1 as

coordinated with the Resource Agencies. This would be done to ensure no net loss of habitat functions and values.

The USFWS CAR outlines mitigation for effects to vegetation and wildlife resources for the LCP. The agricultural land would be mitigated with the planting of native forbs and grasses on non-riprapped areas of the new levee. Placing approximately 18 inches of soils over the riprap and then reseeding the soil with native grasses and forbs would mitigate for the loss of upland habitat along I-5.

A habitat mitigation monitoring plan has also been developed and is included in Appendix H. The purpose of this plan is to present conceptual mitigation proposals, establish performance standards, and outline adaptive management tasks and costs. Additionally, the plan establishes success criteria and adaptive management triggers including invasive plant management measures.

The Corps would conduct full wetland delineations within and adjacent to the project footprint in the PED phase once designs for each reach are developed. Design would be developed to minimize current impacts to wetlands, but if wetland delineations determine that additional acreages of wetlands would be impacted, the Corps would avoid, minimize, or mitigate for the additional impacts and coordinate the impacts with the appropriate regulating agencies.

Implementation of the mitigation measures below were coordinated with resource agencies, are included in the CAR in Appendix A, and would reduce the impacts to vegetation and wildlife.

- Limiting construction crews to the right-of-way and confinement of disturbance to as small an area as possible.
- Requiring construction crews to maintain a 15-m.p.h. speed limit on all unpaved roads to reduce the chance of wildlife being mortally wounded if struck by construction equipment.
- Avoidance of effects to Cache Creek's water quality by taking appropriate measures to prevent construction materials (fuels, oils, and lubricants) from spilling or otherwise entering the creek.
- Avoidance of effects to woody vegetation at all construction sites, staging areas, borrow sites, and haul routes by fencing them with orange construction fencing.
- Minimization of effects to trees along the construction area by having all trimming performed by a qualified arborist to ensure tree survival after the project.
- Conducting nest surveys prior to the removal of any trees or scrub-shrub to ensure migratory birds would not be harmed during construction, pursuant to the Migratory Bird Treaty Act.
- Re-vegetation of borrow, staging, turn-arounds, and any other disturbed areas with native grasses and forbs.
- Development of Mitigation, Monitoring, and Adaptive Management Plan for the project by the Corps.
- For all compensation areas, develop an operations and maintenance plan that is coordinated with the USFWS and other resource agencies.
- Complete the appropriate consultation with the USFWS and NMFS for possible effects of the project, including related operation and maintenance activities, on federally listed species under their jurisdiction.
- The non-federal sponsors would complete the appropriate consultation with CDFW regarding impacts to State listed species under their jurisdiction.

With the implementation of these mitigation measures, both long-term and construction activity effects would be mitigated to a less-than-significant level.

3.3.9 Special Status Species

Many of the special-status species with potential to occur near the project area are the same as those identified in the 2003 DEIS-EIR, and the information is incorporated into this SDEIS by reference. Changes in special-status species and their inclusion in the effects analysis of the proposed project are discussed below.

Affected Environment

A record of species listed or proposed for listing under the Endangered Species Act (ESA) that may have the potential to occur in the project area was obtained from US Fish and Wildlife Service (USFWS) in May 2019 and from National Marine Fisheries Service (NMFS) in July 2019. Table 3-28 includes a compilation of these lists. The table gives details of potential and documented occurrences of special-status species in the project area, as well as information on habitat requirements and distribution. Species from the USFWS and NMFS list, their locations, and their habitat were identified through searches of the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDB), eBird, the Yolo Habitat Conservation Plan/Natural Community Conservation Plan, and other literature available on the project area. In addition, field surveys of the project area were conducted in March and in August 2019 on identify habitat present that could support different life stages of the listed species.

Based on the records search and results of the field surveys, the species with the potential to be present within the project area are: palmate-bracted bird's beak (*Cordylanthus palmatus*, PBBB), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*, VELB), vernal pool branchiopods (VPB) including vernal pool fairy shrimp (*Branchinecta lynchi*, VPFS) and vernal pool tadpole shrimp (*Lepidurus packardi*, VPTS), giant garter snake (*Thamnophis gigas*, GGS), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*, WYBC), and Least Bell's vireo (*Vireo bellii pusillus*, LBV). Suitable habitat for the western snowy plover is also present in the area, however, this species has the potential forage in the area during the winter months when no activities are proposed. Therefore, the project is not expected to affect the western snowy plover. The project area is not located within any designated critical habitat. A Biological Assessment was drafted in November 2019 for submittal to USFWS as initiation of formal consultation for the species with the potential to be affected listed above (no formal consultation was sought with NMFS, as there is expected to be no effect on species under their jurisdiction).

Table 3-28. Federally listed Threatened, Endangered, and Candidate Species with Potential to Occur in the Project Area.

Species	Status	Habitat Requirements	Distribution	Occurrences in Project Area
Birds				
Least Bell's vireo *Vireo bellii pusillus*	E	Breeds in diverse riparian (occasionally non-riparian) woodlands with dense shrub layer. Forages in shrub canopy and upland vegetation adjacent to riparian corridors.	Breeds chiefly in the eight southernmost counties of California south to Baja California, but has been known to occur northward to central California during breeding season. Winters in southern California and Baja California.	The riparian woodlands within the CCSB, and the riparian scrub in the nearby irrigation canal represent marginally suitable nesting habitat for this species. Presence unlikely.
Western yellow-billed cuckoo *Coccyzus americanus*	T	Large tracts (patches greater than 50 acres) of willow-cottonwood or mesquite forest or woodland with high canopy closure.	Sacramento Valley portion of the Sacramento River, the Feather River in Sutter County, the south fork of the Kern River in Kern County, and along the Santa Ana, Amargosa, and lower Colorado Rivers.	The riparian woodlands within the CCSB represent suitable nesting habitat for this species. High potential to occur near project area.
Western snowy plover *Charadrius alexandrinus nivosus* (*C. nivosus nivosus*)	T	Barren to sparsely vegetated open areas near water.	Pacific Coast of the US. Winters in the Baja Peninsula, western Mexico, Gulf of Mexico, and Guatemala.	This species has been documented as a vagrant in the nearby wastewater treatment ponds, and could forage in the agricultural fields within near project area during the winter. Presence during the project construction highly unlikely.
Reptiles				
Giant garter snake *Thamnophis gigas*	T	Permanent freshwater, especially sloughs and marshes overgrown with tules of willows	Central Valley including Butte, Colusa, Yolo, Sacramento, Solano, San Joaquin, Stanislaus,	This species has been documented as a vagrant in the nearby wastewater treatment ponds, and could forage in the agricultural fields during the

			Merced, and Fresno counties.	winter. High potential to occur in project area.
Amphibians				
California red-legged frog *Rana aurora draytonii*	T	Quiet, permanent water in woods, forest clearings, riparian areas, and basking sites	Coast Transverse, Sierra Nevada, and Cascade ranges	Project area is outside of the species range. No habitat present.
California tiger salamander Central California DPS *Ambystoma californiense*	T	Breeds in ponds or other deeply ponded wetlands, and uses gopher holes and ground squirrel burrows in adjacent grasslands for upland refugia/foraging.	Each side of the Central Valley from southern Colusa County south to northern Kern County	No large areas of undisturbed annual grassland are present. No suitable habitat.
Fish				
Longfin smelt *Sphinicus thaleichthys*	C	Fresh and saltwater estuaries.	Pacific Coast estuaries and Sacramento-San Joaquin Delta; most abundant in San Pablo and Suisun Bays although spawns in upper end of Suisun Bay and lower reaches of the Delta; small population in Humboldt Bay and Eel River.	No potential to occur, rarely found upstream of the Delta and CCSB weir and pump facilities preclude presence.
Central Valley steelhead *Onchoryncus mykiss*	T	Ocean and freshwater rivers and streams	Sacramento River and tributaries; SF Bay/Delta estuary and open ocean	No potential to occur, CCSB weir and pump facilities preclude presence.
Delta smelt *Hypomesus transpacificus*	T	Estuarine areas with salinities below 2 grams per liter; spawns in freshwater	Sacramento – San Joaquin Delta	No potential to occur, CCSB weir and pump facilities preclude presence.

Central Valley spring-run Chinook salmon *Oncorhynchus tshawytscha*	T	Ocean and freshwater rivers and streams	Sacramento River and tributaries downstream to and including SF Bay and Golden Gate Bridge.	No potential to occur, CCSB weir and pump facilities preclude presence.
Sacramento River winter-run Chinook salmon *Oncorhynchus tshawytscha*	E	Ocean and coastal rivers and streams.	Sacramento River and tributaries; SF Bay/Delta estuary and the open ocean.	No potential to occur, CCSB weir and pump facilities preclude presence.
Essential fish habitat Pacific Coast Salmonids	-	All water bodies currently or historically occupied by Pacific Fishery Management Council managed Chinook salmon, including estuarine and marine areas.	Sacramento and San Joaquin and tributaries, and the SF Bay.	Cache Creek designated as EFH due to historical presence of Chinook salmon.
Green sturgeon, southern Distinct Population Segment (sDPS) *Acipenser medirostris*	T	Open ocean, estuaries; spawns in cool freshwater.	Widely distributed in salt water; San Francisco Bay, Delta, and Sacramento River. Spawns in the cool waters of the Feather, Yuba, and Upper Sacramento Rivers.	No potential to occur, CCSB weir and pump facilities preclude presence.
Invertebrates				
Valley elderberry longhorn beetle, *Desmocerus californicus dimorphus*	T	Elderberry shrubs in moist valley oak woodlands along the margins of streams and rivers	Northern San Joaquin and southern Sacramento valleys	Evidence (emergence holes) of this species has been seen in the project area.
Vernal pool tadpole shrimp *Lepidurus packardii*	E	Vernal pools and swales containing clear to highly turbid water	Sacramento Valley from Butte County to south of the Sacramento area in Sacramento County and west to the Jepson Prairie region of Solano County.	Marginally suitable habitat is present near project footprint. Low potential to occur.

Vernal pool fairy shrimp *Branchinecta lynchi*	T	Vernal pools in grass or mud bottomed swales, earth sumps, or basalt flow depression pools in unplowed grasslands	Tehama County south through most of the Central Valley and along the south and central Coast Ranges to Santa Barbara County.	Marginally suitable habitat is present near project footprint. Low potential to occur.
Plants				
Palmate-bracted bird's beak *Cordylanthus palmatus*	E	Saline-alkaline soils and is a component of alkali sink scrub vegetation in relatively undisturbed, seasonally flooded lowlands	Populations occur at Delevan, Colusa, and Sacramento National Wildlife Refuges. Also in Yolo, Madera, Alameda, and Fresno counties.	Documented occurrence southeast of Woodland.

Key:
E = Endangered (i.e., Listed (in the Federal Register) as being in danger of extinction.)
T = Threatened (i.e., Listed as likely to become endangered within the foreseeable future.)
C = Candidate (i.e., Candidate to become a proposed species.)

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) establishes a management system for national marine and estuarine fishery resources. This legislation requires all Federal agencies to consult with NOAA Fisheries regarding all actions or proposed actions permitted, funded, or undertaken that may adversely affect essential fish habitat (EFH). EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The phrase "adversely affect" refers to the creation of any effects that reduce the quality or quantity of EFH.

An analysis was completed in July 2019 to evaluate the project's impact on local fisheries. The study area consisted of the lower portion of Goodnow Slough-Lower Cache Creek, a perennial tributary/drainage to the Sacramento River. The study site is located within the Hydrologic Unit Code 1802011 and has been identified as EFH for Pacific Chinook Salmon (*Oncorhyncus tshawytscha*). Designated Critical Habitat is not found within the study area. The study site is part of an existing flood control project consisting of levees, maintenance roads and flood control weir structures along Lower Cache Creek and the CCSB.

Due to fluctuating flows, bypass drainage, fish passage impediments and upstream gravel mining operations, fluctuating flows, the proposed study site does not provide suitable passage, rearing, or spawning habitat for Pacific Salmonids. There are no expected impacts to Cache Creek as the levee improvements are set back from the natural channel and riparian corridor. A 3,000 foot long section of the west levee of the CCSB would be degraded to accommodate for a concrete inlet weir that would be placed on top of the existing adjacent grade. The current impact footprint does not contain shaded aquatic riverine habitat, habitat areas of particular concerns or any EFH elements. Instead the impact area consists of concrete, debris, dirt and other miscellaneous fill material from previous constructed features.

The impacts are like-for-like meaning fill material would be taken out and replaced with the same type of fill material i.e. dirt, concrete. There would be no loss of, or impact to habitat under the EFH jurisdiction within the study area. Therefore, a 'no effect' determination has been made for EFH in the study area.

Palmate-Bracted Bird's Beak

Status. PBBB was federally listed as endangered in July 1986 (51 FR 23765). Critical Habitat for this species has not been designated. The California Native Plant Society has placed it on List 1B (rare or endangered throughout its range).

Distribution. Historical populations of PBBB were scattered throughout the San Joaquin Valley in Fresno and Madera counties, the Livermore Valley in Alameda County, and the Sacramento Valley in Colusa and Yolo counties (CDFG 2000). The extant occurrences of PBBB (CNDDB 2019) are in seven metapopulations in the Sacramento, Livermore, and San Joaquin Valleys. In approximate order from north to south, these are located at (1) the Sacramento National Wildlife Refuge in Glenn County, (2) the Delevan National Wildlife Refuge in Colusa County, (3) the Colusa National Wildlife Refuge in Colusa County, (4) the Woodland area, (5) the Springtown Alkali Sink near Livermore, (6) western Madera County, and (7) the combined Alkali Sink Ecological Reserve and Mendota Wildlife Management Area in Fresno County. The total occupied surface area over the seven metapopulations is estimated at less than 741 acres.

Two CNDDB records for this species occur within two miles of the Action Area (CNDDB 2019). CNDDB Occurrence #1, which is located to the south of the Study Area, is the well-known "Woodland" site noted above. CNDDB Occurrence #3 is located along County Road 102, just south of County Road 20, approximately 0.5 mile southwest of the Action Area. The CNDDB reports this occurrence as "extirpated" due to the heavy disturbance in the area, and the lack of soil with hardpan or salt accumulations.

Life History. This species is restricted to seasonally flooded, saline-alkali soils in lowland plains and basins at elevations of less than 155 meters (500 feet) (USFWS 1998a). Small differences in soil topography are critical for seedling establishment, as seedlings establish on banks and sides of raised irrigation ditches and on small berms in areas subject to overland flows (Showers 1988). According to current data on the species, only perennial plants, such as saltgrass (*Distichlis spicata*), Mojave red sage (*Kochia californica*), and Torrey seepweed (*Suaeda moquinii*), are assumed to function as appropriate host plants for PBBB (Coats et al. 1988; Cypher 1998; EIP Associates 1998). The entire population is limited to Pescadero silty clay, saline-alkali, and Willows clay soil types (Andrews 1970).

Valley Elderberry Longhorn Beetle

Status. VELB was federally listed as threatened with Critical Habitat on August 8, 1980. A draft revised recovery plan for the species was published on October 22, 2018.

Distribution. The historic range of this beetle is limited to moist Valley oak woodlands along margins of rivers and streams in the lower Sacramento and lower San Joaquin Valleys (USFWS 1984). At the time of its listing, the beetle was known from less than 10 localities in Merced, Sacramento, and Yolo Counties (USFWS 1980). Its current distribution is patchy throughout California's Central Valley and associated foothills (USFWS 1999b).

Life History. The VELB is completely dependent on its host plant, elderberry (*Sambucus* species), which occurs in riparian and other woodland communities in California's Central Valley and the associated foothills (USFWS 1999a). Female beetles lay their eggs in crevices on the stems or on the leaves of living elderberry plants. When the eggs hatch, larvae bore into stems with a diameter of one inch or more. The larval stages last for one to two years. The fifth instar larvae create emergence holes in the stems and then plug the holes and remain in the stems through pupation (Talley 2003). Adults emerge through the emergence holes from late March through June. The short-lived adult beetles forage on leaves and flowers of elderberry shrubs. They are typically associated with elderberry stems and trunks that are greater than one inch in diameter at ground level. The USFWS considers all elderberry shrubs containing stems greater than one inch in diameter at ground level as potential VELB habitat. VELB most commonly occur in areas within, or near, some type of riparian corridor containing other woody plant species such as willow, cottonwood *(Populus fremontii* ssp. *fremontii),* wild grape (*Vitis californica),* and box elder *(Acer negundo).*

Vernal Pool Fairy Shrimp

Status. The VPFS was federally listed as a threatened species under the ESA on September 19, 1994. This species was included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (Vernal Pool Recovery Plan), which was published on December 15, 2005. Critical habitat was designated for the species on August 6, 2003.

Distribution. Historically, the range of VPFS extended throughout the California's Central Valley. Populations have been found in several locations throughout California, with habitat extending from Stillwater Plain in Shasta County through the Central Valley to Pixley in Tulare County, along the Central Coast range from northern Solano County to Pinnacles National Park in San Benito County (Eng et al. 1990, Fugate 1992, Sugnet and Associates 1993). Additional populations occur in San Luis Obispo, Santa Barbara, and Riverside Counties. The historic and current ranges of VPFS are similar in extent; however, remaining populations are more fragmented and isolated than in historical times (USFWS 2005).

Life History. VPFS live in vernal pools and ephemeral freshwater habitat. They are ecologically dependent on seasonal fluctuations in their habitat, such as the presence or absence of water during specific times of years, duration of inundation, and water chemistry such as salinity, conductivity, dissolved solids, and pH. levels. Water chemistry is one of the most important factors in determining the distribution of fairy shrimp (Belk 1977).

Fairy shrimp have delicate elongate bodies, large stalked compound eyes, no carapace, and 11 pairs of swimming legs. They swim or glide gracefully upside down by means of complex beating movements of the legs that pass in a wavelike, anterior-to-posterior direction. Female shrimp drop their eggs to the pool bottom or eggs remain in the brood sac until the female dies and sinks. The "resting" or "summer" eggs are capable of withstanding heat, cold, and prolonged desiccation. The eggs hatch when the vernal pools fill with rainwater (Donald 1983).

Vernal Pool Tadpole Shrimp

Status. The VPTS was federally listed as endangered under the ESA on September 19, 1994. This species was included in the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*, which was published on December 15, 2005.Critical habitat for VPTS was designated on August 6, 2003.

Distribution. The historic range of the vernal pool tadpole shrimp likely extended throughout the Central Valley of California, and has been documented from east of Redding in Shasta County south to Fresno County, and from the San Francisco Bay Wildlife Refuge in Alameda County. The historic and current ranges of vernal pool tadpole shrimp are similar in extent; however, current populations are more fragmented and isolated than during historical times (USFWS 2005a).

Life History. The life history of the vernal pool tadpole shrimp is linked to the phenology of the vernal pool habitat. After winter rainwater fills the pools, the populations are reestablished from diapaused eggs that lie dormant in the dry pool sediments (Ahl, 1991). Tadpole shrimp are primarily benthic animals that swim with their legs down. They climb or scramble over objects, as well as plow along in bottom sediments. Their diet consists of organic detritus and living organisms, such as fairy shrimp and other invertebrates (Pennak, 1989).

A female surviving to large size may lay up to six clutches of eggs, totaling about 861 eggs in her lifetime. Some of the eggs hatch immediately and the rest enter diapause and remain in the soil to hatch during later rainy seasons. The vernal pool tadpole shrimp matures slowly and is a long-lived species (Ahl, 1991). Adults are often present and reproductive until the pools dry up in the spring. As they mature slowly, they only occur in vernal pools that have a sufficiently long hydroperiod to remain inundated until tadpole shrimp mature and reproduce.

Giant Garter Snake

Status. The GGS was federally listed as a threatened species under the ESA on October 20, 1993. A final recovery plan was published for on September 28, 2017. Critical habitat has not been designated for this species.

Distribution. Historically, giant garter snakes inhabited the Sacramento and San Joaquin Valleys from the vicinity of Chico in Butte County southward to Buena Vista Lake, near Bakersfield in Kern County, California. The eastern and western boundaries of the giant garter snake range from the foothills occurring along each side of the Central Valley - the Coast Range to the west and the Sierra Nevada to the east (USFWS 2017). Though the abundance of giant garter snakes in the Sacramento Valley has declined, the distribution of giant garter snakes in its northern range may still reflect its historical distribution (USFWS 2012; Wylie et al. 2010).

Life History. Habitats occupied by GGS contain permanent or seasonal water, mud bottoms, and vegetated dirt banks (Fitch 1940). Open areas and grassy banks are required for basking. Small mammal burrows and other small crevices at higher elevations provide winter brumation sites and refuge from floodwaters. In some rice-growing areas, GGS have adapted well to vegetated, artificial waterways and the rice fields they supply (Hansen and Brode 1993).

GGS are associated with aquatic habitats characterized by the following features: (1) sufficient water during the snake's active season (typically early spring through mid-fall) to supply cover and food such as small fish and amphibians; (2) emergent, herbaceous wetland vegetation, such as cattails *(Typha* spp.) and bulrushes *(Scirpus* spp.), accompanied by vegetated banks to provide basking and foraging habitat and escape cover during the active season; (3) upland habitat (e.g. bankside burrows, holes, and crevices) to provide short-term refuge areas during the active season; and (4) high ground or upland habitat above the annual high water mark to provide cover and refuge from flood waters during the snake's inactive overwintering period (Hansen and Brode 1980, Hansen 1998). GGS typically emerge from winter retreats from late March to early April and remain active through October. The USFWS considers the active season for this species to be from 1 May through 1 October (USFWS 1997).

Western Yellow-Billed Cuckoo

Status. The WYBC was listed as federally threatened on November 3, 2014. A proposed rule for designation of critical habitat was published on August 15, 2014; however, no formal designation has been finalized.

Distribution. Over the last 100 years, western cuckoo population declined dramatically due to extensive loss of suitable breeding habitat, primarily riparian forests and associated bottomlands. Once considered a common breeder in California, by 1987 the WYBC was estimated to occupy of 20 percent of its historical range (Laymon & Halterman, 1987). California statewide surveys conducted over the last few decades found WYBC populations were concentrated mostly along the Sacramento River from Red Bluff to Colusa, along the South Fork of the Kern River, and portions of the Lower Colorado River.

The Yolo HCP reports nine documented occurrences of WYBC in Yolo County since 1965 (Yolo Habitat Conservancy, 2018), including one record from the CCSB in July 2005. None of these records are considered breeding records. Although there are no confirmed breeding records for Yolo County, they have been documented nesting approximately 11 miles to the northeast in riparian forests along the western toe drain of the Sutter Bypass (eBird 2019).

Life History. Yellow-billed cuckoos are among the latest arriving Neotropical migrants. WYBC arrive on their breeding grounds in Arizona and California by June. Diet during the breeding season consists primarily of large insects; in addition, they may eat tree frogs and small lizards. Nesting usually occurs between late June and late July, but can begin as early as late May and continue until late September. Nests consist of a loose platform of twigs, which are built by both sexes and take one to two days to build. Fall migration is thought to begin in late August, with most birds gone by mid-September (Hughes, 1999).

Habitat for WYBC is largely associated with perennial rivers and streams that support the expanse of vegetation characteristics needed when breeding. The range and variation of stream flow frequency, magnitude, duration, and timing that would establish and maintain WYBC habitat can occur in different types of regulated and unregulated flow conditions depending on the interaction of the water feature and the physical characteristics of the landscape. Hydrologic conditions at WYBC breeding sites can vary remarkably between years. At some locations during low rainfall years, water or saturated soil is not available. At other locations, particularly at reservoir intakes, riparian vegetation can be inundated for extended periods of time in some years and be totally dry in other years.

The USFWS identified the following primary constituent elements for the western yellow-billed cuckoo in their Proposed Critical Habitat documentation (USFWS, 2014) (79 FR 48548): (1) riparian woodlands, (2) adequate prey base, and (3) dynamic riverine processes. The optimal size of habitat patches for the species are generally greater than 200 ac (81 ha) in extent and have dense canopy closure and high foliage volume of willows and cottonwoods.

Least Bell's Vireo

Status. The LBV was listed as a federally endangered species on May 2, 1986. Critical habitat was designated on February 2, 1994.

Distribution. The least Bell's vireo is one of four subspecies of Bell's vireo and is the only subspecies that breeds entirely in California and northern Baja California. The historical distribution of the least Bell's vireo extended from coastal southern California through the San Joaquin and Sacramento valleys as far north as Tehama County near Red Bluff. The Sacramento and San Joaquin valleys supported 60 to 80 percent of the historical population. The species also occurred along western Sierra foothill streams and in riparian habitats of the Owens Valley, Death Valley, and Mojave Desert (Cooper 1861 and Belding 1878 in Kus 2002a; Grinnell and Miller 1944). Historical accounts described the species as common to abundant, but no reliable population estimates are available prior to the species' federal listing in 1986. The last known nesting pair of LBV in the Sacramento Valley was observed in 1958 (Cogswell 1958, Goldwasser 1978).

During 2010-2013, LBV surveys were conducted in the Putah Creek Sinks located in the Yolo Bypass Wildlife Area (Whisler 2013, 2015), approximately 11 miles south of the project area. LBV were observed in 2010 and 2011, and one individual in 2013. In 2010 and 2011, observed individuals appeared to be partaking in breeding and nesting behavior, but there was no evidence of successful nesting. All individuals were observed in sandbar willow scrub habitat. No further surveys have been conducted to determine the status of this species in the area.

Life History. The least Bell's vireo is an obligate riparian breeder that typically inhabits structurally diverse woodlands including cottonwood-willow woodlands/forests, oak woodlands,

and mule fat scrub (USFWS 1998). Two features appear to be essential for breeding habitat: (1) the presence of dense cover within 3 to 6 feet of the ground, where nests are typically placed; and (2) a dense stratified canopy for foraging (Goldwasser 1981; Gray and Greaves 1981; Salata 1981, 1983; RECON 1989). While LBV typically nests in willow-dominated areas, plant species composition does not seem to be as important a factor as habitat structure. Nests are placed in a wide variety of plant species, but the majority are placed in willow and mule fat. Nests tend to be placed in openings along the riparian edge, where exposure to sunlight allows the development of shrubs.

Least Bell's vireos forage primarily within and at all levels of the riparian canopy (Salata 1983); however, they would also use adjacent upland scrub habitat, in many cases coastal sage scrub. Vireos along the edges of riparian corridors maintain territories that incorporate both habitat types, and a significant proportion of pairs with territories encompassing upland habitat place at least one nest there (Kus and Miner 1989).

Environmental Consequences

Methodology

To prepare for the field surveys and analysis of the potential effects of the proposed project on wildlife, plant, and fish species, biologists reviewed existing resource information related to the study area to evaluate whether sensitive habitats and special-status wildlife species are known to occur or could occur in the study area. The key sources of data and information used in the preparation of this section are listed and briefly described below.

- CNDDB records search of the Woodland and Grays Bend USGS 7.5-minute quadrangles and the nine quads surrounding each (CNDDB 2019);
- USFWS list of endangered, threatened, and proposed species for the Woodland and Grays Bend USGS 7.5-minute quadrangle and Sacramento, Yolo, and Solano Counties (USFWS 2019)
- Vegetation data from the Yolo Natural Heritage Project (Yolo Habitat Conservancy 2018)
- Aerial photographs of the project study area;
- City of Woodland General Plan Update 2035 (City of Woodland 2017);
- Yolo County General Plan 2030 (Yolo County 2009)
- Published and unpublished reports.

A qualified biologist collected data and conducted a literature search and reconnaissance-level field surveys in the study area to determine if there was suitable habitat to support special status wildlife, fish, and plant species. The information discussed above was then used to develop a list of special-status species that could be present in the study area and to conduct the direct, indirect, and cumulative effects analysis discussed in this DSEIS. For this analysis, the project alternatives were determined to have a significant impact on special-status species if project activities would have a substantial adverse effect, either directly or through habitat modification, on any species identified as candidate, sensitive, or special species in local or regional plans or policies, or regulations, or by CDFW, USFWS, or NOAA Fisheries.

Significance Criteria

For this analysis, a direct and indirect effect, which are based on professional practice and NEPA Guidelines, to special status species was considered significant if it meets one or more of the following significance criteria:

- Have a substantial adverse effect, either directly or indirectly through habitat modification, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by CDFW or the USFWS;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites; or
- Contribute to a substantial reduction or elimination of species diversity or abundance.

No Action Alternative

Under the No Action Alternative, the Corps would not participate in construction of the proposed project. As a result, if a flood event were to occur, the city of Woodland would remain at risk of a possible levee failure due to overtopping and erosion. There would be no construction related affects to special status species; however effects to these species associated with flood fighting and O&M could be significant. Flood fighting is usually performed by placing large rock along the levee slope to stop erosion and prevent levee failure and loss of lives and property.

The placement of emergency rock would prevent or impede future growth of trees and vegetation on the levee slopes, which would impact special status fish species from the loss of SRA habitat. These actions could also result in a direct reduction of plant species abundance and diversity in the emergency repair area. Given the unpredictable nature of emergency clean-up activities, it is likely that implementation of BMPs and measures to reduce effects on fish would not be possible. All of these effects would be considered significant; however, given the uncertainty of the occurrence or magnitude of such an event, potential effects on fisheries cannot be quantified based on available information.

Under the no action alternative, O&M actions including vegetation maintenance, rodent control, slope repair, road reconditioning, groundwater level monitoring and monthly visual inspection of levees would remain the responsibility of the local maintaining agencies. Vegetation maintenance could result in the loss of suitable habitat for least Bell's vireo and yellow-billed cuckoo. Trimming of any elderberry shrubs on the levees would be conducted by the maintaining agencies, in coordination with USFWS to ensure that there would be no take of VELB associated with these actions. With this coordination, effects to VELB associated with O&M would be less than significant.

Levee and Conveyance Plan

This section is intended to identify any potential adverse project-related effects on special-status species. Project effects on special-status species would be both temporary and permanent. Temporary effects would result from construction activities, while permanent effects would result from new flood control structures.

The proposed project would be considered to have a significant effect on special-status species if it would result an adverse effect, either directly or through habitat modification, to any

threatened, endangered, or candidate species under the Federal Endangered Species Act. The effects to federally listed species with potential to occur in the project area are discussed below.

Table 3.29 Mitigation for Special Status Species.

Species	Temporary Impacts	Permanent Impacts		Total Compensation
	Impacts (acres)	Impacts (acres)	Ratio	
Palmate-Bracted Bird's Beak	None	0.15 (Indirect)	1:1	2.25 acres
		0.7 (Direct)	3:1	
Valley Elderberry Longhorn Beetle	None	6 elderberry shrubs	1:1	6 VELB credits
Vernal Pool Fairy Shrimp	0.65 (Indirect)	0.65 (Indirect)	2:1	1.3
Vernal Pool Tadpole Shrimp	0.65 (Indirect)	0.65 (Indirect)	2:1	1.3
Giant Garter Snake	0.01 (Aquatic)	1.04 (Aquatic)	3:1	29.46 acres
	41.33 (Upland)	8.78 (Upland)		
Western Yellow-Billed Cuckoo	None	None	N/A	None
Least Bell's Vireo	None	None	N/A	None

As indicated above in Table 3.29, temporary impacts would only last one season due to construction occurring in that specific area over one year. Temporary impacts would be mitigated for be restoring the area back to original condition, such as hydroseeding and planting with native vegetation. Permanent impacts would be compensated for as impacts cannot be mitigated for in any other way.

Palmate-bracted Bird's Beak

PBBB has a low likelihood of occurrence on the old irrigation berms, banks, and other minimally disturbed areas mapped as "Potential Palmate-Bracted Bird's Beak Habitat" in Appendix B. If PBBB is located within the proposed LCP footprint, any plants present would be directly removed or killed through either levee construction or excavation and construction of the new detention basin. Although the seed bank in the vicinity of the occurrence would be harvested and relocated to a suitable nearby location, this species requires a very specific habitat, and the success of any relocation efforts is unknown. Furthermore, suitable habitat is scarce, and this area of habitat would be permanently impacted. As a result, if PBBB is found within the proposed LCP footprint, the Action may affect and is likely to adversely affect the PBBB.

Permanent Effects. Based on our assumed occupancy of 10%, up to 0.70-acre of permanent direct effects to PBBB could occur (if PBBB is present) during the construction of the project during earth work and the creation of the new detention basin. Up to 0.15-acre of

permanent indirect effects to PBBB may occur (if PBBB is present) due to alteration of local hydrology resulting from construction of the levees. The Action may result in PBBB habitat ponding for longer or shorter periods than at present and may result in the killing of PBBB. There is also the potential for increased inundation to create wetland habitat, causing the expansion of suitable habitat for PBBB. Additionally, herbicides used for levee vegetation control may drift into PBBB habitat and result in the killing of PBBB.

Temporary Effects. Temporary (direct and indirect) effects to PBBB would be avoided through the implementation of environmentally sensitive area exclusion fencing, dust abatement, and worker training.

Valley Elderberry Longhorn Beetle

Two elderberry shrubs that represent potential habitat for VELB have been documented within the proposed LCP footprint, and would be removed during construction. Additional shrubs may be found during protocol-level surveys of the proposed LCP footprint and 165-foot buffer. It was assumed for the purposes of this document that four additional shrubs would be found within the proposed LCP footprint, for a total of six elderberry shrubs. All elderberry shrubs within the footprint would be transplanted to a mitigation bank prior to construction, and one mitigation credit would be purchased for each transplanted shrub. Although the removal of the shrub(s) would result in less VELB habitat within the proposed LCP footprint, none of the elderberry shrubs are riparian in nature, and the shrubs are expected to be widely scattered in an existing agricultural setting, representing very low-quality habitat for the VELB. As a result, the Action may affect, but is not likely to adversely affect the VELB.

Permanent Effects. Permanent direct effects to VELB could occur during the construction of the project. There are two observed elderberry shrubs and four estimated shrubs within the proposed LCP footprint that may be impacted. If they cannot be avoided, the elderberries would be removed and transplanted during the levee earth work and the creation of the new detention basin. Permanent indirect effects to VELB may occur from ongoing O&M activities such as trimming of elderberry shrubs and the application of herbicides and pesticides for levee vegetation control. The trimming of shrubs and herbicide and/or pesticide drift may result in the killing of VELB. See Attachment E in Appendix B for impacts to VELB.

Temporary Effects. Temporary (direct and indirect) effects to VELB would be avoided through the implementation of environmentally sensitive area exclusion fencing, dust abatement, and worker training.

Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp (VPB)

Habitat for VPB does not occur within the proposed LCP footprint; however, one depressional seasonal wetland that represents suitable habitat for VPB is present within the Action Area, almost immediately adjacent to a dirt levee maintenance road that would be used for construction access, and beyond that, the levee, where soil would be excavated and concrete slurry would be placed.

Permanent Effects. Permanent direct effects to VPB would not occur during the construction of the project, as the seasonal wetland would be avoided, fenced, and constructions crews would be trained to avoid the feature. Additionally, dust abatement measures would be in effect. Permanent indirect effects to VPB are possible if the hydrology of the seasonal wetland does in fact come from seepage through the levee. As the intent of the proposed Action is to

eliminate seepage through the levee, the proposed Action could result in dewatering of the seasonal wetland and killing of VPB. Other permanent indirect effects to VPB may occur from ongoing O&M activities such as the drift of herbicides for levee vegetation control. See Appendix B for impacts to VPB.

Temporary Effects. Temporary (direct and indirect) effects to VPB would be avoided through the implementation of environmentally sensitive area exclusion fencing, dust abatement, and worker training.

Giant Garter Snake

A total of 1.05 acres of GGS aquatic habitat is present within the proposed LCP footprint, and may be directly affected during construction. The irrigation canal along the west side of the CCSB levee that represents the majority of this acreage is not expected to be filled or otherwise manipulated during construction; however, as the basin has not yet been designed, it is possible that construction of the detention basin to the west could result in temporary impacts to the west edge of the channel. A total of 50.11 acres of GGS upland habitat is present within the proposed LCP footprint. All impacts to GGS Upland Habitat within the CCSB levee and staging areas (41.33 acres) would be temporary, would occur over one construction season, and the habitat would be restored to its prior condition following construction. An additional 4.97 acres of GGS Upland Habitat consisting of a ruderal strip between the irrigation canal and an agricultural field would be impacted by construction of the new detention basin. Following construction, the edges of the detention basin would be revegetated and hydroseeded with a native grass and forb mixture, and are expected to be functionally similar to the existing habitat. Because the detention basin would only be inundated during flood events, and most years remain dry, vegetation should match surrounding areas once the native seed mix has grown. As construction is only expected to last one year, this area is also considered to be temporarily impacted for one year. Lastly, 3.81 acres of GGS Upland Habitat would be permanently impacted by construction of the new levee, which would tie into the existing levee. Although GGS would be able to utilize the new levee for basking following construction, the new levee would be regularly maintained, and the soil cracks and rodent burrows that currently provide refugia for the snakes in the existing habitat would not be available on the new levee. As the majority of impacts are temporary in nature, are expected to last no more than one construction season, and would employ avoidance and minimization measures to avoid mortality of individual GGS, the Action may affect and is likely to adversely affect GGS.

Permanent Effects. Permanent direct effects to GGS could occur during the construction of the project from grading and crushing by vehicles. GGS also may be disturbed during the construction by vibrations and human activity. These direct effects would be minimized by only allowing work within GGS habitat during the active season (May 1 through September 30), the installation of GGS exclusion fencing, the installation of escape ramps, worker training, biological monitoring, and preconstruction avoidance surveys. Additionally, the proposed Action would permanently impact 8.78-acres of upland and 1.04-acres of aquatic GGS habitat. See Appendix B for impacts to GGS habitat. Ongoing O&M activities including mechanical vegetation management may result in the killing of GGS. Additionally, vehicles used to patrol the levees and detention basin may crush GGS.

Several permanent indirect effects to GGS were considered but were determined to have no potential to occur. Specifically, the following determinations were made. There would be no increase of trash, herbicides and/or pesticides applications, hazardous waste, or additional off-

road vehicle use due to increased human presence. The Action would not result in development or increased access to GGS habitat.

Temporary Effects. The Action would temporarily impact approximately 41.33-acres of upland and 0.01-acre of aquatic GGS habitat. Earthwork, grading, equipment and materials staging, and vehicle movement may result in the crushing and killing of GGS. The avoidance and minimization measures listed above would minimize the potential of take of GGS. Upon completion of the project all temporarily impacted GGS habitat would be restored to pre-project conditions. There would be no temporary indirect effects to GGS by the proposed Action.

We anticipate the take of two GGS by the proposed Action described above.

Western Yellow-Billed Cuckoo

Habitat for WYBC does not occur within the proposed LCP footprint, but suitable nesting habitat is present immediately to the east and north of the CCSB levee (Attachment G in Appendix B). Pre-construction surveys would be conducted if construction is initiated after April 1 in any given year, and if any WYBC nests are found, a minimum 300-foot buffer would be established, along with regular nest monitoring to ensure the nest buffer is sufficiently large to avoid adverse effects on nesting birds. As a result, birds that may already be nesting within the Action Area are not expected to be impacted by the Action. However, as WYBC does not typically arrive for nesting until late May or early June, construction may already be underway at the time the birds arrive in the area to nest. If that was the case, the noise and activity associated with construction could deter them from utilizing the riparian woodlands near the proposed LCP footprint for nesting. This would be a temporary impact, and is expected to last no more than one nesting season. Therefore, the Action may affect, but is not likely to adversely affect the WYBC.

Permanent Impacts. Because no suitable habitat for WYBC would be impacted by the Action, there would be no direct permanent effects. Several permanent indirect effects to WYBC were considered but were determined to have no potential to occur. Specifically, the following determinations were made. There would be no increase of trash, herbicides and/or pesticides applications, hazardous waste, or additional off-road vehicle use due to increased human presence. The Action would not result in development or increased access to WYBC habitat.

Temporary Impacts. Approximately 45.40-acres of suitable habitat for WYBC lies within 300 feet of the proposed LCP footprint. Indirect effects by construction noise and human activity may lead to nest abandonment and take of WYBC if present. Potential indirect effects to WYBC would be avoided by implementing the avoidance measures for the species including pre-construction surveys.

Least Bell's Vireo

Habitat for LBV does not occur within the proposed LCP footprint, but suitable nesting habitat is present immediately to the east and north of the CCSB levee (Appendix B). Pre-construction surveys would be conducted if construction is initiated after April 1 in any given year, and if any LBV nests are found, a minimum 300-foot buffer would be established, along with regular nest monitoring to ensure the nest buffer is sufficiently large to avoid adverse effects on nesting birds. As a result, birds that may already be nesting within the Action Area are not expected to be impacted by the Action. However, if Project construction is already underway if and when they arrive in the area to nest, the noise and activity associated with construction could deter them from utilizing the riparian habitat near the proposed LCP footprint for nesting. This

would be a temporary impact, and is expected to last no more than one nesting season. Therefore, the Action may affect, but is not likely to adversely affect the LBV.

Permanent Impacts. Given that no suitable habitat for LBV would be impacted by the Action, there would be no direct permanent effects. Several permanent indirect effects to WYBC were considered but were determined to have no potential to occur. Specifically, the following determinations were made. There would be no increase of trash, herbicides and/or pesticides applications, hazardous waste, or additional off-road vehicle use due to increased human presence. The Action would not result in development or increased access to WYBC habitat.

Temporary Impacts. Approximately 49.88-acres of suitable habitat for LBV lies within 300 feet of the proposed LCP footprint. Indirect effects by construction noise and human activity may lead to nest abandonment and take of LBV if present. Potential indirect effects to LBV would be avoided by implementing the avoidance measures for the species, including pre-construction surveys.

Mitigation

The measures described below would be implemented to avoid, minimize, or mitigate the impacts described above.

General Conservation Measures

- Avoid vegetation removal, grubbing, and contouring activities to the extent feasible.
- Identify all habitats containing, or with a substantial possibility of containing, listed terrestrial, wetland, and plant species in the potentially affected project areas. To the extent practicable, efforts would be made to minimize effects by modifying engineering design to avoid potential direct and indirect effects.
- Incorporate sensitive habitat information and requirements for contractors to avoid identified sensitive habitats within project bid specifications.
- Construction materials such as portable equipment, vehicles, and supplies, would be stored at designated construction staging areas and barges, exclusive of any riparian and wetlands areas.
- All liquid chemicals and supplies would be stored at a designated impermeable membrane fuel and refueling station.
- Erosion control measures, including a Storm Water Pollution Prevention Program and a Water Pollution Control Program, would be implemented to minimize soil or sediment from entering the river. The measures shall be installed, monitored for effectiveness, and maintained throughout construction operations to minimize any effects to federally-listed species and EFH.
- Construction would be scheduled when listed terrestrial and aquatic species would be least likely to occur in the project area.
- Site access would be limited to the smallest area possible in order to minimize disturbance.
- Litter, debris, and unused materials would be removed from the project area daily. Such materials or waste would be deposited at an appropriate disposal or storage site.
- Any spills of hazardous materials would be cleaned up within 24 hours and reported to the resource agencies. Any such spills, and the success of the efforts to clean them up, shall also be reported in post-construction compliance reports.
- A Corps-appointed biologist would serve as the point-of-contact for any contractor who might incidentally take a living, or find a dead, injured, or entrapped threatened or

endangered species. The representative shall be identified to the employees and contractors during an all employee education program conducted by the Corps.
- The USFWS and NMFS would be informed of any changes in project construction scheduling as soon as possible. Should the project schedule be altered from that described herein, the Corps must immediately reinitiate formal consultation as per 50 §CFR 402.16.
- The Corps would check with the Service before each construction season to ensure that any and all updates to these guidelines are incorporated into the project. The Service would be informed of conservation area monitoring plans to ensure that success criteria outlined in these guidelines are accurately assessed.

Palmate-Bracted Bird's Beak Conservation Measures

The following measures are proposed to minimize potential impacts to PBBB:

- Surveys. Protocol-level surveys for PBBB would be conducted throughout all areas of suitable habitat within the proposed LCP footprint and within 100 feet of the proposed LCP footprint no later than the identifiable season prior to construction.
- Avoidance or Compensation. If PBBB is documented within the proposed LCP footprint or within 100 feet, a 100-foot avoidance buffer would be established around the plants. If impacts to the plants themselves are unavoidable, or a 100-foot avoidance buffer cannot be established, then the compensation measures would be implemented, including education and habitat enhancement at Woodland Regional Park (Hogan, n.d.).

Valley Elderberry Longhorn Beetle Conservation Measures

Surveys for elderberry shrubs would be conducted in accordance with the *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus)* (USFWS 2017) ("VELB Framework"). Surveys would be conducted throughout the proposed LCP footprint and within all accessible areas within 165 feet of the proposed LCP footprint. The surveys would not be restricted to areas identified as "Potential Habitat", as isolated shrubs may also occur outside of those areas.

If any elderberry shrubs are identified during the survey described above, the following Avoidance and Minimization measures would be implemented to avoid and minimize effects to VELB and/or its habitat outside of the immediate Study Area, but within 165 feet. If any elderberry shrubs are found within the proposed LCP footprint, compensation measures would be implemented.

Construction Avoidance and Minimization Measures

- Protective Fencing. All areas to be avoided during construction activities would be fenced and/or flagged.
- Signage. Signs would be placed along the fenced buffer areas with the following information: "NOTICE: This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment."
- Avoidance Area. An avoidance area would be established of at least 20 feet from the drip-line of all elderberry shrubs; this avoidance area would be fenced and/or flagged.

- Pre-Construction and Post-Construction Surveys. Pre-construction and post-construction surveys would be conducted for all accessible elderberry shrubs within 165 feet of the proposed LCP footprint. Pre-construction surveys would document compliance with avoidance and minimization measures (fencing and signage). The post-construction survey would confirm that there was no damage to elderberry shrubs.
- Trimming. Trimming of elderberry shrubs would occur between November and February and only branches and stems less than 1 inch in diameter would be removed.
- Chemical Usage. Herbicides would not be used within 20 feet of an elderberry shrub. Insecticides would not be used within 100 feet of an elderberry shrub. All chemicals would be applied using a backpack sprayer or similar direct application method. All chemicals would be applied by certified applicators and according to manufacturer's instructions. Chemical applications would be applied with sustained wind speeds 8 miles per hour (mph) and below, with temperatures below 90°F, to prevent wind drift and harmful volatilization.
- Mowing. Mechanical weed removal within the drip-line of the shrub would be limited to the season when adults are not active (August - February) and would avoid damaging the elderberry.
- Dust Control. Any areas of bare ground that are disturbed as a result of construction activities, or dirt haul roads within 100 feet of elderberry plants would be watered at least twice a day during the dry season to minimize dust. Haul trucks carrying soil away from the degraded levee would be covered if possible to minimize dust during transport.

Operations and Maintenance Avoidance and Minimization Measures

- Trimming. Trimming of elderberry shrubs would occur between November and February and only branches and stems less than 1 inch in diameter would be removed.
- Chemical Usage. Herbicides would not be used within 20 feet of an elderberry shrub. Insecticides would not be used within 100 feet of an elderberry shrub. All chemicals would be applied using a backpack sprayer or similar direct application method. All chemicals would be applied by certified applicators and according to manufacturer's instructions. Chemical applications would be applied with sustained wind speeds 8 miles per hour (mph) and below, with temperatures below 90°F, to prevent wind drift and harmful volatilization.
- Mowing. Mechanical weed removal within the drip-line of the shrub would be limited to the season when adults are not active (August - February) and would avoid damaging the elderberry.

Vernal Pool Branchiopod Conservation Measures

Construction Avoidance and Minimization Measures

- Protective Fencing. The vernal pool branchiopod habitat within the Action Area is not proposed for impact, and would be fenced with silt fence and signage as far from the feature as possible. A qualified biologist would survey and approve the placement of the fencing prior to commencement of construction.

Operations and Maintenance Avoidance and Minimization Measures

- Herbicides and Pesticides. Herbicide and pesticide spraying in association with maintenance activities within 250 feet of vernal pool branchiopod habitat would not be performed on .days with sustained winds higher than 8 mph or with temperatures above

90°F to prevent wind drift and harmful vaporization (Buhler 2019). Only herbicides or pesticides specifically labeled for use near aquatic resources would be utilized within 50 feet of vernal pool branchiopod habitat. Chemicals would be applied by certified applicators and according to manufacturer's instructions.

Giant Garter Snake Conservation Measures

Construction Avoidance and Minimization Measures

- Construction Timing. Any earthwork within 200 feet of GGS aquatic habitat would be completed from May 1 to September 30 during the active season.
- Pre-Construction Surveys and Avoidance. A giant garter snake survey would be conducted by a biological monitor 24 hours prior to construction in any suitable aquatic or upland habitat. Should there be any interruption in work for greater than two weeks; a biological monitor would survey the proposed LCP footprint again no later than 24 hours prior to the restart of work. If a snake is discovered, no work would occur within a 200-foot radius of the snake discovery location until the snake moves away from construction activities. The snake shall not be harassed or encouraged to leave the construction area, but would be allowed to do so on its own.
- Wildlife Exclusion Fencing. A 32-inch-high silt barrier fence would be installed between GGS aquatic habitat and adjacent proposed LCP footprint (including staging areas). The fence would be installed as far from the aquatic habitat (as close to construction impacts) as possible, and a map of proposed fencing locations would be provided to USFWS for review and approval prior to installation. Four inches of the bottom portion of the fence would be buried in a trench to prevent wildlife passage. The silt fence would be maintained throughout construction and would be removed upon completion of the Action.
- Daily Clearance Sweeps. In all areas within GGS upland habitat, a biological monitor would conduct a clearance-sweep of the proposed work area for each day prior to commencement of work to ensure that no GGS are present if work occurs during the dormant season, October 1 to April 29. This daily clearance sweep would include checking any potential natural earthen burrows, equipment, vehicles and stockpiles, and the wildlife exclusion fencing within the work area.
- Biological Monitor. A biological monitor would be present to monitor all work within GGS aquatic habitat. If a GGS enters the work area, the monitor would have the authority to halt work until the snake leaves the work area on its own.
- Wildlife Protection in Trenches and Holes. All excavated, steep-walled holes or trenches would be covered with appropriate covers (thick metal sheets or plywood) at the end of each workday. Covers would be placed to ensure that trench edges are fully sealed with rock bags or sand. Alternatively, such trenches may be furnished with one or more escape ramps constructed of earth fill or wooden planks to provide escape ramps for wildlife, approved by the monitoring biologist. Before holes or trenches are filled, sealed, or collapsed, they would be thoroughly inspected for trapped animals. Any animals discovered would be allowed to escape voluntarily, or would be removed by the monitoring biologist.
- Speed Limit. Maintain a 10-mile-per-hour speed limit within potential GGS upland habitat including haul/ access routes, except on county roads and state and federal highways.
- Construction Lighting/Daily Timing. Construction and ground disturbance within potential GGS upland habitat would occur during daytime hours. Work would cease no less than 30 minutes before sunset and would not begin again prior to 30 minutes after sunrise. Nighttime lighting of potential GGS upland habitat should be avoided to the greatest extent practicable.

  - If emergency 24-basis construction were required to ensure levee completion prior to flood season, coordination with the Resource Agencies, including USFWS, would be required with their approval granted prior to initiation of 24-hr work, to ensure avoidance with special-status species including GGS.
- Equipment Movement and Stockpiles. Movement of heavy equipment to and from the construction site would be restricted to established roadways. Stockpiling of construction materials would be restricted to designated staging areas, which would be located more than 200 feet away from giant garter snake aquatic habitat wherever possible.

Operations and Maintenance Avoidance and Minimization Measures

- Herbicides and Pesticides. Only herbicides or pesticides specifically labeled for use near aquatic resources would be utilized within 50 feet of GGS aquatic habitat. All chemicals would be applied by certified applicators and according to manufacturer's instructions. Chemical applications would be applied with sustained wind speeds 8 miles per hour (mph) and below, with temperatures below 90°F, to prevent wind drift and harmful volatilization.

- Speed Limit. Maintain a 10-mile-per-hour speed limit within potential GGS upland habitat, except on county roads and state and federal highways.

Western Yellow-Billed Cuckoo and Least Bell's Vireo Conservation Measures

The following measures would be implemented to minimize effects on WYBC and LBV and their potential nesting habitat during construction and maintenance activities.

Construction Avoidance and Minimization Measures

- Pre-Construction Surveys and Avoidance. To the maximum extent practicable, the Corps would avoid construction in areas within 300 feet of potential WYBC or LBV nesting habitat during the period from May 15 through September 30.

- When construction within 300 feet of potential nesting habitat must occur between May 15 and September 30, a USFWS-permitted biologist would conduct a presence/absence survey for WYBC and LBV within all accessible suitable habitat within 300 feet of the proposed construction area. The surveys would be conducted within 14 days prior to the start of construction within each construction season. If any nesting WYBC or LBV are detected within that area, construction would halt within a 300-foot buffer until the young fledge or the biologist determines that the nest is inactive. Additionally, the biologist would monitor the nest daily when work is occurring within 500 feet of the nest to ensure that the work is not altering nesting behavior.

Operations and Maintenance Avoidance and Minimization Measures

- Herbicide and pesticide spraying in association with maintenance activities within 300 feet of potential WYBC or LBV nesting habitat would not be performed on windy days.

3.3.10 Cultural Resources

Cultural resources include buildings, structures, objects, sites, districts, and archeological resources associated with historic or prehistoric human activity. The cultural value of these resources may be of national, state, or local significance. On the Federal level, cultural resources that are listed in, or eligible for listing in, the National Register of Historic Places (NRHP) are known as historic properties.

For a cultural resource to be determined eligible for listing in the NRHP, it must meet certain criteria. The resource has to be at least 50 years old or exhibit exceptional importance and meet one or more of the following criteria as defined in 36 CFR 60.4. It must (1) be associated with events that have made a significant contribution to the broad patterns of our history; (2) be associated with the lives of persons significant in our past; (3) embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or (4) have yielded, or be likely to yield, information important in prehistory or history.

Affected Environment

Cultural Context

Prehistory

The earliest known human occupation in or near the study area is from Borax Lake, located approximately 50 miles away near Clear Lake, where radiocarbon dates place a site recorded as CA-LAK-36 in the 10,000- to 12,000-year-old range. Artifacts from this site consist of fluted projectile points and chipped stone “cresents,” both of which are typical of sites of similar antiquity elsewhere. This was an era when large game hunting was emphasized. Archeological evidence for continuous habitation of the study area is missing until the period of around 2000 B.C. Radiocarbon dates from a prehistoric site in Capay Valley show that both large and small game were being hunted and undoubtedly many vegetable food sources were being used by that period. Populations in the region, as elsewhere in California, continued to increase through time, with the result that technological specialization in economic and ceremonial systems became characteristic. In the most recent archeologically distinct period of 500 A.D.-1770 A.D., the bow and arrow became predominant. By this period, acorns had become a staple food source, and all manner of plants, animals, and fish were used for food, basket materials, decorative items, shelter, ceremonial and musical implements, clothing, and other items. There are numerous recorded archeological sites along Cache Creek and the Sacramento River that have provided evidence of a substantial population already in place prior to arrival of non-Native Americans.

Ethnography

“Ethnography” refers to the recent history of the Native Americans of the region, from the late 1700’s to the early 1900’s. During this period, the Penutian-speaking Patwin Indians occupied a large area west of the Sacramento River, north from the town of Princeton and south to the city of Benicia. The Patwin were composed of three main groups: the River, Hill, and Southern Patwin. Patwin peoples were organized along socio-political lines in small units called tribelets and lived throughout the study area until their virtual eradication by the ever-increasing influx of Euro-Americans who took up the land for farms, ranches, and towns. Epidemics of malaria and smallpox in the 1830’s also contributed to the rapid decimation of the Patwin.

Before such events, the Patwin lived along waterways in permanent villages that varied in size from 50 to 1,000 inhabitants. The larger villages were along the Sacramento River. There is little evidence for permanent occupation away from the various streams in the study area, although temporary campsites and other temporary use areas may have been established. A wide variety of food and other resources were available and used by the Patwin, including fish, deer, elk, birds, berries, seeds, and particularly acorns. Trade networks were extensive and trade goods included items not otherwise present in the study area, such as obsidian from Clear Lake, shell beads from the coast, and salt from farther north. The village of Churup, a Patwin name, was recorded near the town of Yolo. The village of Chila was located near Cache Creek at its lower terminus.

History

Euro-American occupation in the Sacramento Valley is represented first by Spanish interests, then Mexican dominion, and finally by American claim of the region. English fur trappers were present, but English rule of the territory was not. Explorers and trappers entered the Sacramento Valley at least by 1808. Under the First Mexican Empire, Captain Luis Arguello's expedition of 1821 was probably the first near the study area. In 1829, Alexander McLeod of the Hudson's Bay Company led a hunting and trapping party, and encountered Cache Creek, which they named as such because of the caches of pelts and furs they hid in the banks of the creek. French Camp, on the north bank of the creek about 1 mile downstream from Yolo was one such site (Walters, 1995).

William Gordon, the first major Euro-American settler in the study area, came to Yolo County in 1842 and claimed the Mexican land grant of Rancho Guesesosi along Cache Creek as his own. His first house, built on the north side of Cache Creek, is long gone. Gordon had to reestablish his claim on the land after 1846 when Alta California became part of the United States. He was issued a patent for the 8,894.49 acres. The rancho boundaries are defined by County Road (CR) 19 on the north, CR 94B on the east, State Highway 16 on the south, and CR 89 on the west. He farmed the property until 1866 (Walters, 1995). Gordon represents the first wave of settlers who acquired large parcels of land for ranching and farming. Agriculture was historically, and still remains, the primary industry of Yolo County.

Adjacent to and downstream of Rancho Guesesosi, on both sides of Cache Creek, lay Rancho Rio Jesus Maria, which was taken up by Thomas Hardy in 1843. His ranch covered 6 leagues or 26,000 acres. Hardy died in 1849, and his ranch was bought by James Madison Harbin, James M. Estill, George W. Tyler, and John G. Parrish. They were eventually issued a patent for the land in 1858. Harbin ended up with much of the property and sold off parcels until none remained in his ownership. He and his family lived on the land for about 7 years (Walters, 1995). Rio Jesus Maria was the original Spanish name for Cache Creek. On the 1858 surveyor's plat for the ranch, there are four residences, including three upstream of Yolo and one downstream. Later maps continue to show structures in these locations; however, they would have to be field inspected to determine if they represent earlier or later occupations.

The town of Yolo and the city of Woodland are both within the study area. Yolo grew out of a community established on the property of Thomas Cochran, who built a modest inn there in 1849. Later, James A. Hutton acquired some of the property. The Yolo Post Office was officially open in 1853. In 1857, the town of Cacheville, as it was then called, became the Yolo County seat of government. Yolo boasted a newspaper, church, and cemetery, among the other properties and residences. The county seat was moved to Washington (now Broderick) in 1860.

Settlement in Woodland began when John Morris, from Kentucky, moved to the current site of First and Clover Streets in 1849. The area was informally called Yolo City until the wife of Frank S. Freeman named it Woodland as the petition for establishment of a post office was forwarded to Washington, then the county seat (Larkey and Walters, 1987). In 1862, Freeman successfully lobbied to have the county seat moved to Woodland where it has remained since that time (Larkey and Walters, 1987).

Although growth in Yolo County, including the communities of Yolo and Woodland, continued steadily in the mid- and late 1800's, the coming of the railroad to Woodland in 1869 accelerated that development. Growers profited because there was now a ready source to transport produce, particularly grain, to market. By the 1880's, vineyards, orchards, and other crops began to be more important and were planted, sometimes in place of grain (Larkey and Walters, 1987). Farmers such as Camillus Nelson, R. H. Beamer, Harvey Gable, W. B. Gibson, and others prospered and built grand homes in Woodland or in the outlying areas. Some of these are still standing and are within the study area.

No account of the history of Cache Creek can ignore the effect of the gravel mining operations that have been carried out for the last 100 years. This activity has been a significant force in Yolo County economics and has markedly changed the regime of the stream in the upper part of the study area. Some cultural properties are no longer in existence because of the gravel extraction along the creek. Downstream from the gravel mining, Cache Creek has remained in its current course for the last 100 years.

Cultural Resources Investigations

A records and literature search was conducted at the Northwest Information Center at Sonoma State University in March 2001 for the study area and again in September 2019 for an area comprising the cultural resources area of potential effects (APE) and a surrounding ¼-mile buffer. The cultural resources APE is defined as the geographic area or areas within which a federal undertaking may directly or indirectly cause alternations in the character or use of historic properties, if such properties exist (36 CFR § 800.16(d)). The records and literature search results indicate that only three previous cultural resources investigations have occurred within the APE, and that these investigations covered less than five percent of the total APE. Previously recorded cultural resources identified through the records search include a total of nine historic-era resources in the APE and four additional historic-era resources within a ¼ mile of the APE. No known prehistoric resources are recorded either in or within a ¼ mile the APE. The previously recorded resources are listed in Table 3-30 and summarized below.

Table 3-30. Record Search Results for Cultural Resources

Resource Number	Trinomial	Name	NRHP Status	Within APE
P-57-000594	CA-YOL-000246H	Cache Creek Levee	Unknown	Yes
P-57-000751		Dinsdale Ranch Site	Unknown	Yes
P-57-000764		Woodland Racetrack Site	Unknown	Yes
P-57-000847		Adams Grain #1	Unknown	No
P-57-000920		Pacific Rice Mills	Unknown	Yes
P-57-000970		California-Pacific RR Route Thru Yolo County District;	Unknown	Yes
P-57-000977		Central-Pacific RR Route Thru Yolo County District	Unknown	Yes
P-57-000986		Barn #1 (c.1890s-Present)	Unknown	Yes
P-57-001095		Aoki Farm Fields (c.1950s-Present)	Unknown	Yes
P-57-001272		Northern Electric Railway Route	Unknown	Yes
P-57-000792		Spreckles Sugar Plant	Unknown	No
P-57-001018		Nelson's Grove	Unknown	No
YOL-HRI-5/148		Robinson Olive Trees	Unknown	No

The Cache Creek Levee, site CA-YOL-246H, is located on the north bank of Cache Creek. The levee segment is 11.81 miles long and is named Unit 1 of "Unit No. 126" in the 1961 Supplemental Operation and Maintenance Manual. The levee is approximately 10 feet high, 12 feet wide at the crown, and about 50 feet wide at the base. Both the water and landside of the levee is covered in riparian vegetation. The levee was constructed prior to 1938 and later modified to bring it up to USACE Flood Control Levee specifications. It was incorporated into the USACE Sacramento River Flood Control Project in 1943.

Site P-57-000751 is the Dinsdale Ranch located at the southwestern end of the APE. The Dinsdale Ranch was owned by John Dinsdale and Sofi Wallace Dinsdale. It was built c.l890s and operated as a 160+ acre beet sugar field. The Dinsdale Ranch sold its crops to the Spreckles processing plant in Yolo County. The ranch included all of the NE¼ of Sec. 35 and was sold in pieces beginning in 1978. The buyers included RC Collett and Carl Panatoni and Buzz Oats. RC Collett was a road construction firm, which used the ranch-proper for its office and equipment yard. The south side of the property, south of I-5, is part of the Bronze Star Retail Center, east of County Road (CR) 102. Directly behind the Collett property are a motel and a fitness center. Directly across from the ranch was the grade for the Northern Electric Rail Road (RR), which currently operates as the Sierra Northern RR (SERA). To the east of the Collett property is Mazda parts warehouse and the Walgreens Distribution Center, which was built over alkaline soil. The barn (still standing) and the home (razed c.late-1960s) were built in c.1890s.

Site P-57-000764 consists of the Woodland Racetrack, which was located on Kentucky Avenue (previously named Racetrack Road) but is no longer in existence. The entrance to the track was on the north side of then-Racetrack Road, at the intersection with College Street.

When the racetrack closed and the Southern Pacific tracks were relocated to East Street, the street was renamed Kentucky Avenue.

Site P-57-000847 consists of Adams Grain #1, a rice mill started c.1920s. It is located on the north side of the SERA RR tracks, bordering East Main Street at the northwest corner of CR 102.

Site P-57-000920 is the Pacific Rice Mill, a multi-dryer/silo facility, with both truck and train access. It is located just west of the California Northern RR tracks, at the northwest corner of Kentucky Avenue and North East Street.

Site P-57-000970 consists of the California-Pacific RR Route through Yolo County. The original route of the California-Pacific RR coursed through Yolo County, from Davisville (Davis) to Knight's Landing, with a spur running from Knight's Landing northeast to a currently defunct sugar beet farm. The tracks through Woodland were removed in 1872 and replaced on East Street, where they are currently owned and operated by the California-Northern RR.

Site P-57-000977 consists of the Central-Pacific RR Route thru Yolo County. These track were immediately adjacent to the California-Pacific RR Route (Site P-57-00970). The original route of the Central-Pacific RR coursed through Yolo County, from Davisville (Davis) to Woodland, with a spur running to Knight's Landing and another spur running northeast to a currently defunct sugar-beet farm. The original tracks through Woodland were removed in 1872 and replaced on East Street, where they are currently owned and operated by the California-Northern RR, under a long-term lease with the Union Pacific RR. A second set of rails went northwest from near the intersection of current-day Kentucky Avenue (CR 20 back in the 1800s and Racecourse Avenue around the early 1900s), across Kentucky Avenue, then across present-day I-5 (built c.1974). The line travels on the northwest side of old Hwy. 99 west towards the Yolo/Colusa County Line, just north of Dunnigan, CA. The line also passes through the towns of Yolo and Zamora.

Site P-57-000986 consists of a wooden 19th Century "A" frame barn. The barn has a center door, flanked by an additional door and the upper overhang once held a boom. An ad for a Yuba City (Sutter County) water well drilling company covers the loft door. The barn is located on the west side of CR-98; north of West Kentucky Avenue/CR-20.

Site P-57-001095 consists of the Aoki Farm Fields. George Aoki and his family have farmed these fields since the 1950s. George was born April 11, 1925 and passed away July 1, 2008. The fields are located west of CR 16 between West Kentucky Avenue and West Main Street.

Site P-57-001272 consists of the Northern Electric Railway Route. The Northern Electric Railway started at the Woodland Depot, located on the southwest corner of the intersection of 2nd Street and Main Street in c.1912. It remained operational until Halloween 1940. The building remained vacant until c.1960 when it was razed. In 1986, local businessman and County Supervisor Tom Stallard rebuilt a replica depot using the original blueprints. The tracks were moved c.1960 to a point just east of East and Main Streets, where the tracks are still operational. The Northern Electric was replaced by the Sacramento Northern in 1940. Sacramento Northern continued to haul passengers and freight to Sacramento until c.1960. The line was sold to Western Pacific, then to Union Pacific. In 1991, the Yolo Shortline restarted freight serve to West Sacramento. They also started the Sacramento River Train. In 2012, the

Yolo Shortline merged with the Sierra Railroad and was renamed the SERA. The line still travels approximately 16-miles from Woodland to West Sacramento, but on an as needed basis.

The Spreckels Sugar processing plant (P-57-000792) is located on CR 18C. Completed in 1937, the plant was designed in the Moderne architectural style. Nelson's Grove (P-57-001018) at CR 99E south of CR 18, and Robinson olive trees (YOL-HRI-5/148) lining CR 18A (Best Ranch Road) are all on the Yolo County Historic Inventory. They are located between Woodland and Cache Creek to the north. The Robinson olive trees are 140 years old, and Nelson's Grove is the only extant area of the original oak woodland remaining. Nelson's Grove is both a natural and a cultural resource. None of these resources have been evaluated for the NRHP.

Through the records and literature search it also was determined that, in 1982, a building inventory was completed of the potentially historic buildings in the city of Woodland (Wirth A.I.A. & Associates/Architects, Inc. 1982). A similar county-wide survey also was completed in 1986. The 1982 inventory identified 32 properties that were recommended for inclusion in the NRHP. All of these properties are located outside of the APE and surrounding ¼ mile radius, but are within the larger study area.

The NRHP website (https://www.nps.gov/subjects/nationalregister/index.htm) currently lists eight individual historic properties in the city of Woodland, and one historic district. The eight individual properties are the R.H. Beamer house at 19 3rd Street, the William B. Gibson house at 512 Gibson Road, the Hotel Woodland at 426 Main Street, the Walnut Street School at 175 Walnut Street, the Yolo County Courthouse at 725 Court Street, the Woodland Public Library at 250 1st Street, the Porter Building at 501-511 Main Street and the I.O.O.F Building at 723 Main Street. The historic district is the entire Downtown Woodland Historic District, which is on Main Street between Elm and Third Streets. Presumably, the Downtown Woodland Historic District nomination was based on the results of the 1982 historic building inventory. Additionally, two other buildings in the city have been designated as State Historical Landmarks: the Woodland Opera House (#851) and the Gable Mansion (#864). Neither of these two buildings are listed on the NRHP, however.

The Nelson Ranch on CR 18C, located north of the city of Woodland, is a property that is listed on the NRHP. This two-story brick residence was built in 1872 and has intact outbuildings. The Wells Fargo express stop and bank is located adjacent to modern farm buildings and a residence near the town of Yolo, on the south side of the creek. It is reported as having been built by W. G. Hunt in the 1860's opposite Yolo because high waters in Cache Creek made crossing to town dangerous and/or impossible (Larkey, pers. comm. 2002). The Wells Fargo express stop and bank has not been evaluated for NRHP eligibility but is listed in the Yolo County Historic Inventory. All the historic-era properties listed above, while outside the APE and surrounding ¼-mile radius, are still within the study area for the project and are representative of the types of resources and historical context found in the general project area.

Environmental Consequences

Most of the cultural resources located within a ¼ mile of the APE would not be impacted by the project. Changes in cultural resources pertinent to the current proposed alternative are discussed below. An impact would be considered significant if the project would adversely affect historic properties, as defined at 36 CFR § 800.16(l).

Significance Criteria

Title 54 U.S.C. § 306108, commonly known as Section 106 of the National Historic Preservation Act (NHPA), requires Federal agencies to take into account the effects of their undertakings on historic properties. Undertakings are projects, activities, or programs funded in whole or in part under the direct or indirect jurisdiction of a Federal agency (54 U.S.C. § 300320). The process for implementing Section 106 of the NHPA is described at 36 CFR Part 800. The Section 106 process involves identifying historic properties in the APE for an undertaking and resolving any adverse effects on such properties through a consultative process involving the lead Federal agency, the State Historic Preservation Officer (SHPO), Indian tribes, and other consulting parties. Implementation of an action alternative that would cause an adverse effect on historic properties also would constitute a significant cultural resources impact under NEPA. An adverse effect would result if the action alternative would alter any of the characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR §800.5). Examples of adverse effects include:

- Physical destruction, damage, or alteration of all or part of the historic property;
- Alteration of the property in a way inconsistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR Part 68);
- Removal of the property from its historic location;
- Change of the character of the property's use or of physical features within the property's setting that contribute to its significance;
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;

Due to real estate access issues and other project constraints, the APE for the proposed undertaking has not yet been systematically surveyed for historic or prehistoric resources. Additionally, many previously recorded buildings and structures have yet to be evaluated for the NRHP. As such, a phased approach to Section 106 compliance, to include deferring the identification and evaluation of historic properties as provided for to 36 CFR § 800.4(b)(2), is needed. In order to phase the Section 106 process, execution of a Programmatic Agreement (PA) is required pursuant to 36 CFR § 800.14(b)(1)(ii).

The USACE has prepared a draft PA (Appendix C) that stipulates the steps that would be taken to comply with the Section 106 of the NHPA and 36 CFR Part 800 should a project be authorized for construction. In accordance with 36 CFR Part 800 requirements, USACE has notified the Advisory Council on Historic Preservation of the need for a PA, consulted with the California SHPO on the development of the PA, and invited the following Indian tribes to consult under Section 106 regarding the undertaking and PA: Mooretown Rancheria of Maidu Indians, Yocha Dehe Wintun Nation, Ione Band of Miwok Indians, Tsi Akim Maidu, Colfax-Todds Valley Consolidated Tribe, Shingle Springs Band of Miwok Indians, Strawberry Valley Rancheria, Wilton Rancheria and the Estom Yumeka Maidu Tribe of the Enterprise Rancheria. The Yocha Dehe Wintun Nation and Shingle Springs Rancheria have expressed interest in consulting with USACE regarding the proposed undertaking.

USACE will continue to consult with these parties on the development of the PA, which must be fully executed before USACE signs of a Record of Decision (ROD) for the project. Section 106 compliance would conclude upon execution and implementation of the PA. Implementation of the steps outlined in the PA would take place, as appropriate, beginning with

a more complete inventory and evaluation of the cultural resources in the project APE. Mitigation of any adverse effects would be accomplished prior to, during, or following project construction, as stipulated in the PA.

No Action Alternative

Under the No Action Alternative, the Corps would not conduct work to address levee overtopping, seepage, or stability concerns along Lower Cache Creek. Known cultural resources in the study area would remain at risk of damage from flooding and subsequent cleanup and restoration activities. The risk of damage to cultural resources from the regular operation and maintenance of the existing Cache Creek channel levees would continue as well under the No Action Alternative

Levee and Conveyance Plan

Under this plan, cultural resources south of the proposed levee would be protected from flood damage; however, cultural resources between the new levee and the creek would still be subject to flooding and other damages as they are currently. By way of example, based on floodplain mapping, under the LCP, known cultural resources such as the Robinson olive trees, Nelson's Grove, and the Camillus Nelson residence could still be flooded during a severe event, but the depth and duration of water ponding would vary depending on the location of the resource. Additionally, cultural resources in the direct APE could be adversely affected by project construction activities. These effects would be considered less than significant with the implementation of mitigation measures.

Mitigation

Additional cultural resource surveys will be required to identify historic properties that could be directly affected by construction of the project, as well as the nature and extent of those effects. Additionally, further research will be needed to determine if the frequency, depth, and duration of water ponding associated with new levee construction would adversely affect Nelson Ranch, which is listed on the NRHP, or other potential historic properties, such as Nelson's Grove and the Robinson olive trees. Any adverse effects to historic properties resulting from project construction and implementation would be mitigated through measures described in the PA, which will be executed pursuant to Section 106 of the NHPA prior to signing a ROD. If adverse effects to any historic properties are found during the phased identification and evaluation process specified in the PA, those effects would be mitigated as stipulated in that document.

3.3.11 Aesthetic and Visual Resources

This section describes the regulatory and environmental settling for aesthetic and visual resources, effects on visual resources that would result from the proposed project, and minimization and mitigation measures that would reduce potentially significant effects.

Regulatory Setting

There are no Federal or State laws concerning aesthetic and visual resources. However, significance criteria have been developed to determine significance of impacts resulting from construction of the LCP and long-term effects. The following local regulations and policies apply to the resources covered in this section:

- City of Woodland 2035 General Plan – Adopted May 2017
- City of Woodland Zoning Ordinances
- City of Woodland Tree replacement program ordinance 12.48.100
- Yolo County 2030 Countywide General Plan – Adopted November 2009
- County of Yolo Bicycle Transportation Plan – March 2013
- Yolo County Oak Woodland Conservation and Enhancement Plan – Adopted January 2007

Affected Environment

Most of the information on aesthetic and visual resources from the 2003 DEIS-EIR remains unchanged, and is therefore incorporated into this DSEIS by reference. Changes in aesthetic and visual resources pertinent to the current proposed alternative are discussed below.

The study area is primarily in an agricultural/industrial region with residential parcels to the south, each with their own unique aesthetic qualities. This includes the linear and checkerboard pattern of fields, crops, and orchards contrasted by the curvilinear meandering form of the creek and its associated riparian vegetation. The rural/agricultural nature of orchards, croplands, and the occasional farm structure contrasts greatly with the adjacent developed areas of Woodland and Yolo. New warehouses in Woodland are introducing an urbanized scene to the agronomic setting. Orchards, croplands, and the urban areas of Woodland and Yolo characterize the valley portion of the study area. The riparian vegetation adjacent to the levees is visible from the town of Yolo and from I-5. The north Coast Range Mountains and the Sierra Nevada Mountains are visible when weather or air quality conditions allow, but not dominant landscape features.

Aesthetic and visual resources are the natural and human-built features of the landscape that can be seen and contribute to the public's enjoyment of the environment. Identifying a study area's visual resources and conditions involves three steps: objective identification of the visual features (visual resources) of the landscape; assessment of the character and quality of those resources relative to overall regional visual character; and determination of the importance to people, or sensitivity, of views or visual resources in the landscape.

The visual components of a particular area consist of such features as: landforms, vegetation, manmade structures, and land-use patterns. Visual character is influenced by geologic, hydrologic, botanical, wildlife, recreational, and urban features. The perception of visual character can vary significantly seasonally, even hourly, as weather, light, shadow, and elements that compose the viewshed change.

Visual sensitivity depends on the number and type of viewers and the frequency and duration of views. Visual sensitivity is also modified by viewer activity, awareness, and visual expectations in relation to the number of viewers and viewing duration. For example viewers using recreation trails and areas, scenic highways, and scenic overlooks are usually assessed as having high visual sensitivity. Viewer sensitivity is higher for views seen by people who drive for pleasure and homeowners. Sensitivity tends to be lower for views seen by people driving to and from work (FWHA 1988).

There are approximately 200 residences and 15 businesses near the proposed levee alignment. Located north of Western Kentucky Avenue, these establishments are primarily surrounded by agriculture. The primary viewer groups in the study area are persons living or

conducting business in greater Woodland area, and travelers using the interstates, highways, and smaller local roads.

Viewer Groups and Viewer Reponses

Residents. Rural residents are located along the northern extent of the City of Woodland and scattered throughout the unincorporated part of Yolo County north of the city limit line. Residents on the outer edges of development or isolated in a single development have background views of the existing Cache Creek levees. The separation and orientation of rural residences allow inhabitants to have direct views over agricultural fields. These residents are likely to have a high sense of ownership over the open space surrounding them and the inherent scenic quality of the existing viewsheds. Because of their potential exposure to such views, short distance from the project area, and sense of ownership, these residents are considered to have high sensitivity to changes in the viewshed.

Businesses. Viewers from industrial and commercial facilities have semi-permanent views from their respective facilities. Situated primarily towards east Woodland, these facilities' views range from views limited by the CCSB levees to sweeping views of agricultural fields that extend out to the background. Employees and users of these facilities are likely to be occupied with their work activities and tasks at hand. For these reasons, their limited viewing times, their focus on tasks at hand, and the current use of the levees, this viewer group is considered to have low-moderate sensitivity to changes in views.

Roadway Users. Roadway users' vantages differ based on the roadway they are traveling and elevation of that roadway. The majority of views are mostly limited to the foreground by suburban, commercial, and industrial development, and agricultural lands. Travelers using the elevated portions of I-5 over the Yolo Bypass have relatively unobstructed views of the CCSB; however industrial buildings start blocking the view moving north.

Travelers use roadways at varying speeds; normal highway and roadway speeds differ based on the traveler's familiarity with the route and roadway conditions (e.g., presence/absence of rain). Single views typically are of short duration, except on straighter stretches where views last slightly longer. Viewers who frequently travel these routes generally possess moderate visual sensitivity to their surroundings. The passing landscape becomes familiar to these viewers, and their attention typically is not focused on the passing views but on the roadway, roadway signs, and surrounding traffic. Within the study area, there are no scenic stretches of roadway that offer sweeping views of the surrounding area that are of interest to motorists. For these reasons, viewer sensitivity is low among most roadway travelers.

Recreationists. There are few recreational opportunities in the study area. Due to the rural nature of the existing Cache Creek levees, none are used regularly for passive recreation, like biking or walking. Cache Creek is not large enough to boat on, nor does it have sand or gravel bars or beaches for recreationists to enjoy the waterways. While viewer sensitivity for recreationists is generally high, the lack of available recreational resources in the study area equates to low viewer sensitivity.

There are no State-designated visual resources within the project area. Within the study area, SH 16 is eligible for a scenic highway designation (from Capay to its intersection with SH20); however, this project would have no bearing on its continued candidacy. Nighttime views within the project area are typical of those within an agricultural setting. Sources of light include the city of Woodland, traffic on I-5, and rural residences.

Within the study area or proposed LCP project area there are no scenic vistas. The only relatively scenic area would include the CCSB which has the potential for wildlife-viewing, however the flood risk management project is not open to the public. The levees have locked gates to prevent vehicle traffic. Lower Cache Creek during normal water years dried in the summertime and is not known for its scenic waterside views. Additionally, there are no scenic routes or state scenic highways in or adjacent to the proposed LCP project area.

Environmental Consequences

Using the concepts and terminology described at the beginning of this section, and the criteria for determining effects, evaluation of the project's potential impacts on visual resources was based on:

- Direct field observation from vantage points, including neighboring buildings, property, and mostly roadways;
- Review of project construction drawings; and
- Review of the project in regard to compliance with local ordinances and regulations.

Basis of Significance

For this analysis, the thresholds of significance encompass the factors taken into account under NEPA to determine the significance of an action in terms of its context and intensity. The proposed project would be considered to have a significant effect on aesthetic and visual resources if it would result in any of the following:

- Have a substantial adverse effect on a scenic vista or view open to the public;
- Substantially damage scenic resources including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or
- Create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area;
- In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings

In assessing the aesthetic effects of the project, the visual sensitivity of the site must be considered. Areas of high visual sensitivity are highly visible to the general public. The evaluations of a particular scene would vary depending on the perceptions and values of the observer. The determination of significance of potential esthetic effects is based on the change in visual character as determined by the obstruction of a public view, creation of an aesthetically offensive public view, or adverse changes to objects having aesthetic significance.

No Action Alternative

Under the No Action Alternative, the flood risk management project would not be constructed, therefore there would be no construction-related effects to visual resources in the project area. However, there would continue to be risk of flooding in the City of Woodland.

If levee overtopping were to occur, flood fighting and other emergency activities would occur. Levee failure and subsequent flooding and inundation would have the potential for the visual resources to be adversely affected due to high amounts of various forms of trash and debris in the study area associated with the resultant flooding of homes, businesses, and agricultural fields. Flooded abandoned cars would remain in the residential areas. Flooding and inundation could temporarily or permanently displace residents over a wide area. Rushed emergency levee repairs are more likely to cause adverse impacts of visual resources.

The No Action Alternative would include continued operations and maintenance (O&M) by the Department of Water Resources (DWR). O&M activities consist of vegetation clearing on the levees and within the stream channel to reduce hindrance to flow and to lower the risk of wildfire. Because these activities are already a part of the existing levee system O&M, effects to esthetic and visual resources would be less than significant.

Levee and Conveyance Plan

The existing Cache Creek levee system would still require O&M, flood fighting, and repair activities under the direction of the DWR. Potentially adverse effects to aesthetic and visual resources may occur as result of flood fighting. These impacts would be temporary. Residents would be most impacted by O&M and repair activities of the new levee. However, O&M would occur during the daytime when most residents are at work, and would likely complete work on the levee near one house in under an hour. Emergency work would have greater impacts; however, the benefits of the repairs, reducing risk of flooding, outweighs any temporary adverse effects. Impacts to businesses, recreationists, roadway users would be minimal and negligible. Regular O&M including vegetation removal by mowing or burning, and removal of burrowing animals would have no effect on the visual resources.

Construction activities such as the operation of heavy equipment and material storage would change the visual character of the area. Construction activities would introduce considerable heavy equipment and associated vehicles, including dozers, graders, cranes, scrapers, and trucks into the views of adjacent residents, recreationists, motorists, and businesses. The equipment would be visible throughout the construction season. Presence of the equipment would temporarily degrade the visual quality of the study area.

Residential viewer groups in the study area and vicinity are not accustomed to seeing construction activities and equipment, and sensitivity to such effects would be high. These effects would be temporary resulting from a 2 season construction window. Residents along Carter Lane, Hanging Oak Way and N. Ashley Avenue would be directly impacted by views of construction related activities as there is only a narrow vegetation buffer. Businesses along Churchill Downs would be similarly exposed to temporary construction impacts. Velocity Island Park would be exposed to construction equipment in the viewshed, which could cause a reduction in business and revenue during the busy summer months. The waterpark is lined with trees which may soften impacts to visual disturbances. Although the current viewshed includes roadway traffic on I-5 to the south, which currently doesn't detract visitors. Travelers entering town from the north on County Road 102 and 101, State Route 113, County Road 99 and 98 would be exposed to relatively unusual views of large-scale construction activities. Although commuters and truck drivers transporting goods throughout the local area would not be greatly impacted by construction related visual changes. Recreationists utilizing Velocity Island Park would be temporary impacted during their visit there. However, the location is not particularly peaceful with I-5 traffic just feet away. Children may enjoy seeing large-scale construction equipment like

cranes, bulldozers, and excavators. However, there would be temporary significant impacts on recreationists resulting from LCP construction.

Significant effects to aesthetic and visual resources during construction of the LCP cannot be avoided and cannot be fully mitigated. Construction equipment would be in any reach for at least several months. Construction related changes to the rural aesthetic of the area north of the city limit line would cause temporary significant and unavoidable impacts on residents. Residents and recreationists at Velocity Island Park would tire quickly of seeing construction equipment outside their windows for several months. Once construction is complete vehicle and heavy equipment movement would return to pre-project conditions.

Once construction was complete, the new levee would vary in height from approximately 6 feet above the ground near County Road 98, to 14 feet at the intersection of the new levee and the west levee of the CCSB. Near the western edge of the proposed LCP footprint, exists the highest density of homes that are directly adjacent to the construction footprint. These homes are located on CR 98, Carter Lane, Hanging Oak Way, N. Ashley Avenue and Cherry Way. At this reach, the levee height would be around six feet tall, blocking the existing views of the open agricultural landscape with the Cache Creek riparian corridor to the north. The existing tree line surrounding the resident's homes would remain in place offering a natural visual buffer to the new levee. East of State Route 113, the topography slopes down and the new levee would start raising to tie in with existing CCSB levees, and long-term impacts of permanent changes to the viewshed. The residential neighborhood near County Road 98 is a more sensitive receptor to visual changes than the industrial area east of the I-5 overpass.

Businesses along Churchill Downs would have a blocked view of the agricultural nature of the surrounding landscape and instead be exposed to a 10-12 foot levee. The levee would be seeded with native grasses and forbs, and blend in to the existing landscape. Businesses and industrial parks, while would be impacted by the new levee in their viewshed, would not be significantly impacted, as they are only near the area to work. Recreationists would be positively impacted by the new levee as it offers a new opportunity to walk, run, or bike. The levee offers safe and traffic-free recreation with views of Cache Creek and surrounding agriculture to the north. Roadway users would have to travel on elevated roadways over the new levee. Bridges and roadway raises already occur in the study area. For example SR 113 and CR 102 have raised bridges passing over Cache Creek. The road raises required for the LCP would hardly vary from these existing features. There would be insignificant long-term impacts on roadway users.

Significant effects to aesthetic and visual resources after construction of the LCP cannot be avoided and cannot be fully mitigated. The new levee would block existing views of rural agriculture and industrial areas. Residents would be permanently impacted as their once long-range views of fields would be blocked by a levee, causing significant and unavoidable effects.

The proposed LCP would not add any new permanent source of light or glare. There may be short bursts of glare when the sun reflects off windshields of construction equipment; however, this is not anticipated to cause significant impacts to residents, business, roadway users, or recreationists. During construction, staging areas may be lit at night for security reasons. There are less than a dozen homes near staging areas. The western-most staging area near CR 98/Pedrick Road is at least 400 feet from residences which have trees along property lines blocking light, reducing impacts to less than significant.

Night work may be necessary for the cutoff wall installation and inlet weir construction if winter storms were forecasted unseasonably early to ensure the levees are flood worthy. Night

work would not be required west of State Route 113. There would be no impact to residences as there are none near the CCSB. Businesses would not be impacted during night work, as it is would occur outside normal daytime business hours. There would be no night time recreationists in the project area. Roadway users may see the lighted work near the CCSB, however this impact would be minor. There would be no substantial sources of light or glare resulting from the LCP.

The new levee would permanently block the viewshed of the agricultural and industrial area to the north of the City of Woodland. Residents along Carter Lane, Hanging Oak Way and N. Ashley Avenue would be significantly impacted by degrade in the visual character and quality of the existing rural, agricultural views. Residents would also be significantly impacted by temporary construction-related impacts to the surrounding aesthetic quality. The mitigation measures listed below would lessen the impacts to viewers in the study area; however, the overall effect to esthetics and visual resources would remain significant and unavoidable.

Mitigation

The new levee and the existing impacted CCSB levees would be reseeded with native grasses and forbs. The earthen levee and berm would be reseeded to match the local conditions. Staging areas used during construction would be resurfaced to match existing surrounding topography and restored with native seed mix.

However, proposed mitigation for the aesthetic and visual resources would not reduce the effects of the LCP. The LCP has short-term construction related impacts on visual resources, as well as long term impacts on residents and local travelers in the Woodland area. Tree plantings may reduce the impacts on the waterside of the proposed levee; however the landside of the project would remain visible. The construction of the LCP has significant impacts on the aesthetic and visual resources of sensitive viewers in the area.

3.3.12 Utilities

Affected Environment

This chapter describes the existing utilities and service systems surrounding the project area. The utilities and service systems addressed are water supply, wastewater, solid waste management, electrical service, natural gas service, and telecommunications. Utilities were briefly described in Section 3.3.1 Social and Economic Resources of the 2003 DEIS-EIR.

Water Supply

Much of the county's domestic water supply originates from groundwater. Yolo County has six groundwater sub-basins. The East Yolo sub-basin extends from south of Dunnigan to Davis and provides the greatest supply of residential water extraction. In 2016, the Woodland-Davis Clean Water Agency (WDCWA) completed its water supply project, which includes a jointly owned and operated intake on the Sacramento River connecting to a regional water treatment facility (RWTF), where treated water is delivered to Woodland, Davis, and UC-Davis. Woodland receives 18 million gallons of water per day from the RWTF, which is the primary source of drinking water within the city, supplemented groundwater supplies during times of high water demand or decreased surface water availability. The City maintains an Urban Water Management Plan adopted in in 2016, and a Groundwater Management Plan, adopted in 2010.

The municipal water supply distribution system consists of 260 miles of transmission and distribution lines, a 3 million gallon ground-level storage tank, and a 400,000 thousand gallon elevated storage tank. There are multiple pressurized main lines within the project footprint, and numerous lateral lines.

Wastewater

Wastewater service is provided to Woodland by the City's Public Works Department. Wastewater is conveyed by gravity pipelines to the Water Pollution Control Facility (WPCF), located on CR 103 east of the city, where it is treated and discharged into a large, unimproved channel. The treated wastewater eventually drains to the Tule Canal on the east side of the Yolo Bypass. WPCF has a hydraulic capacity of 10.4 million gallons per day (mgd). As of 2017, the average flow to the WPCF was 5.0 mgd, and is expected to reach 8.3 mgd by 2035 (City of Woodland, 2017). Woodland's wastewater collection system consists of 270 miles of sewer main and 80 miles of service line. There are multiple small (4 to 12 inches in diameter) gravity main lines within the project footprint, as well as one larger line (33 to 48 inch diameter). In the unincorporated areas surrounding Woodland, wastewater is treated using private and individual septic systems. The project lies mostly within or along the Woodland City Limits; however, the footprint does extend into the unincorporated area in some places, and septic systems may lie within the footprint.

Solid Waste Management

Solid waste collection and management within Woodland is provided by a franchise agreement with Waste Management. Material is disposed and processed at Yolo County Central Landfill, a 722 acre facility located on CR 28H, approximately six miles southeast of Woodland. Based on predicted disposal rates in 2009, the landfills expected closure date is January 1, 2081 (Yolo County, 2009). As of 2017, the landfill was at 30% capacity.

Electrical Services

In 2016, Yolo County and the City of Davis formed the Community Choice Energy Program. Community Choice Energy was launched in 2018, offering customers the option to select either Valley Clean Energy or Pacific Gas & Electric (PG&E) as their electricity provider. PG&E remains responsible for distributing electric services and maintaining the infrastructure.

Natural Gas Services

Natural gas is provided by PG&E throughout the county. Three major PG&E gas transmission lines extend through the project area: two lines less than 12 inches in diameter each along CR 101 and CR 98, and a third 13 to 18 inches in diameter roughly parallel to I-5. PG&E also operates the Pleasant Creek storage facility near Woodland, which has a capacity of 2.3 billion cubic feet of natural gas.

Telecommunications

The primary provider of land line telephone service throughout the county is AT&T. Residents of Woodland are provided broadband services predominantly by AT&T of California and Wave Broadband.

Environmental Consequences

This section provides information relevant to utilities and service system impacts in connection with the LCP. Effects would be considered significant if the proposed project would do any of the following:

Significance Criteria

- Exceed wastewater treatment requirements of the Central Valley Regional Water Quality Control Board;
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which would cause significant environmental effects;
- Exceed water supplies available to serve the project from existing entitlements and resources, such that new or expanded entitlements needed;
- Exceed permitted landfill capacity with solid waste generated by the project;
- Fail to comply with applicable laws and regulations related to solid waste;
- Damage public utility and service facilities, pipelines, conduits, or power lines;
- Degrade the level of service of a public utility or service system, or create extended service disruption; and
- Require substantial improvements to the infrastructure or level of staffing of a utility or service system to maintain existing level of service.

No Action Alternative

Under the No Action Alternative, the levee improvement project would not be constructed, therefore, there would be no construction-related effects to utilities and public services in the project. Current levels of levee protection and maintenance would continue. Regular O&M of the levee system would continue and could include hand and mechanical (mower) removal of weeds, spraying of weeds with approved pesticides, minimal tree or shrub trimming all up to four times a year, monthly control of burrowing rodent activity by baiting with pesticide, and reconditioning of levee slope and road with a bull dozer as needed.

Without levee improvements, there is a continued risk of levee overtopping and flooding in the City of Woodland. If levee overtopping or breach were to occur, emergency flood fighting and response activities would occur. Flooding could inundate underground utilities, rendering them unusable for an unknown period of time that could result in extended service disruption, lasting for up to several weeks.

Flood waters could release contaminants from stored chemicals, septic systems, and flooded vehicles, all of which could contaminate the Sacramento River and the Delta surface waters and potentially soil and groundwater. These contaminants would likely exceed acceptable established water quality standards and impair beneficial uses of the Sacramento River and Delta, including downstream drinking water intakes. Effects on the water supply system could be particularly severe in a flood event, as a single break in a water delivery pipe or main could contaminate the entire city's water supply. All breaks and leaks would need to be repaired and the pipes of every house would need to be flushed to remove contamination before residents and businesses could rely on safe water. Depending on the severity and location of the flooding and contamination, this effort could take a significant amount of time and would likely be a significant impact on populations in the project area.

Flood damage to homes and other structures can render them dangerous as a result of structural damage and contamination. Electrical systems could be damaged by flooding, posing the potential of fires, and natural gas leaks could result poisoning through inhalation of fumes, or could cause a sudden explosion if sparked. While this would likely be a significant effect on populations in the project area, the timing, duration and magnitude of a flood event are speculative and unpredictable, and therefore a precise determination of significance is not possible.

Levee and Conveyance Plan

Construction of the LCP has the potential to impact utilities and service systems in the study area. Primary effects to utilities would be related to relocation or other repairs or adjustment to the existing utility infrastructure. These relocations and repairs would be included as part of the proposed action in order to bring the utilities into compliance with Corps policy for encroachments through the levee prism. A separate assessment on every utility to be relocated would be conducted and a legal opinion would be obtained for each utility to determine who pays for relocations and to determine if a substitute facility is required. Relocation of utility infrastructure could result in temporary loss of service for existing infrastructure, such as telephone lines, natural gas lines, fiber optic, cable and other utility lines.

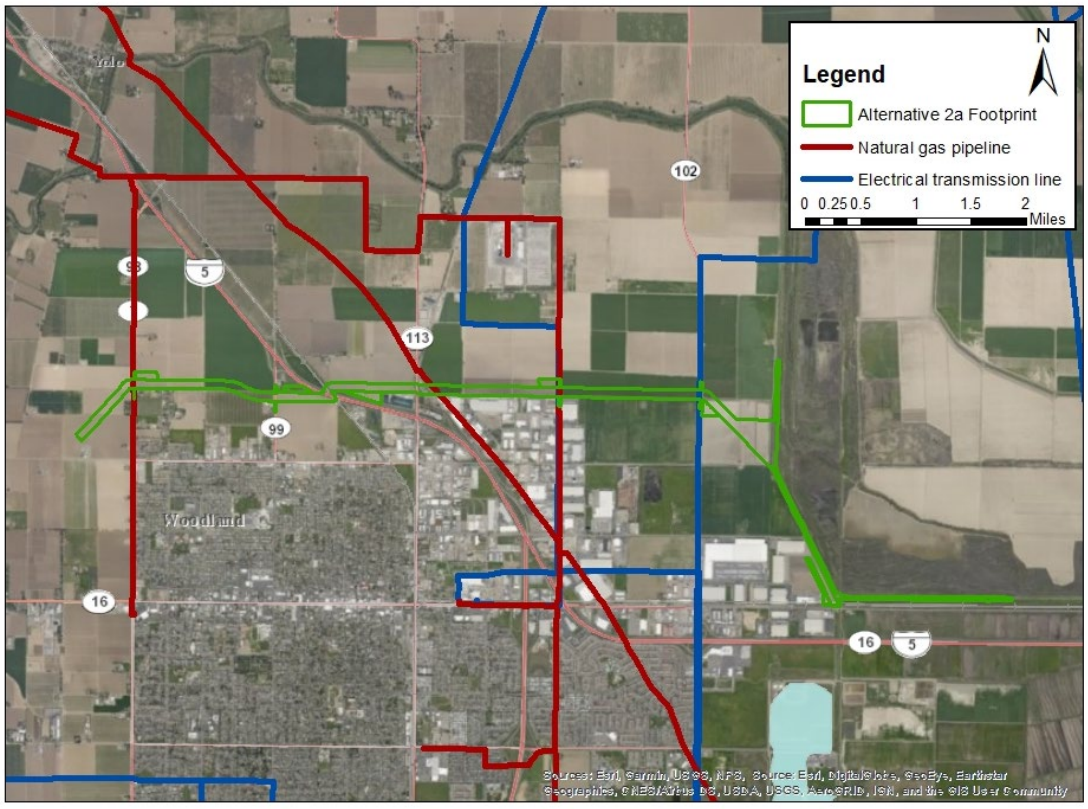
Wastewater is treated at the regional WPCF. The average flows to the WPCF are currently estimated to be less than 50% of the total acceptable capacity, with the ability to intake an additional 5.4 mgd. Thus, the existing WPCF would be able to sufficiently accommodate the water produced by the project actions. The proposed project would remain compliant with all requirements set by the CVRWQCB.

Much of the material excavated during construction would be reused as fill material for the newly constructed levee and berm, reducing the amount of solid waste generated by the project's actions. The YCCL, a 722 acre facility, has a projected closing date of January 2081, thus would have plenty of capacity to handle the project's solid waste disposal needs (Yolo County 2009). The contractor would comply with all applicable local and state laws and regulations relating to solid waste disposal. The estimated total solid waste for the LCP is 91,852 cubic yards over two construction seasons, so about 46,000 cubic yards a year. Soil weighs about a ton (2,000 pounds) per cubic yard. An average person produces 3.7 to 4.5 pounds per day of municipal solid waste (University of Michigan 2018). Calculating an average of 4 pounds per day generated, a single person would produce 1,460 pounds annually. There were 60,531 people in the City of Woodland in July 2018 (U.S. Census 2018). The residents of the City of Woodland would produce approximately 88,330,000 million pounds of trash annually. This would not include local construction or business related municipal waste. And the Yolo County Central Landfill serves Yolo County, not just the City of Woodland. Yolo County has 220,408 residents (U.S. Census 2018). The municipal solid waste generated by the LCP annually, about 100,000 pounds, would be minor compared to the annual trash generated by the community.

Flood water conveyed in the trapezoidal drainage canal would inundate the detention basin located just west of the new inlet weir. Waters would gravity drain over the inlet weir into the CCSB. Waters below the inlet weir grade would be passed via culverts into the existing drainage ditch on the western side of the CCSB. This ditch culminates at the East Main Pumping Plant. Flood water would not exceed the capacity of the existing ditch or pump station, as water would be controlled by a series of culverts fitted with flap gates. Water would be treated and eventually enter the Yolo Bypass.

A fair amount of utility infrastructure exists within the proposed project footprint. There is a small 8-12 inch diameter sewage gravity line that runs along Churchill Downs Ave, as well as a larger 33-48 inch diameter gravity line that runs along the existing southwest levee of the CCSB, where one of the planned staging areas is located. A pressurized water main runs alongside Churchill Downs Ave between SH 113 and CR 101 (there is no water storage within the project footprint). There are two major electrical transmission lines that traverse the site at CR 101 and CR 102, as well as additional distribution lines. Three natural gas pipelines traverse the project area: one parallel to CR 98, another which is roughly parallel to I-5, and a third along CR 101. (Figure 3-13). Project implementation could require disruption of public utilities or service systems to accommodate construction activity, including the possible relocation of infrastructure within the project footprint. Project construction activities have the potential to damage public utility and service systems infrastructure, which could result in short-term disruptions of service. Compliance with CA Govt Code § 4216 (DigAlert) and coordination with the California Underground Facilities Safe Excavation Board (Dig Safe Board) would help to ensure that damage to the underground utility lines is not incurred as a result of project excavation. However, some temporary impacts are unavoidable and potentially significant.

Figure 3-18. Utility lines (natural gas and electricity) traversing the project footprint.



In order to maintain the current level of service to the city of Woodland and surrounding areas, a substantial increase in staffing is not anticipated. However, since infrastructure such as a pressurized water main, sewer lines, and natural gas pipelines are located underground within the project footprint, it is reasonable to assume that at least some, if not all, of the infrastructure would either require improvements in order to withstand the additional weight of the newly constructed levee or would have to be relocated.

There would be temporary impact to utilities and service infrastructure during the two-year construction window that would include disruptions in service. These potential disruptions of natural gas, electrical, water and sewer systems would be mitigated to less than significant with the below measures.

Mitigation

The following measures would be implemented during construction to avoid and minimize potential damage to utility and service infrastructure during construction. Implementing these measures would help ensure that existing utilities are not damaged and that service interruptions are minimized.

- Obtain utility excavation or encroachment permits as necessary before initiating any work with the potential to affect utility lines, and include all necessary permit terms in construction contract specifications.
- Before starting construction, coordinate with utility providers in the area to locate existing lines and ensure appropriate clearance requirements are met.
- Coordinate with utility providers to avoid compaction over pipelines, changes in drainage patterns that could undermine stability of soils around pipelines, and future construction of additional facilities within easements.
- Avoid the relocation of utilities when possible and coordinate with utility companies and the California Public Utilities Commission, as needed, to ensure that any relocation plans for electric transmission facilities, if required by the project, are properly developed and approved. Provide notification of potential interruptions in services to the appropriate agencies.
- Before starting construction, verify utility locations through field surveys and Underground Service Alerts. Clearly mark any buried utility lines in the area of construction before any earthmoving activity.
- Before starting construction, prepare a response plan to address potential accidental damage to a utility line. The plan should identify chain-of-command rules for notifying authorities and appropriate actions and responsibilities to ensure the safety of the public and the workers.
- Minimize service interruptions during any utility replacement or relocation activities.

3.3.13 Hydrology and Hydraulics

Affected Environment

Most of the hydrology information, including a description and history of the Cache Creek Watershed, is unchanged and may be found in the 2003 DEIS-EIR, and is incorporated into this DSEIS by reference. General geomorphic characteristics of Cache Creek are summarized in the 2003 DEIS-EIR. Changes in existing hydrology pertinent to the current proposed alternative are discussed below.

The study area includes the lower planar reach of Cache Creek, encompassing agricultural areas, the City of Woodland, unincorporated areas of Yolo County, and the CCSB. The principal sources of flooding threatening the City of Woodland include not only Cache Creek, but the Colusa Basin Drain, Yolo Bypass, and Willow Slough. The study area is drained by the Yolo Bypass, a major structural feature of the regional SRFMS which diverts water around the

major urbanized areas of Sacramento, West Sacramento, Woodland, and Davis. While the existing flood risk management system has reduced risk of flooding to the study area, residual risks related to potential events exceeding the historic design and related failures are inherent to the system.

The study area is located on the alluvial fan of Cache Creek. The general terrain slopes downward from the Capay Valley towards the Sacramento River. Cache Creek is perched on a ridge of higher ground that formed through the historical deposition of fine grained sediment along the Cache Creek banks during storm events that flowed out of bank. Historically, Cache Creek was described as a wide, relatively steep braided channel upstream from Yolo, and a narrow, incised channel flowing in fined-grained overbank deposits and tule marsh downstream.

Cache Creek has experienced natural changes including shifting of the stream channel resulting from eroding banks and storms, bank erosion upstream in the watershed, and poor water quality due to boron, mercury, and other naturally occurring chemicals. The human-induced changes include channel and levee work for flood management and irrigation, gravel mining within the channel, agricultural runoff, soil erosion due to over use and livestock in the rangeland portion of the creek, and non-native plant introduction of species such as tamarisk and giant reed.

The primary risk of flooding from Cache Creek is overtopping of existing levees. Upon levee failure, the distribution of sheet flow varies depending upon the location the overtopping occurs. For purposes of discussion, the study area has been divided into four sections: the agricultural plain east of SR 113, agricultural area west of SR 113, the CCSB and the existing Woodland storm drainage system. Upon levee failure, the distribution of the sheet flow would vary depending on the location of levee failure.

Cache Creek Settling Basin

The Cache Creek Settling Basin lies in the east section of the project area. The CCSB was constructed by the Corps in 1937 to minimize the adverse effect on the hydraulic capacity of the Yolo Bypass caused by excess sediment deposition by allowing sediment carried by Cache Creek to settle out before entering the Yolo Bypass. The levee heights and locations have been modified several times to control sediment deposition and increase sediment storage capacity. In 1991, modifications to the settling basin included 50-year storage capacity with an average of 340 acre-feet of sediment accumulation per year. This corresponds to an average trapping efficiency of 55 percent, assuming existing levee project conditions and a Cache Creek channel conveyance of 30,000 cfs. The crest elevation of the weir is currently set at an approximate elevation of 35 feet (NAVD88), approximately 11 feet above ground surface downstream.

The UC Davis J.A. Hydraulic Laboratory performed trap efficiency studies based on action plan requirements outlined in the USACE 2007 Cache Creek Settling Basin Draft Operations and Maintenance (O&M) Manual, in which the outlet weir is to be raised an additional 6-feet at year 25 (2018) of the project, or when the trap-efficiency becomes less than 30%. Also the Draft O&M Manual states that beginning in year 25 of the project, 400-foot sections of the interior training levee would be removed every five years, starting with a section 1100 feet upstream from the current terminus of the training channel. Each subsequent 400-foot section would be removed 1100 feet upstream from the section that is removed previously (DWR 2018).

As the trap efficiency remained higher than 30% in 2018, the proposed CCSB modifications did not occur as expected. There is no anticipated date of raising the outlet weir or degrading the training levee. Trap efficiency studies would continue to be performed. As DWR is

unable to foresee the modifications required in the O&M Manual, the Corps must remove the training levee for the performance of the LCP.

Internal Drainage

Most of the land within the Woodland City Limits is developed, creating impervious surface from the construction of roads, parking lots, buildings, etc. This type of infrastructure reduces the amount of water infiltration to the ground, increases direct runoff, and cause soil erosion and sedimentation, which can create water quality and flooding concerns. The Environmental Services Division in the City's Public Works Department (PWD) provides stormwater management within Woodland. The city's stormwater system includes 130 miles of drain pipe, 14 miles of drainage channel, 1600 catch basins, 1874 drain inlets, nine detention ponds, and nine stormwater pumps in three locations. Once collected, the water generally flows west to east and is delivered to East Main Street Lift Pump Station. It is then pumped into a canal along the southern edge of CCSB and flows into the Yolo Bypass, the Tule Canal, and the Sacramento River. The City maintains a Storm Drainage Facilities Master Plan for the planning and implementation of improvements to stormwater infrastructure within the city, and plans on rebuilding the drainage system after the project is complete. A 30 to 36 inch diameter gravity main line runs along Pioneer Ave from the Woodland City Limits to Kentucky Ave. Several smaller gravity main lines lie between Pioneer Ave and N East St. There are two detention basins near the intersection of I-5 and SH 113.

In the agricultural areas of the unincorporated communities, on-site ditches convey water to existing roadside ditches. These roadside ditches are intended to carry only runoff from the roadway and were not designed to serve as an informal flood control system.

Future without Project Condition

According to the trap efficiency studies conducted by U.C. Davis, the CCSB has yet to reach its sediment trapping capacity as expected in year 25 (2018). While the outlet weir raise and training levee degrade are authorized projects, it is unknown when these projects would be completed. The performance of the alternatives is dependent upon the training levee, that is why the training levee degrade is contained with the LCP.

Results of Hydraulic Modeling

The existing Cache Creek levee profile was designed to provide a freeboard of at least 3 feet above an adopted flood profile calculated using a project design flood of 30,000 cfs (USACE, 1961). Based on current analysis presented in this report, the existing levee profile would pass a 10% (1/10) ACE event (30,000 cfs) with 90% assurance, if the levee is assumed to not fail prior to overtopping. However, including the probability of geotechnical failure prior to overtopping, the existing levee project would pass a 50% (1/2) ACE event (10,800cfs) with 90% assurance.

Based on Tuflow hydraulic modeling analysis, the levees of the Lower Cache Creek start overtopping at an estimated flow of 49,000 cfs near I-5. The overtopping flows splits into multiple floodplains, propagating towards the north and the south of the Cache Creek. The northern overtopping flows split into couple of floodplains reaching to Colusa Drain and Knights Landing Ridge Cut. All northern flows eventually drain into the Yolo Bypass near confluence with Knights Landing Ridge Cut. The southern overtopping flows also split in two floodplains, eastward of I-5 and westward of I-5. The flood flows east of I-5 inundates agricultural areas between the Cache Creek and City of Woodland and the flows west of I-5 propagates south and inundates City of Woodland. The flooding in the overbank areas is shallow and very expansive. The estimated

maximum depths of the flooding range 2 feet to 5 feet in the urban areas. The boundary of 0.2% (1/500) ACE floodplain extends all the way to Putah Creek.

The velocities of the flows in most of the overbank areas and in the floodplain range on average of 2 fps to 3 fps. There are some localized areas of velocities up to 5 feet per second near roadways and intersections.

Figure 3-19. Inundation in the study area under existing conditions during a 2, 5, 10, 20, 50, 100, 200, and 500 year event. The maps depict levee overtopping only.

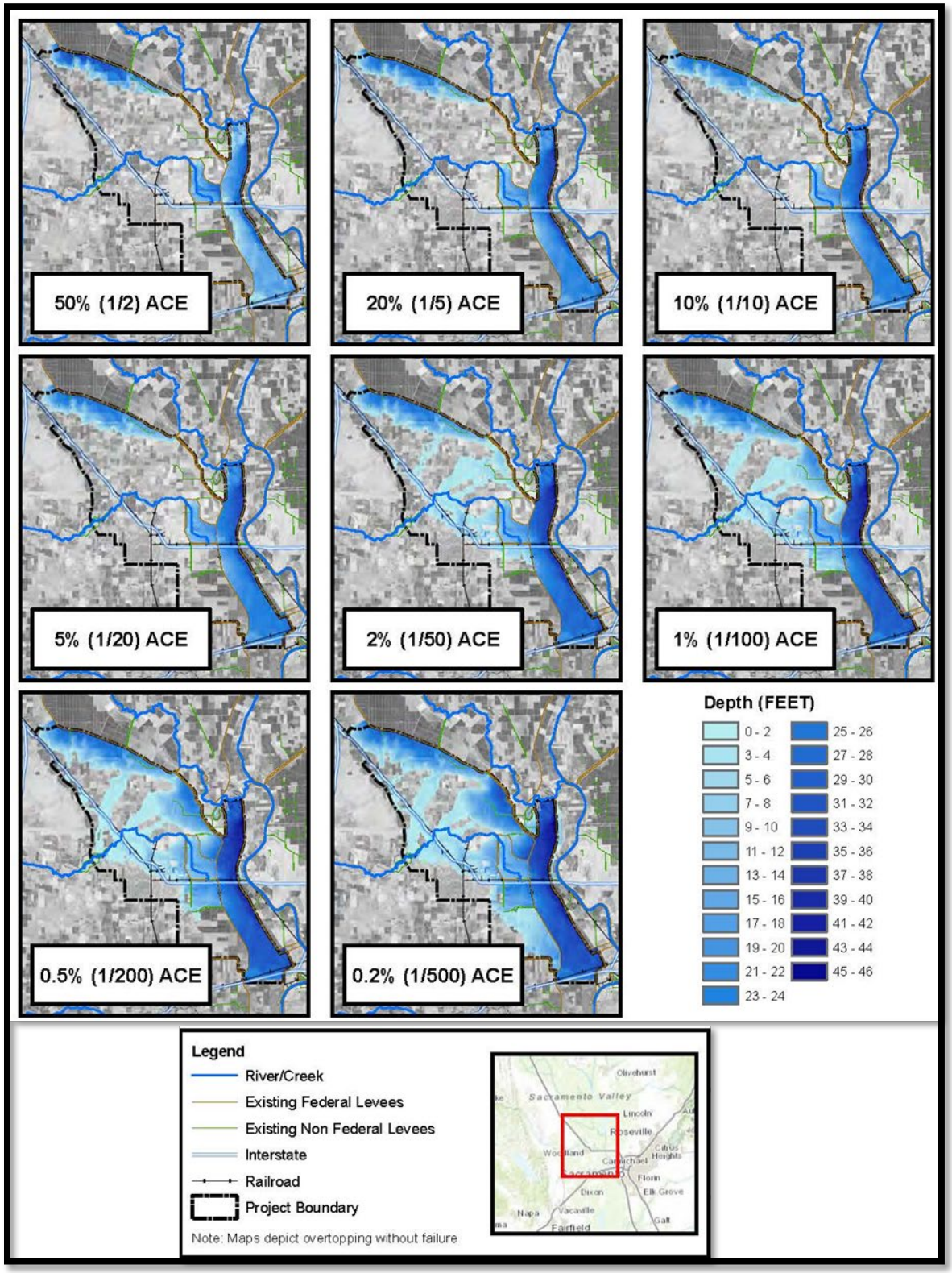


Figure 3-20. The 1% (1/100) AEP event during existing conditions, overtopping.

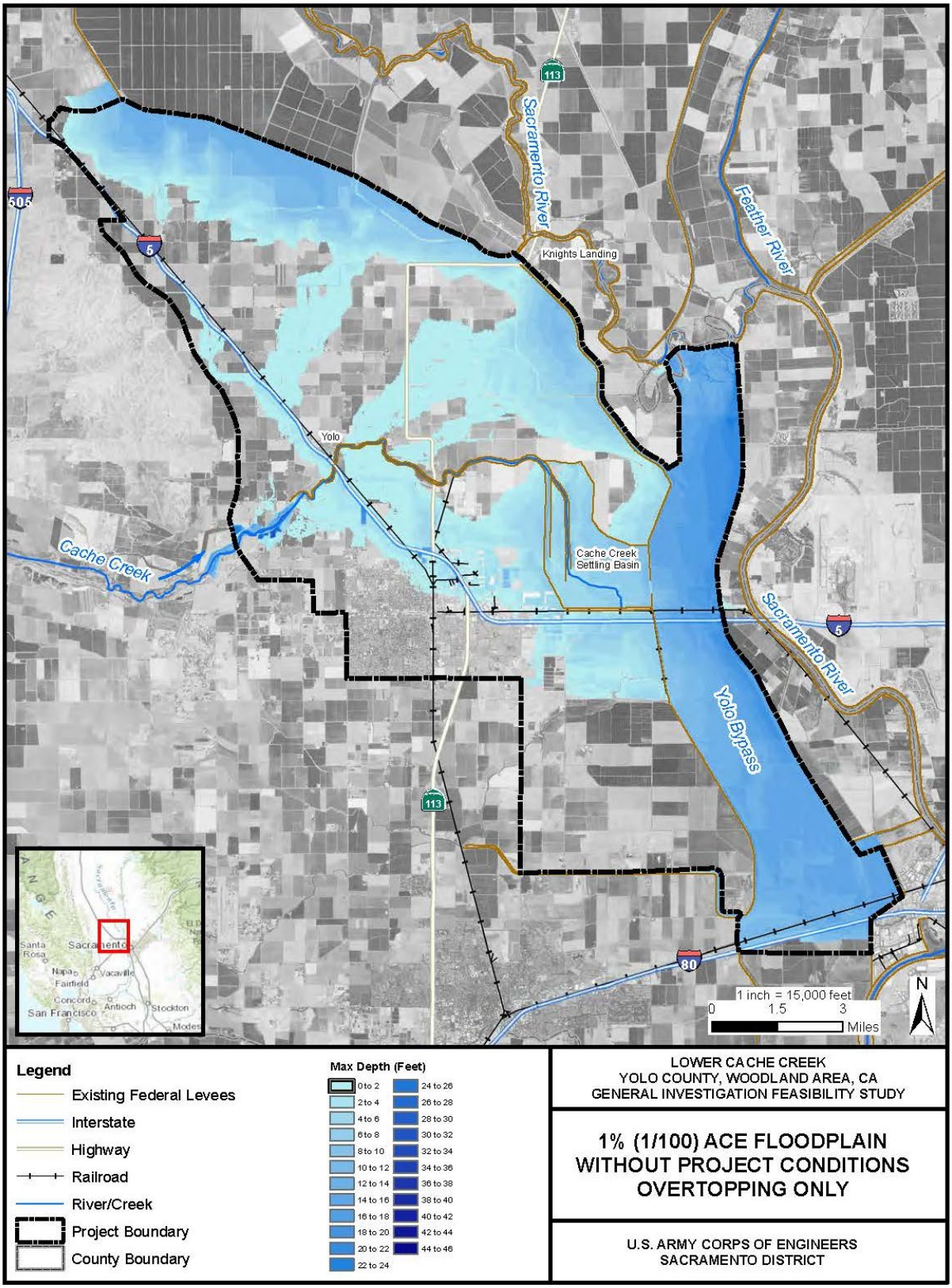
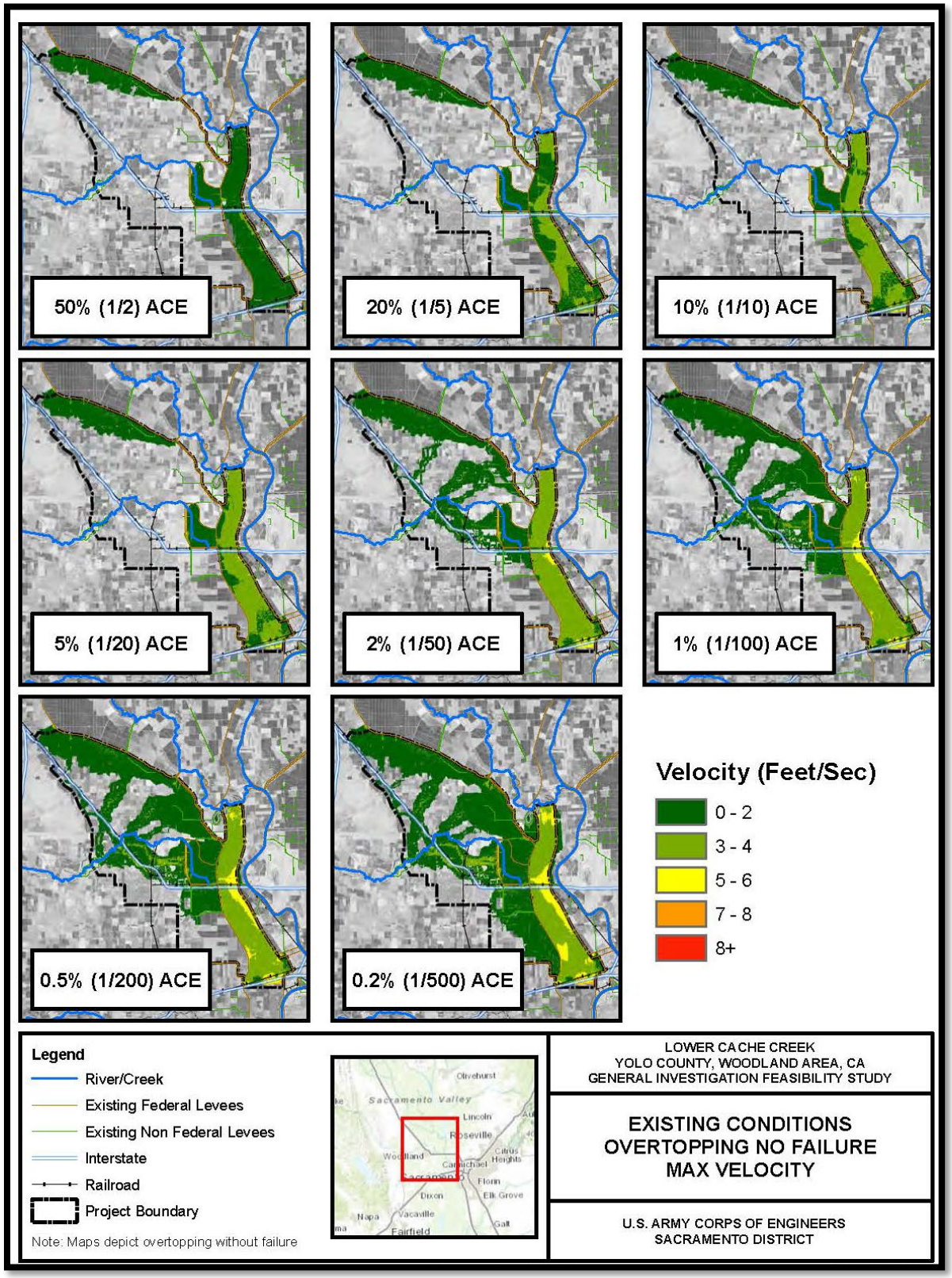


Figure 3-21. Maximum velocity of overtopped flood waters in existing conditions.



Flood Stages

The National Weather Service (NWS) is the agency responsible for determining flood stages for waterways across the county. Current NWS flood stage thresholds for Cache Creek at Yolo are as follows:

Table 3-31. Annual average and peak river stage since 2004 at Yolo.

75.0 feet	Action Stage	Yolo County and DWR begin patrolling levee sections
81.0 feet	Flood Stage	Overflow is expected on the non-leveed south bank, upstream from the start of the south-side levee. Water begins to move southeast toward the city of Woodland
84.1 feet	Major Flood Stage	Overtopping of levees and flooding

Table 3-32. Annual peak and average river stage (feet), Lower Cache Creek at Yolo, 2004-2019.

Water year	Mean Stage (ft.)	Peak stage (ft.)	Date
2019(through Jun 12)	49.2	84.9	Feb 27
2018	46.0	52.0	Mar 23
2017	50.1	80.2	Feb 18
2016	44.9	62.7	Mar 7
2015	44.5	76.8	Dec 12
2014	44.0	47.2	Mar 1
2013	45.0	70.3	Dec 24
2012	44.7	55.8	Mar 28
2011	46.7	74.3	Mar 20
2010	45.2	68.9	Jan 21
2009	44.2	57.0	Mar 3
2008	44.8	72.6	Jan 26
2007	44.8	52.7	Feb 11
2006	49.4	83.2	Dec 31
2005	45.8	62.7	Mar 22
2004	46.5	76.2	Feb 26

Current floodplain maps assuming under existing conditions generated by the Corps are shown in Figure 3-20. The maps account for waters overtopping the existing levee, not for failure in any other manner. In events with at least 5 percent ACE, only the northern edge of the study area is inundated. During 50 year and larger events, floodwaters begin to encroach into the city of Woodland and surrounding rural and agricultural areas, thus failing meet the SB-5 requirement of protection from a 200 year flood event, which is a goal of the City of Woodland.

The current FEMA Flood Insurance Study for Yolo County, dated May 16, 2012, maps areas within the 1% ACE floodplain. The FIS uses a flow of 63,680 cfs for Cache Creek at CR 94B for the 1% ACE event. The FIS finds that the existing Cache Creek levees are not in compliance with the National Flood Insurance Program requirement of protection against the 1-percent annual chance flood.

Recent Flood Events

The event on February 27, 2019 had an approximate flow of 26,400 cfs and resulted in overtopping of the left bank levee downstream of the town of Yolo and overtopping of the right banks upstream of the project levees. During this event there were also numerous boils and seepage concerns along both banks downstream of SH 113. DWR and local agencies laid emergency sandbags to raise the top of the levee to prevent additional overtopping. Additionally, sandbags were used to fight seepage and boils on the land-side of the levees and an emergency rock berm was constructed on the landside of the right bank levee upstream of Interstate 5 where a significant through-seepage boil threatened levee stability. After the event, DWR followed up by repairing and raising the levees at the locations where the overtopping occurred. (MBK Engineers, 2019).

Based on the February 2019 event, the Cache Creek capacity near the town of Yolo is actually approximately 26,400 cfs. The reduced capacity in the area may be attributed largely to subsidence in the area, as well as sedimentation and vegetation within the channel and the settling basin (MBK Engineers, 2019). The 2019 event and other historical high flow events are summarized in Table 3-33.

Table 3-33. Peak discharge and river stage during historical high flow events, Cache Creek at Yolo (NOAA 2019).

Water Year	Peak discharge (cfs)	Stage (ft.)	Date
2019	26,393	84.90	Feb 27, 2019
2006	26,908	83.28	Dec 31, 2005
1998	34,600	84.39	Feb 3, 1998
1995	36,400	85.37	Mar 9, 1995
1983	33,000	83.75	Jan 27, 1983
1965	37,800	--	Jan 6, 1965
1958	41,400	85.35	Feb 25, 1958
1940	38,700	85.30	Feb 28, 1940

Environmental Consequences

This section identifies potential project-related effects on hydrology in the project area. The City of Woodland and the Central Valley Flood Protection Board Significance (CVFPB) have established objectives that the LCP should meet, described below (City of Woodland, 2016):

Significance Criteria

The thresholds of significance encompass the factors taken into account under NEPA to determine the significance of an impact in terms of its context and intensity. The alternatives under consideration were determined to result in a significant impact related to hydrology and hydraulics if they would do any of the following:

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river in a manner that would result in: (1) substantial erosion or siltation on- or off-site, and (2) substantial increase in the rate or amount of surface runoff in a manner that would 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.
- Place housing within a 100-year flood hazard area.
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows.
- Expose people or structures to a significant risk of loss, injury, or death involving flooding.
- Have an adverse impact on the sediment trapping functionality of the CCSB.

ER 1105-2-100 states two additional criteria regarding significance of hydraulic impacts: 1) an increase in flood depth of velocities would create a significant life safety issue; and 2) an increase in depth, velocity, or frequency cause a constitutional taking of property.

Methodology

The hydraulic analysis evaluates the potential flood-related impacts of the alternatives on water surface elevations in Cache Creek and within the watershed. Specifically, hydraulic model outputs were used to compare existing conditions to the alternatives. This analysis was conducted by the Corps and additional information can be found in the Hydraulic Appendix to the Feasibility Report.

The study area was divided into six geomorphically distinct reaches. For the purposes of the economic analysis, a single point is needed to represent each reach and is referred to as an index point. There are seven index points on Lower Cache Creek, one on the Colusa Drain, one on the Knights Landing Ridge Cut, one on the Yolo Bypass, and one at CA Highway 113.

Tuflow hydraulic computer program has been used to simulate depth-averaged, one and two dimensional free-surface flows and associated hydraulic analysis for the existing and the project conditions. The one dimensional channel components of the model are based on HEC-RAS geometry. The model consists of high resolution 25-foot grid in the vicinity of the breach locations and 100-foot grid for other portions of the model domain. When simulating a levee breach in the TUFLOW, the model adjusts the elevation of the two-dimensional grid over time.

Hydrographs at each of these locations are based on scaled versions of the 1964 historic storm pattern for each n-year run, and shifted in time in relation to the Cache Creek Hydrographs to maintain the relative timing of the 1964 flood and create a condition whereby flooding in Cache Creek is coincident with flooding in the Sacramento River System. The hydrographs for 50% (1/2) ACE, 20% (1/5) ACE, 10% (1/10) ACE, 5% (1/20) ACE, 2% (1/50) ACE, 1% (1/100) ACE, 0.5% (1/200) ACE, and 0.2% (1/500) ACE, are presented in the Hydraulic Appendix to the Feasibility Report.

In order to reduce uncertainty in model results, the one-dimensional hydraulic model component has been calibrated to January 1, 2006 event on Cache Creek using high-water mark data compiled by DWR for the CVFED Program. It should be noted that the peak flow recorded during the 2006 storm event was 29,900 cfs which is slightly less than the nominal capacity of Cache Creek downstream of County Road 102. Therefore, the 2006 storm represents a condition that is essentially bankfull, making it useful for calibrating the one-dimensional component.

No Action Alternative

Under the No Action Alternative, the Corps would not conduct any additional work to address levee overtopping concerns in the study area. Flow conditions in the system would be consistent with the future without project condition, as described above. If a levee overtopping were to occur, people and structures would be exposed to significant risk of loss, injury, or death involving flooding. In addition, significant erosion or siltation could occur due to the substantial increase in flows. Flood flows would contain contaminants and would be highly polluted, spreading and exposing people in urban areas to substantial health and safety risks. Emergency repair activities would be implemented and could result in the loss of channel capacity and alteration of present day geomorphic processes with the placement of large quantity of rock into the river to close the levee failure. As a result, effects to hydrology and hydraulics under the No Action Alternative would be significant.

Recent studies on the increased rate of land subsidence caused by groundwater extraction in the western portion of the Sacramento Valley may alter the existing hydrology in the study area (DWR 2014). Local rates of subsidence may reduce channel capacity, cause existing levees to settle and the increase the risk of flooding in the study area. The issue of subsidence compounds existing flood risk to the community.

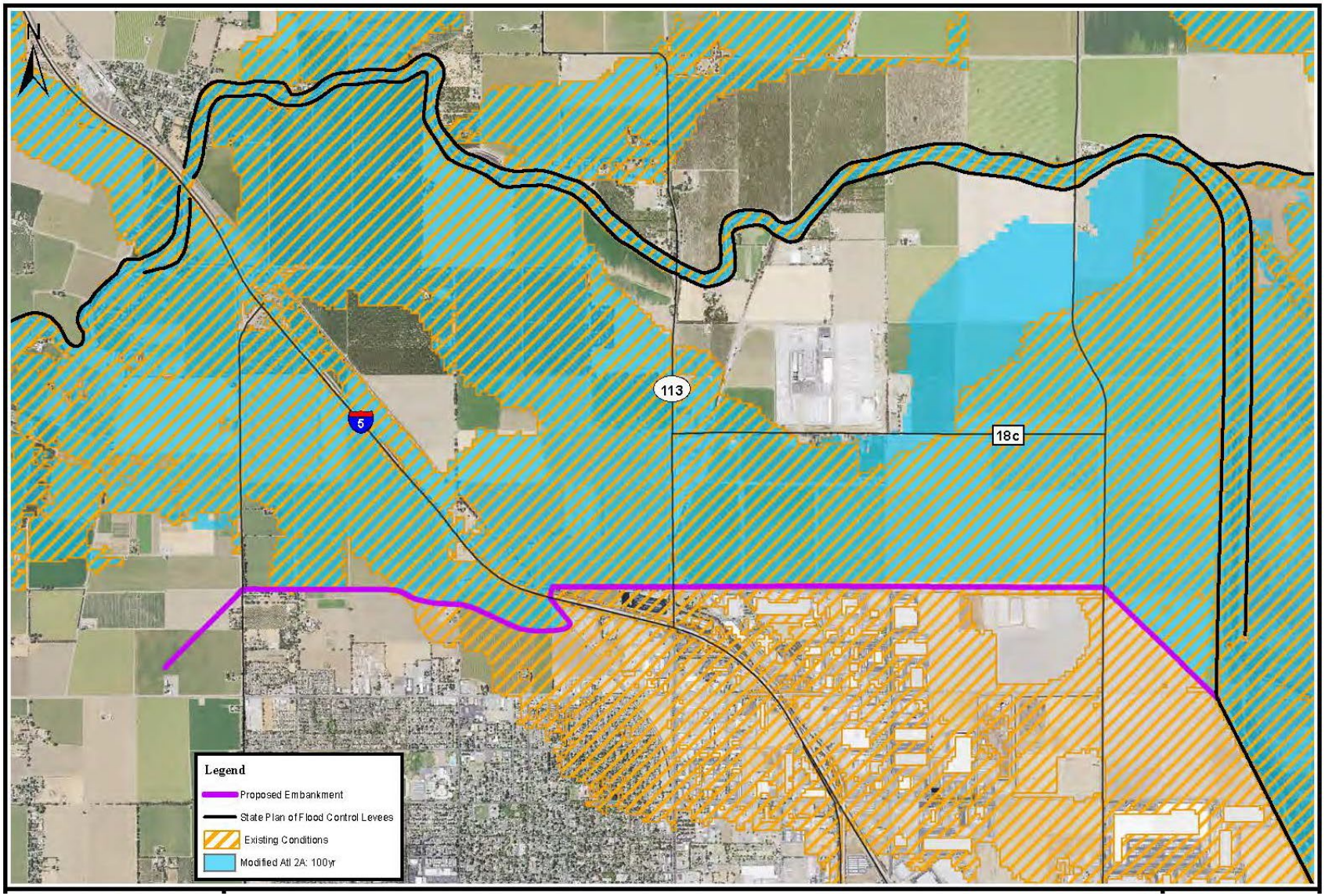
Levee and Conveyance Plan

Since the completion of the Woodland-Davis Clean Water Agency's regional surface water supply project in 2016, surface waters from the Sacramento River are the primary source of water for the City of Woodland. The river's surface waters supply approximately 85 to 95 percent of the city's water needs in normal years, with the remaining needs (especially in summer months and other dry periods) being supplemented with the utilization of up to 10,000 acre-feet of water under a senior water right purchased from the Conaway Preservation Group, as well as existing groundwater sources. Water used for farming and irrigation in the rural areas surrounding Woodland is diverted from Cache Creek, primarily at the Capay Diversion Dam. The Sacramento River and Cache Creek above the Capay Diversion Dam would not be affected by the proposed project. Furthermore, the project would not utilize groundwater, nor would it contribute to any changes in groundwater recharge. Thus, the proposed project would not have an effect on the water supply reliability.

The LCP proposes placement of a new levee, with some improvements made to existing levees on the CCSB. The proposed project is offset from Cache Creek and does not change the geometry or characteristics of the channel or streambed. Therefore, the project would have no effect on the frequency or direction of flood flows in Cache Creek.

Within the city limits of Woodland, south of the proposed levee, runoff naturally flows to the south away from the city. Therefore, the construction of a levee north of the city would not affect the pattern of flow. North of the project area, increased inundation during flood events would be induced by the presence of the levee. Measures such as culverts, a drainage canal, and a weir would convey water east to the CCSB, but in some areas east of SR 113 flood inundation depths and durations could still be greater than the same flood event under existing conditions.

Figure 3-22. Flood extents with the LCP during a 1% (AEP) flood event. Orange indicates existing conditions, blue is LCP conditions.



Flood waters that do not pass over the inlet weir into the CCSB would be collected in the proposed 15 acre detention basin. The detention basin would be drained via an east outlet into the CCSB and a south outlet into the city's interior drainage system. The amount of water that would enter the city's interior drainage system through the south outlet is unknown, but is anticipated to be drained via the pumps. Currently in the city there are two pumping stations located on E. Main St with a capacity of 500 cfs. The pumping volume cannot be increased due to the current capacity of the existing drainage ditch; instead, in order to increase water capacity, more retention would be needed in the city's industrial area. The city is currently working to find potential sites for additional internal drainage retention. It is expected that the majority of water entering the internal drainage system would not be Cache Creek floodwaters, but rainwater from winter storm events. Only flood water that could not pass over the CCSB inlet weir would be diverted to the pump station after stormwater had already been pumped out of the city following the first few days after a storm. The capacity of the existing CCSB west ditch and the pump stations is not expected to need improvements.

Results of Hydraulic Modeling

A potential adverse hydraulic impact would be induced flooding or significant increase in velocities within the system or both. Induced flooding could result from a project increasing the depth, duration, or frequency of flooding. The potential for induced flooding was evaluated by comparing with-project and No Action Alternatives throughout the system. Increases and decreases to flood depths within the model domain are provided in the figures below. Differential changes to the velocities due to the proposed TSP are presented in Figure 3-19.

Highway 113 demarks a significant change in the duration of flooding and any induced flooding. During a large flood event (e.g. 1% AEP event) duration of flooding west of SR 113, near I-5 would be shorter than existing conditions, lasting only several days. East of Highway 113, the duration and depth of flood impacts would increase, with the highest depth increases and longest duration being near the inlet weir. It is estimated that the duration of flooding west of Highway 113 is less than on 1 week and the duration of flooding at the inlet weir would be around 1 month. A major factor for the duration of flooding near the inlet weir is the availability and capacity of the city pump station that would be used to pump the water into the Yolo Bypass.

The average change in flood depth during a 2% (1/50) AEP event is represented by Figure 3-20. Flood depths near I-5 would increase between 0.1 to 4.0 feet. SR 113 would have a -2.0 to -0.1 foot flood depth allowing traffic to move north-south. Between SR 113 east to CR 101 flood depths generally increase by 0.1 to 1.0 foot. Between CR 101 and CR 102 flood depths deepen from 2.0 to 6.0 feet. From CR 102 east to the CCSB inlet weir flood depths are between 4.0 to 6.0 feet. North-south travel on CR 101 and CR 102 would be prohibited until flood waters receded.

The average change in flood depth during a 1% (1/100) AEP event (Figure 3-21) and a 0.5% (1/200) AEP event (Figure 3-22) from existing conditions is very similar. Flood depths near I-5 would increase between 0.1 to 4.0 feet. SR 113 would have a -1.0 to -0.1 foot flood depth allowing traffic to move north-south. Between SR 113 east to CR 101 flood depths generally increase by 0.1 to 1.0 foot. Between CR 101 and CR 102 flood depths deepen from 2.0 to 6.0 feet. From CR 102 east to the CCSB inlet weir flood depths are between 4.0 to 6.0 feet. North-south travel on CR 101 and CR 102 would be prohibited until flood waters receded.

Figure 3-23. Flood depths during a 1% (1/100) AEP event with the LCP.

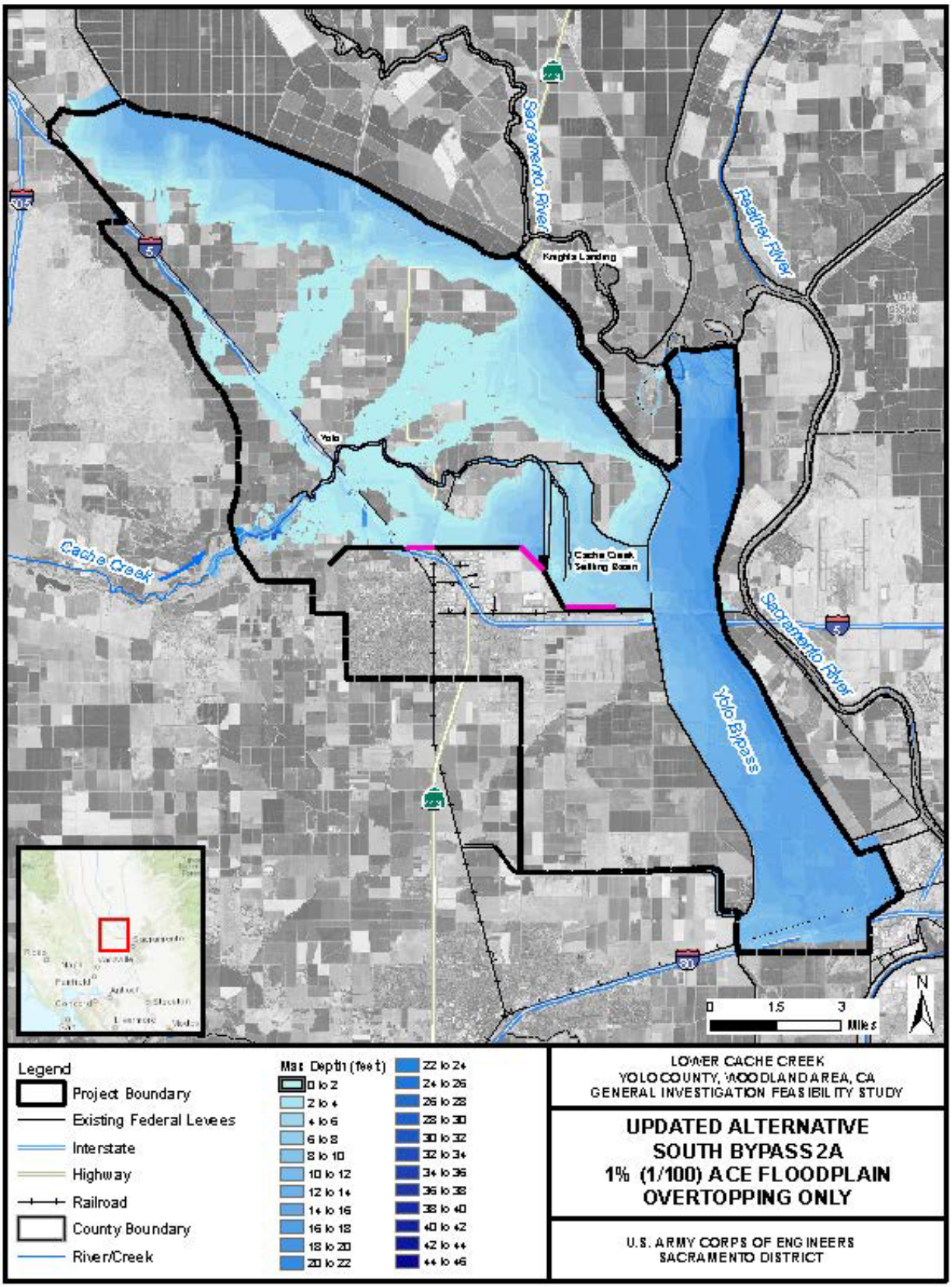


Figure 3-24. Maximum velocities with the LCP at a 1% (1/100) AEP event.

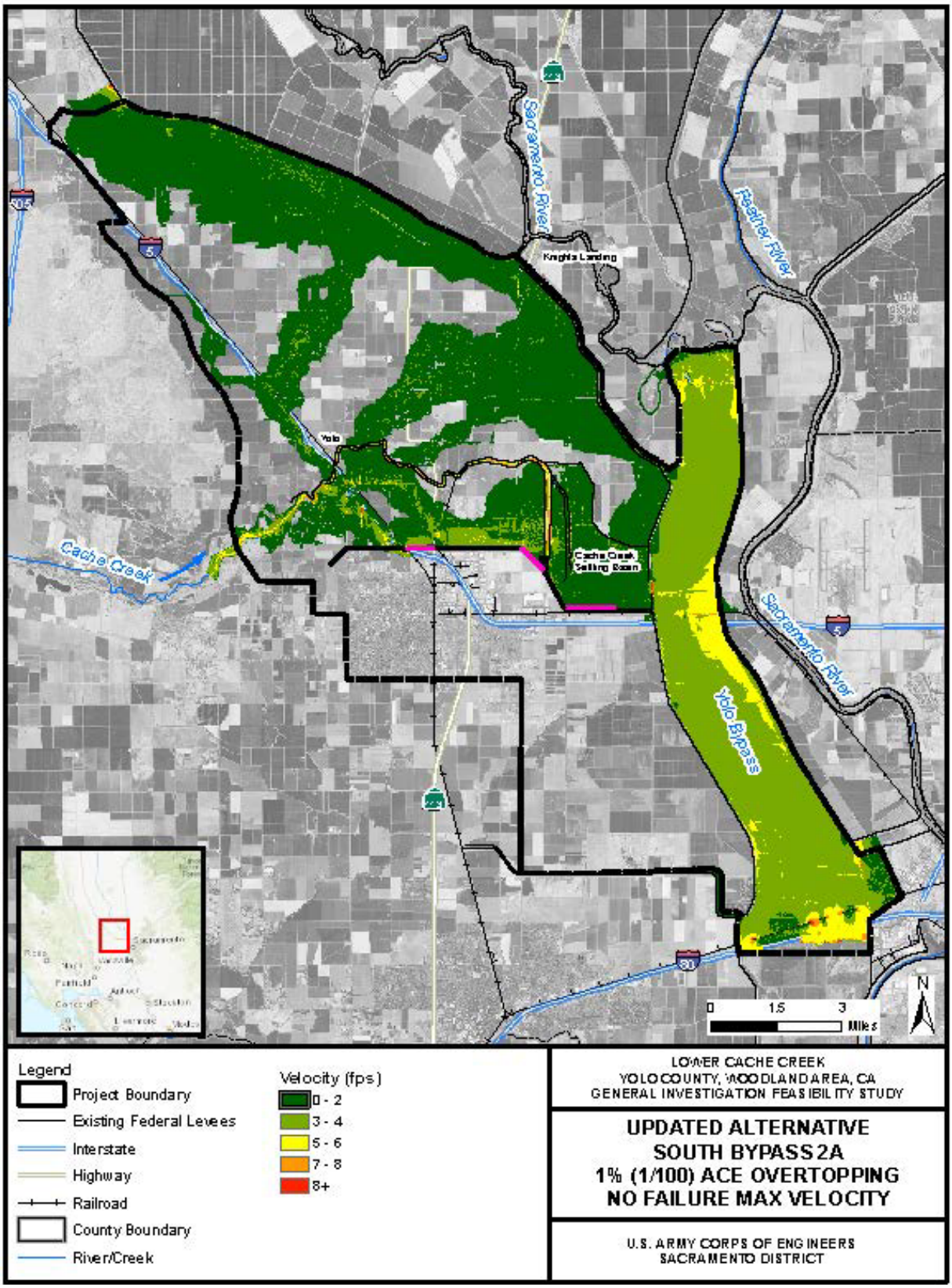


Figure 3-25. Average change in velocity with LCP at the 1% (1/100) AEP event.

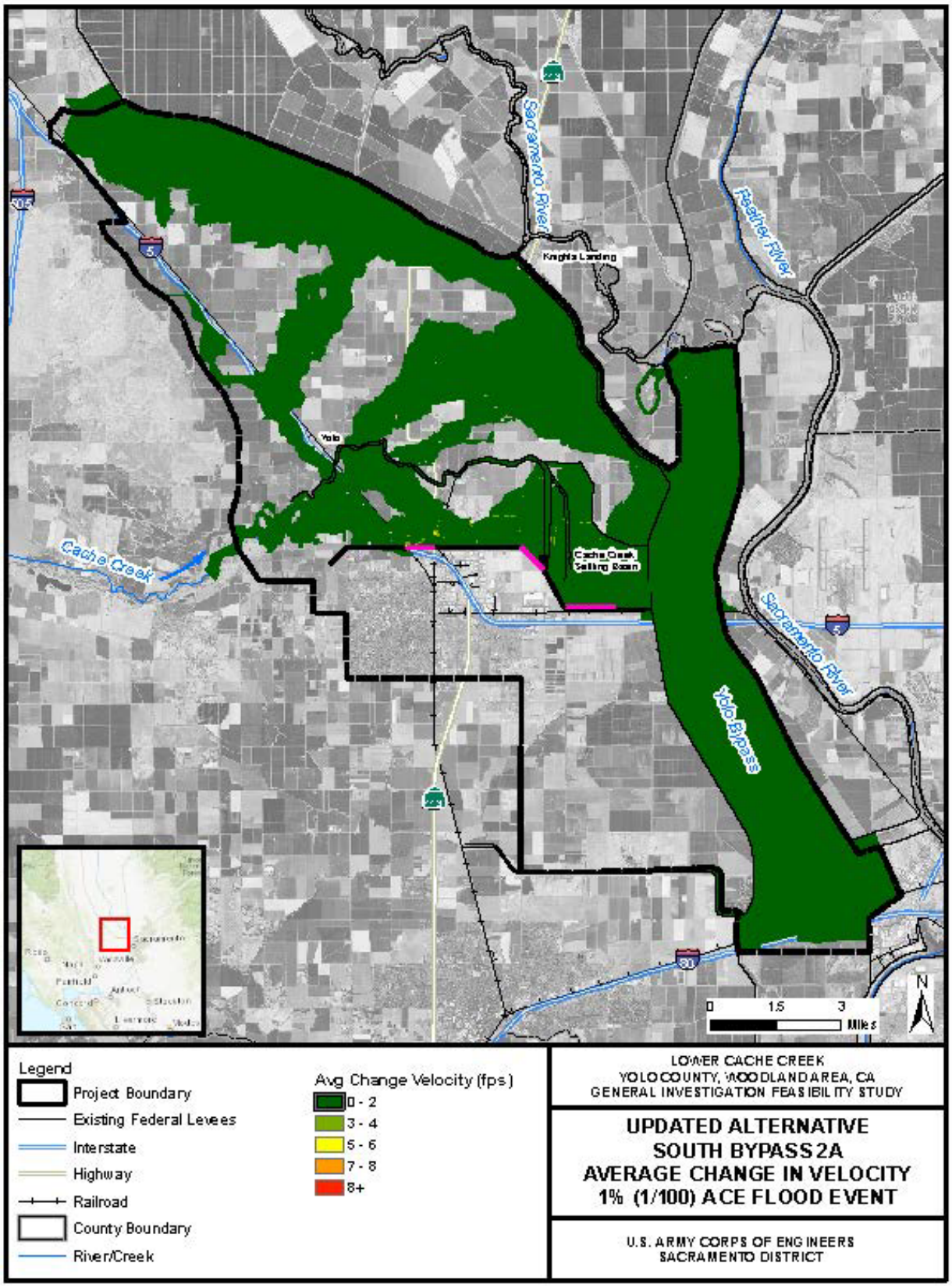


Figure 3-26. Average change in flood depth with the LCP at a 2% (150) AEP event.

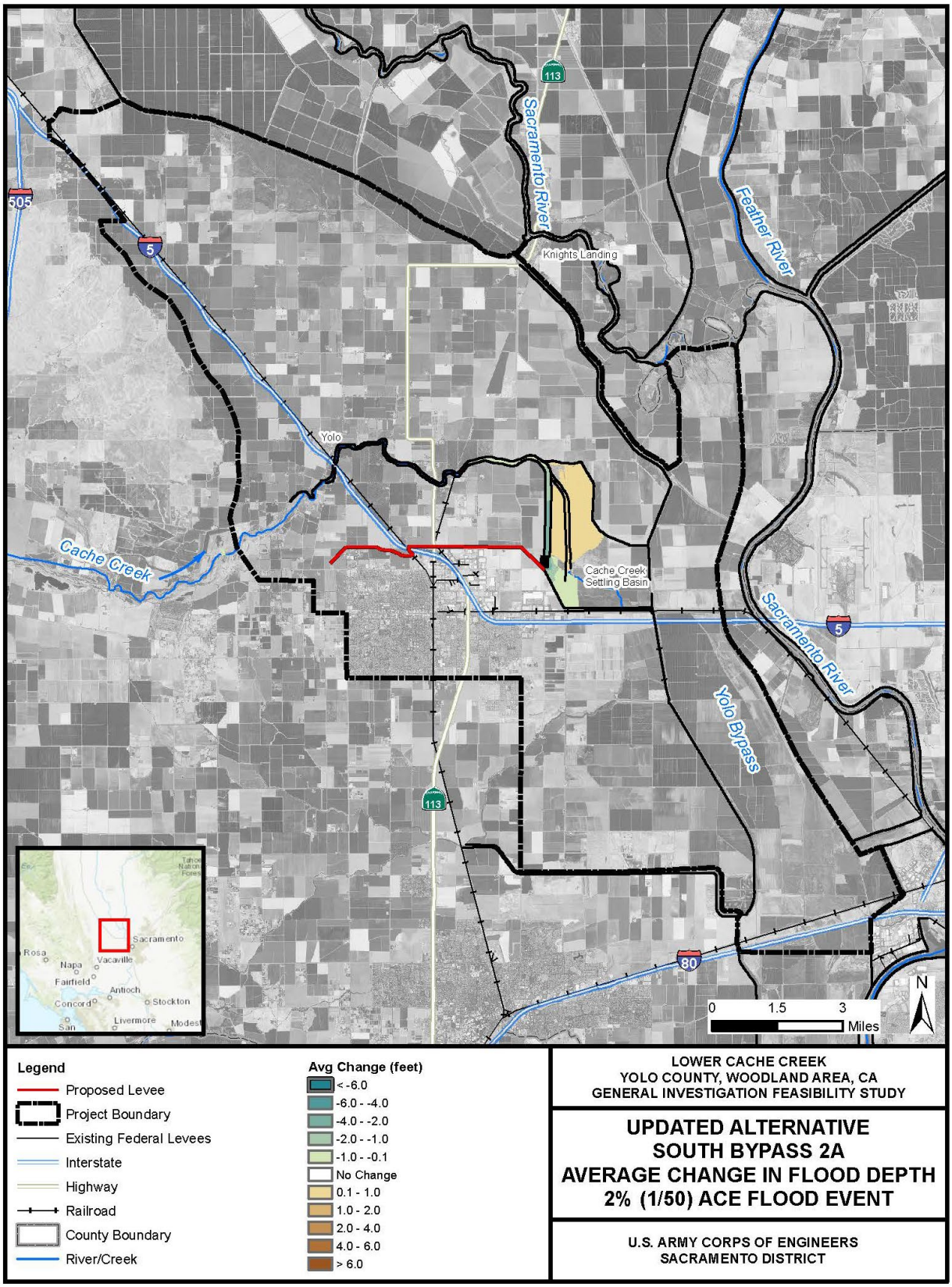


Figure 3-27. Average change in flood depth at the 1% (1/100) AEP event with LCP.

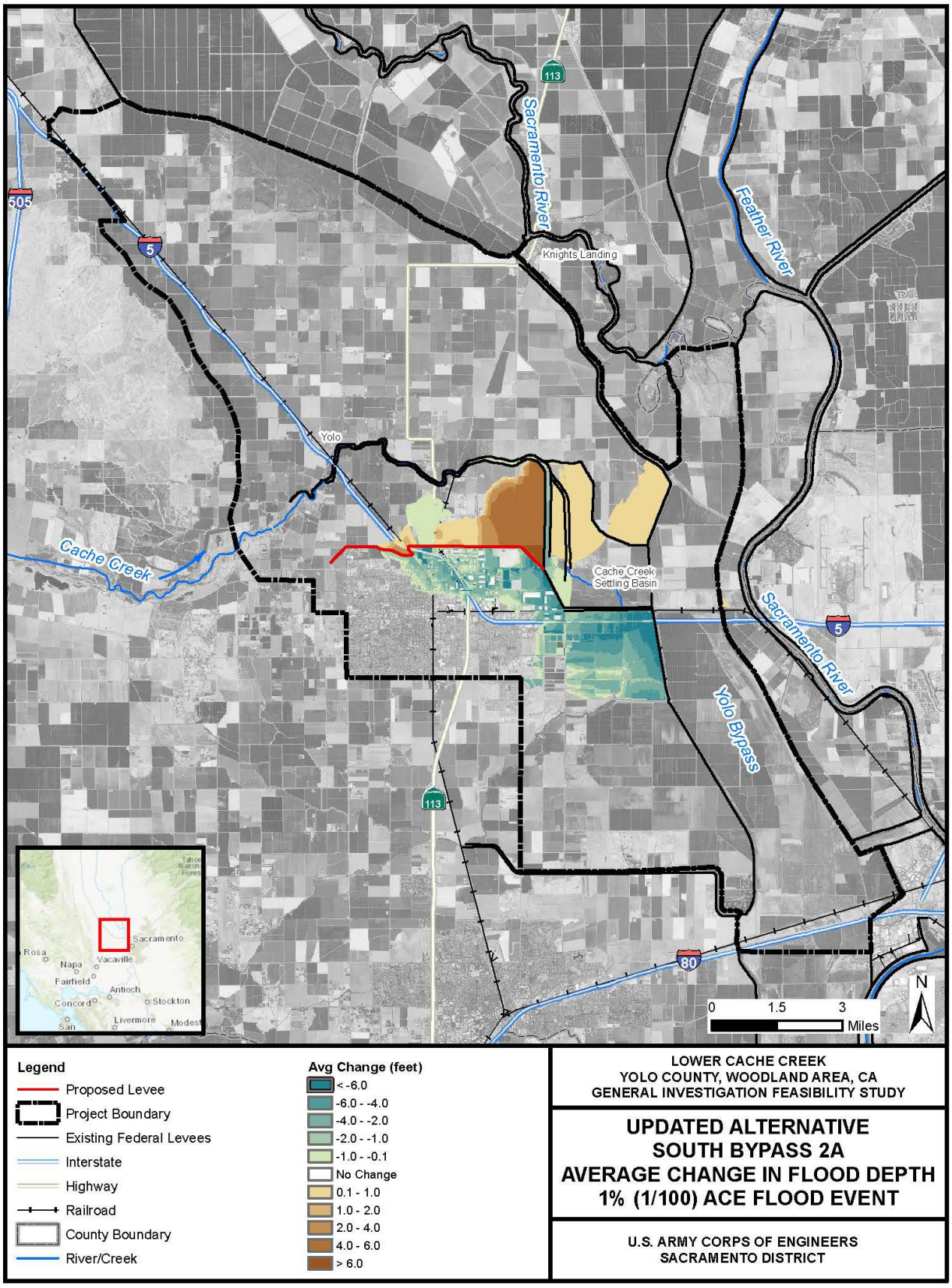
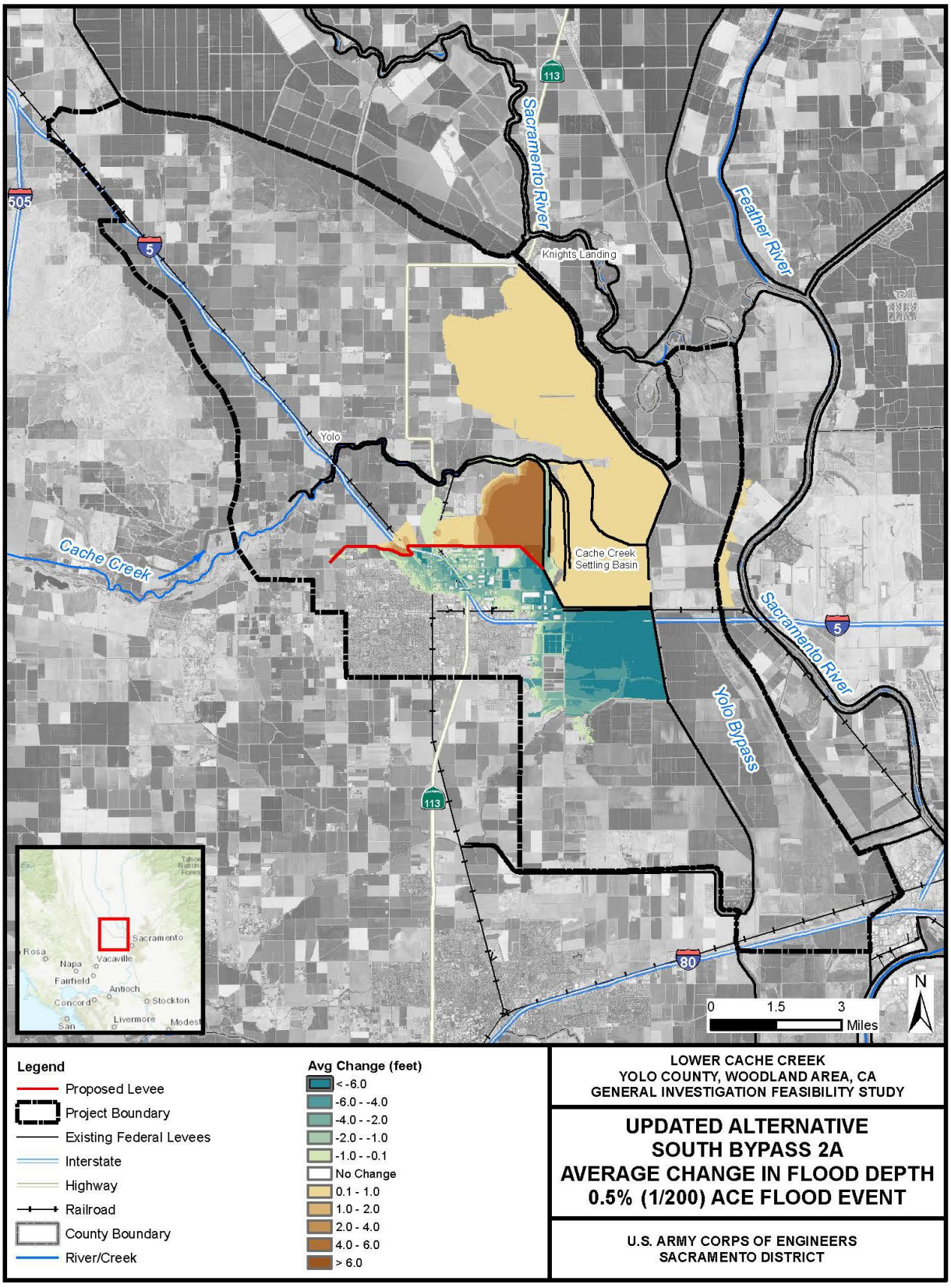


Figure 3-28. Average change in flood depth with LCP for a 0.5% (1/200) AEP event.



UC-Davis completed sediment transport simulations for the current condition and LCP under 10, 50, 100, and 200-year events (DWR, 2018). Trap efficiencies for the full domain are based on the total bed and suspended load entering the system at the upstream boundary at CR 94B, and the total load exiting the system at the overflow weir. Trap efficiencies for the CCSB are based on the total load entering the CCSB at CR 102 for the current condition or CR 102 and the proposed inlet weir for the LCP, and exiting the system at the overflow weir (Table 3-34.)

Table 3-34. Trap efficiencies (quantified as percent of load entering the Yolo Bypass) of 10, 50, 100, and 200-year flow events for the current condition, the LCP and the CCSB.

	Full Domain		CCSB	
Flow Event	Current Condition	LCP	Current Condition	LCP
10-Year	80	83	31	41
50-Year	86	86	56	58
100-Year	88	90	57	63
200-Year	93	92	66	71

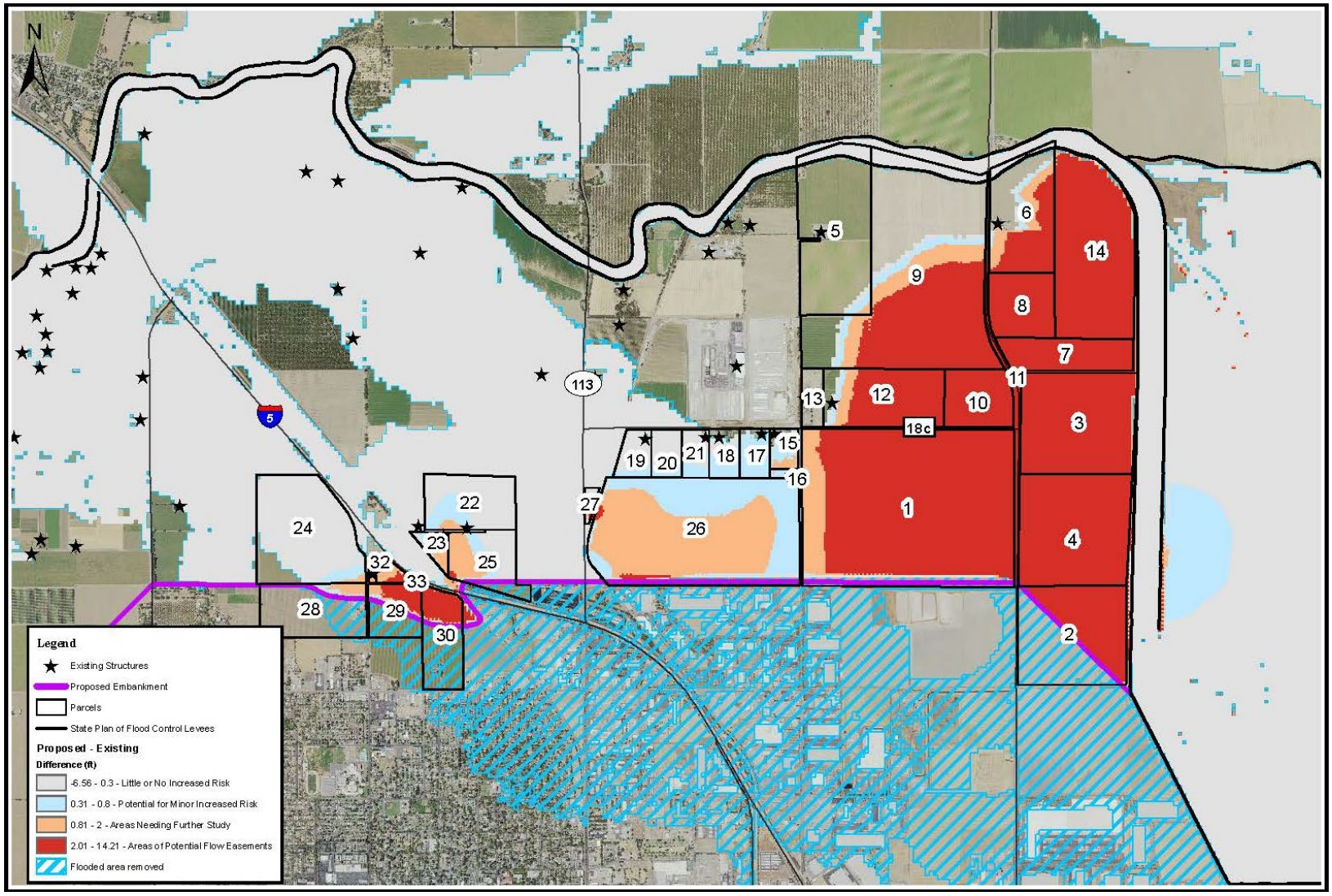
In all cases, whether considering current conditions or the LCP in the full domain or the CCSB, sediment trapping efficiency increases with event magnitude. Furthermore, the LCP meets or exceeds the current trapping efficiency whether calculated for the full domain or the CCSB in all event magnitudes, with the exception of the 200-year event calculated in the full domain. Currently, 7.3% of the total sediment load enters the Yolo Bypass. Under LCP, it is predicted that 7.5% of the total load would enter the Bypass, not a substantial increase. Overall, the proposed alternative does not have a significant adverse impact to the functionality of the CCSB.

The construction of the new levee removes a large area of land from the 100-year and 200-year floodplains, including all of the City of Woodland (see Figure 3-21 and 3-22). The proposed alternative completely eliminates the threat of inundation for Woodland under these conditions. Figure 3-21 and Figure 3-22 indicates the change in flood depths during 100 and 200-year events with the implementation of the LCP. As the maps indicate, the proposed project would provide the city of Woodland protection from 200-year flood events, as required by the City and CVFPB objectives.

The new levee would result in localized areas of slight increases in flood depth north of the LCP levee and only impact approximately eight structures. An additional 14 structures north of the City would remain in the floodplain, but would not experience a change in depth or duration of flooding. One structure would experience increase in depth by up to 2 feet. The other seven structures would experiences increase of depth by up to 1 foot. As all of these structures would be flooded under existing conditions without the LCP, an increase of 1-2 foot flood depth is not considered a significant impact.

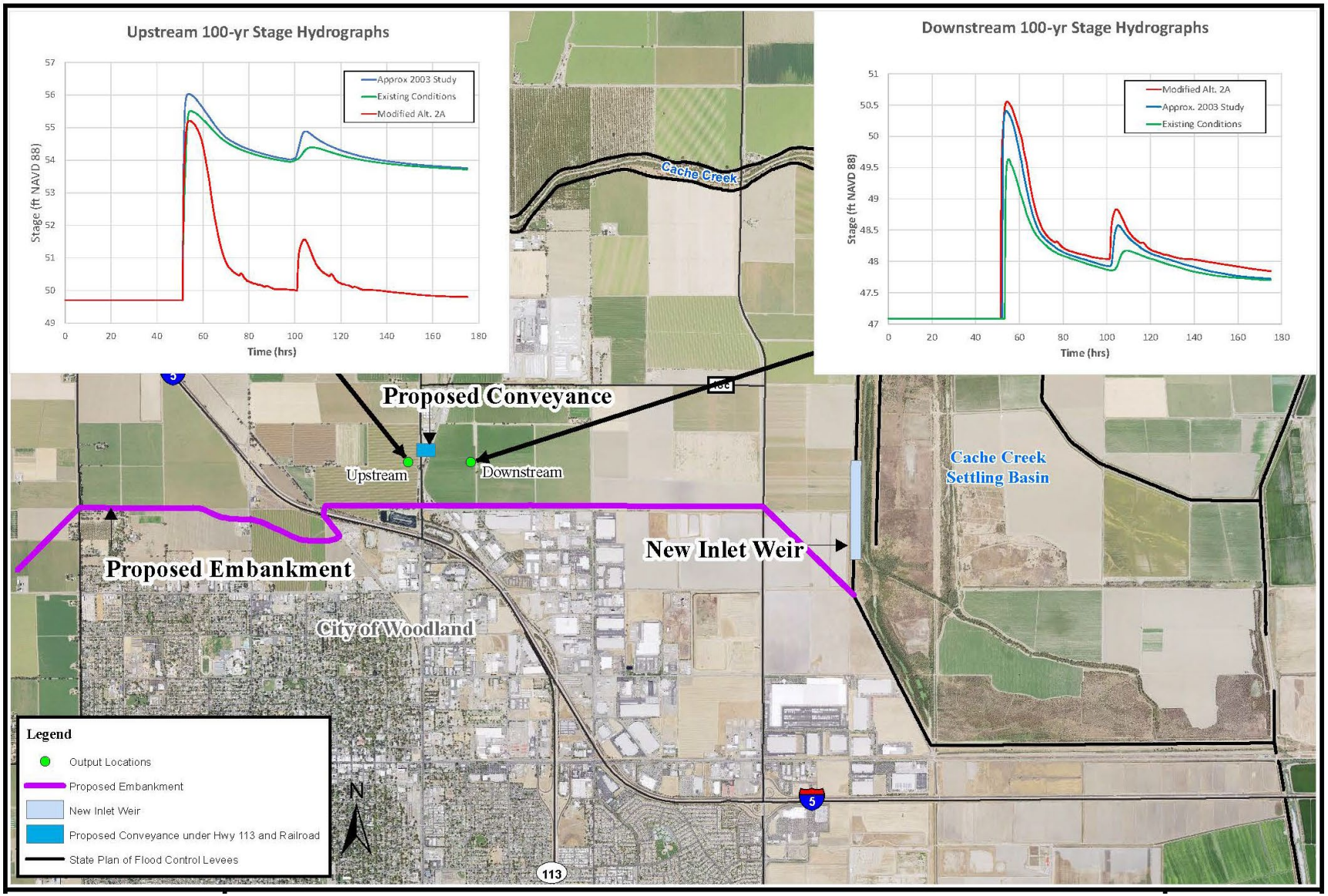
Approximately 2,700 acres would experience changes in flood depth and duration resulting from the LCP. All acreages would have experienced flooding under existing conditions without the proposed LCP. However resulting from the LCP, of those 2,700 acres, 450 acres primarily west of SR 113, would have a decrease in flood depth and duration. About half of the 2,250 acres would have an increase in flooding of up to 4 feet, and the other half (1,200 acres) would have an increase of up to 6 feet. The detention basin would experience flooding greater than 6 feet.

Figure 3-29. Structures and change in flood depth resulting from the LCP during a 1% (AEP) flood event.



Note: This figure was produced for CEQA analysis in the City of Woodland's EIR. Under NEPA, federal analysis has determined that hydraulic impacts are less than significant and do not require mitigative features, like flowage easements.

Figure 3-30. LCP Model Output Hydrographs showing flood duration near SR 113.



In areas north of the proposed levee, the inundation depths during flood events are expected to remain the same, except in isolated areas of mostly minor increases. The exception being lands adjacent to the western levee of the CCSB, where water levels could increase by as much as 6 feet during a 0.5 (1/200) AEP event. This area contains no existing structures. A small area near the intersection of I-5 and CR 99 including three residences and two commercial businesses (ARCO gas station and Denny's) may experience increases of 0.1 to 2 feet in water depth during a 0.5 (1/200) AEP event. These structures are at risk of flooding during existing conditions. The ARCO gas station is fully paved with a concrete pad above the tank fill pipes. The parking lot is elevated relative to surrounding streets and fields, reducing erosion and scour. Gas stations are consistently exposed to heavy winter rains and temporary flooding. Flooding in this area would last one week or less. During a 1% (1/100) AEP overtopping event flood water velocities would increase from existing conditions of 2-4 feet per second (fps) to 5-6 fps. Small increases in velocity would not be expected to scour soils above the concrete underground storage tanks significantly enough to damage the tanks. While minimal damage is expected, major gasoline leaks would not occur as the concrete tanks are durable and waterproof. Small gas spills on the paved surfaces from regular operations would enter the flood waters in quantities similar to roadways.

The majority of structures situated between Cache Creek and the proposed levee would experience no change in flood depth under the 100- or 200-year flood events and many of the lands would experience a decrease in duration of flooding as compared to existing conditions. The induced flooding would not cause structural damage beyond anticipated damage during a flood event without the LCP. These structures would be at risk of flooding during existing conditions and changes in depth and duration of flooding would not cause significant impacts.

The increased flood depth in the aforementioned areas would not place people or structures at a higher risk of loss, damage, injury, or death, compared to existing conditions. The hydrologic and hydraulic impacts resulting from LCP are negligible.

Mitigation

There are no significant changes in the frequency, duration or depth of flooding resulting from the LCP compared to existing conditions. As a result, no hydraulic mitigation is proposed.

4.0 CUMULATIVE AND GROWTH-INDUCING IMPACTS, AND OTHER STATUTORY REQUIREMENTS

4.1 Introduction

This chapter describes statutory Federal requirements not discussed elsewhere in the DSEIS. Cumulative effects and growth-inducing effects are discussed along with unavoidable adverse effects, the relationship of short-term uses and long-term productivity, and irreversible and irretrievable commitments of resources. Mitigation and environmental monitoring for the project and the project's compliance with applicable laws, policies, and plans are discussed. Public involvement associated with the project is included.

4.2 Cumulative Effects

NEPA requires the consideration of cumulative effects of the proposed action, combined with the effects of other projects. NEPA defines a cumulative effect as an effect on the environmental that results from the incremental effect of an action when combined with other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR § 1508.7). This section discusses the potential cumulative effects of the Lower Cache Creek Feasibility Study when added to other past, present, and reasonably foreseeable future actions.

If the project is not expected to contribute to a cumulative effect on a resource, then that resource is not included in the sections below. Resources described in Section 3.2 would not be affected by the proposed alternatives, and are therefore cumulative effects are not evaluated below. These resources include topography, geology and soils, recreation, hazardous, toxic and radioactive waste, public health vectors and vector control, and fisheries.

This section discusses the potential cumulative effects of the LCCFS when added to other past, present, and reasonably foreseeable future actions. As presented in Section 3.3, the following resources are identified as potentially impacted by the project:

- Socioeconomics and Environmental Justice
- Land Use and Agriculture
- Transportation
- Noise
- Air Quality
- Climate Change
- Water Quality
- Vegetation and Wildlife
- Special-Status Species
- Cultural Resources
- Aesthetic and Visual Resources
- Utilities
- Hydrology and Hydraulics

4.2.1 Methodology and Scope of the Analysis

The cumulative effects analysis determines the combined effect of the LCCFS TSP and other closely related, reasonably foreseeable projects. Cumulative effects were evaluated by identifying projects in and around the Woodland area that could have individually minor but collectively significant actions taking place over a period of time. These potential effects are combined to the potential adverse or beneficial effects of the proposed alternatives to determine the type, length, and magnitude of potential cumulative effects. Those effects that cannot be avoided or reduced to less than significant are more likely to contribute to cumulative effects in the area. Mitigation of significant cumulative effects could be accomplished by rescheduling actions of proposed projects and adopting different technologies.

The significance of the cumulative effects would be determined by assessing the effects from the combination of the TSP and the other related projects discussed below in comparison to the no action alternative using the specified criteria identified under each environmental resource section in Chapter 3.

The geographic area that could be affected by the project varies depending on the type of environmental resource being considered. For example, air and water resources extend beyond the confines of the project footprint since effects on these resources would not necessarily be confined to the project area. Table 4-1 presents the general geographic areas associated with the different resources addressed in this DSEIS. The related projects that are considered may also vary under each environmental resource section depending on the type of environmental effects that may result from these projects.

The cumulative analysis for this DSEIS varies by topic area, but generally includes planned development in Yolo County, and is based on the County General Plan, Land Use designations, Yolo County Habitat Conservation Plan, Cache Creek Annual Status Report (p. 17), Off-Channel Mining Plan (OCMP), and the Cache Creek Resources Management Plan (CCRMP). The temporal scope of the analysis is generally limited to actions that either present lingering effects or O&M effects that overlap with the existing conditions described in the 2003 DEIS-EIR, which this document is supplementing. Future projects can only be reasonably foreseeable to a certain degree in the future. In this case, future proposed projects are considered if they have an existing funding source, NEPA or CEQA document out to the public, and are expected to construct prior to the estimated completion of construction of the LCCFS TSP (approximately 2027).

Table 4-1. Geographic Scope of the Cumulative Effects Analysis.

Resource Area	Geographic Scope
Socioeconomic Resources and Environmental Justice	City of Woodland and Yolo County, including those directly impacted by project construction
Land Use	Lands in and adjacent to the study area, including the floodplains associated with the TSP.
Agriculture, Prime and Unique Farmland	Agricultural lands in the study area, including the floodplains associated with the TSP
Transportation	Roadway network in the City of Woodland and adjacent portions of Yolo County with regional implications
Noise	Immediate project vicinity
Air Quality	Regional air effects in the Yolo-Solano Air Quality Management District and Sacramento Federal Nonattainment Area; Global air effects for greenhouse gas emissions
Sedimentation and the Settling Basin	Cache Creek and the Cache Creek Settling Basin
Water Quality	Cache Creek, the Cache Creek Settling Basin, the Yolo Bypass, city of Woodland interior drainage system
Vegetation and Wildlife	Habitat at the immediate estimated project footprint, with regional implications for species
Special Status Species	Habitat at the immediate estimated project footprint, with regional implications for species
Cultural Resources	Immediate project footprint ground disturbance sites, with regional implications
Aesthetic and Visual Resources	Immediate project area vicinity at the landscape level

Utilities	City of Woodland, unincorporated Yolo County lands in the vicinity of the study area.
Hydrology and Hydraulics	Cache Creek, the Cache Creek Settling Basin, the Yolo Bypass, City of Woodland interior drainage system

4.2.2 Past, Present, and Reasonably Foreseeable Projects in the Study Area

Lower American River Common Features Project

Based on congressional authorizations in WRDA 1996 and WRDA 1999, the Corps, CVFPB, and SAFCA have undertaken various improvements to the levees along the north and south banks of the American River and the east bank of the Sacramento River. Under WRDA 1996, this involved addressing seepage through the construction of 26 miles of slurry walls on the American River. The WRDA 1999 authorization included a variety of additional levee improvements to address stability and overtopping, ensuring that the levees could pass an emergency release of 160,000 cubic feet per second (cfs) from Folsom Dam. These improvements included measures such as levee raises, slope geometry improvements, and levee widening improvements. The WRDA 1996 and 1999 projects were completed in 2014.

Since the WRDA 1996 and 1999 projects are complete, construction would not overlap between these two projects. As a result, the only reasonably foreseeable cumulative action would be LCCFS construction occurring at the same time as long term O&M actions along the Lower American River. As these O&M actions are usually site-specific and temporary actions, it is unlikely that they would produce any effects that would result in a cumulative effect. As a result, this project is not discussed further in this assessment.

American River Common Features, Natomas Basin Project

In 2007, the Natomas Levee Improvement Project was initiated by SAFCA in order to provide flood protection as an early implementation project to the Natomas Basin as quickly as possible. These projects consisted of improvements to the perimeter levee system of the Natomas Basin in Sutter and Sacramento Counties, as well as associated landscape and irrigation/drainage infrastructure modifications. SAFCA, DWR, CVFPB, and the Corps initiated this effort with the aim of incorporating the Landside Improvements Project and the Natomas Levee Improvement Project into the Federally-authorized American River Common Features, Natomas Basin Project. Construction on the early implementation project was completed in 2013, and included approximately 18 miles of levee improvements.

The remaining 24 miles of levee improvements under the ARCF Natomas Basin Project were authorized in the Water Resources Reform and Development Act of 2014. The Corps initiated construction in 2018 on the Natomas Cross Canal in Sutter County, and on the American River north levee adjacent to Discovery Park. Work on these segments continued in summer 2019, and construction was additionally initiated on the southern end of the Natomas East Main Drainage Canal west levee. Proposed improvement primarily involve constructing cutoff walls through the levees, or alternatively an adjacent levee in some reaches. Construction on the Natomas Basin Project is anticipated to continue through 2024.

It is unlikely that construction would overlap between these two projects, unless Natomas construction is delayed, or LCCFS is authorized for construction sooner than anticipated. As a result, the only reasonably foreseeable cumulative action would be LCCFS construction occurring

at the same time as Natomas long term O&M actions. As these O&M actions are usually site-specific and temporary actions, it is unlikely that they would produce any effects that would result in a cumulative effect. As a result, this project is not discussed further in this assessment.

Sacramento River Bank Protection Project

The Sacramento River Bank Protection Project (SRBPP) was authorized to protect the existing levees and flood control facilities of the Sacramento River Flood Control Project. The SRBPP was authorized in 1960 and initially consisted of the construction of 436,397 linear feet of bank protection from 1963 to 1975. In 1974, Congress authorized the SRBPP to continue into a Phase II with an additional 405,000 linear feet of bank protection.

The SRBPP directs the Corps to provide bank protection to address erosion damage to the Sacramento River Flood Management System, including the Lower Cache Creek levees. This is an ongoing project, and additional sites requiring repair would continue to be identified until the remaining authority of 4,966 linear feet is exhausted. WRDA 2007 authorized an additional 80,000 linear feet of bank protection for Phase II, which would be initiated upon approval of the SRBPP Post Authorization Change Report. Construction proposed for 2019 includes a site at river mile 1.0 on the Feather River levee, which is located approximately 7.5 miles to the northeast of the LCCFS study area.

Due to the programmatic nature of the SRBPP, it is currently unknown whether there would be proposed bank protection work occurring in the vicinity of the LCCFS study area during the estimated construction period. However, it is reasonable to assume that there could be a SRBPP site constructing somewhere within the region that overlaps with the LCCFS construction period; therefore cumulative effects could occur. Potential cumulative effects that could result from these overlapping projects could include emissions of criteria pollutants within the Sacramento Federal Nonattainment Area, increased regional traffic impacts, and potentially an increase in regional loss of riparian habitat during construction. Significance of overlapping project impacts is assessed in the resource categories below.

West Sacramento Project

The West Sacramento general reevaluation study determined the Federal interest in reducing the flood risk within the West Sacramento project area. The purpose of the West Sacramento Project is to bring the 50 miles of perimeter levees surrounding West Sacramento into compliance with applicable Federal and State standards for levees protecting urban areas. Proposed levee improvements would address: (1) seepage; (2) stability; (3) levee height; and (4) erosion concerns along the West Sacramento levee system. Measures to address these concerns would include: (1) seepage cutoff walls; (2) stability berms; (3) levee raises; (5) flood walls; (6) relief wells; (7) sheet pile walls; (8) jet grouting; and (9) bank protection.

The West Sacramento Project was authorized in WRDA 2016, and in the Fiscal Year 2019 work plan, the project received initial funding to begin preconstruction design. Construction of the project by the Corps is estimated to begin in approximately 2021. However, under the West Sacramento Area Flood Control Agency's Early Implementation Program, four levee segments have already been completed: a small segment along the Sacramento River adjacent to the I Street Bridge, a stretch along Sacramento River in the northern portion of the city near the neighborhood of Bryte, improvements to the south levee of the Sacramento Bypass, and the Southport setback levee along the east bank of the Sacramento River.

It is possible for there to be overlapping construction between the LCCFS and the West Sacramento Project, therefore cumulative effects could occur. Potential cumulative effects that could result from these overlapping projects could include emissions of criteria pollutants within the Sacramento Federal Nonattainment Area, increased regional traffic impacts, and potentially an increase in regional loss of riparian habitat during construction. The loss of extensive riparian habitat would be a significant impact.

Folsom Dam Safety and Flood Damage Reduction Project

The Folsom Dam Safety and Flood Damage Reduction Project, referred to as the Joint Federal Project (JFP), addressed the dam safety hydrologic risk at Folsom Dam and improved flood protection to the Sacramento area. Several activities associated the project included: the Folsom Dam Auxiliary Spillway, static upgrades to Dike 4, Mormon Island Auxiliary Dam (MIAD) modifications, and seismic upgrades (piers and tendons) to the Main Concrete Dam. The Folsom JFP was completed in fall 2017.

Since the Folsom JFP is complete, construction would not overlap between these two projects. As a result, the only reasonably foreseeable cumulative action would be LCCFS construction occurring at the same time as long term O&M actions along the Lower American River. Additionally, there could be a long term indirect cumulative effect in the Yolo Bypass, since the JFP controls American River flow into the Bypass from the east, while Cache Creek does the same from the west. However, as there is not proposed to be a change in flows associated with the LCCFS, any downstream effects would not be the result of the contribution provided by LCCFS to any cumulative effect. Regarding long-term O&M actions, these measures are usually site-specific and temporary actions, and it is unlikely that they would produce any effects that would result in a cumulative effect. As a result, this project is not discussed further in this assessment.

Folsom Dam Water Control Manual Update

The Folsom Dam Water Control Manual (WCM) was updated to reflect authorized changes to the flood management and dam safety operations at Folsom Dam to reduce flood risk in the Sacramento area. The WCM Update would utilize the existing and authorized physical features of the dam and reservoir, specifically the recently completed auxiliary spillway. Along with evaluating operational changes to utilize the additional operational capabilities created by the auxiliary spillway, the WCM Update would assess the use of available technologies to enhance the flood risk management performance of Folsom Dam to include a refinement of the basin wetness parameters and the use of real time forecasting to inform dam operation. Further, the WCM Update would evaluate options for the inclusion of creditable flood control transfer space in Folsom Reservoir in conjunction with Union Valley, Hell Hole, and French Meadows Reservoirs (also referred to as Variable Space Storage). The study resulted in an Engineering Report as well as a Water Control Manual that implements the recommendations of the analysis. The WCM was finalized and approved in summer 2019.

It should be noted that the initial WCM Update effort would focus on additional operational capabilities created by the auxiliary spillway. The Water Control Manual would be further revised in the future to reflect the capabilities to be provided by the Folsom Dam Raise Project and ARCF 2016, as appropriate.

The Folsom WCM did not involve any construction and rather regulates downstream flows out of Folsom Reservoir. There could be a long term indirect cumulative effect in the Yolo Bypass,

since Folsom Dam controls American River flows into the Bypass from the east, while Cache Creek does the same from the west. However, as there is not proposed to be a change in flows associated with the LCCFS, any downstream effects would not be the result of the contribution provided by LCCFS to any cumulative effect. As a result, this project is not discussed further in this assessment.

Folsom Dam Raise Project

Construction of the Folsom Dam Raise project would follow completion of the JFP and the WCM projects The Dam Raise project includes raising the right and left wing dams, Mormon Island Auxiliary Dam and dikes 1-8 around Folsom Reservoir by 3.5 feet. Similar to the ARCF 2016 Project, the Folsom Dam Raise Project was fully funded by the Bipartisan Budget Act of 2018. Construction on the Folsom Dam Raise Project is scheduled to begin in 2019 with the Dike 8 construction, followed by Dike 7 in 2020, Dikes 1 through 3, the wing dams, and MIAD in 2021, and completing the project with Dikes 4 through 6 in 2022.

It is unlikely that construction would overlap between these two projects, unless construction is delayed on the Folsom Dam Raise project, or LCCFS is authorized for construction sooner than anticipated. As a result, the only reasonably foreseeable cumulative action would be LCCFS construction occurring at the same time as long term O&M actions at Folsom Dam. As these O&M actions are usually site-specific and temporary actions, it is unlikely that they would produce any effects that would result in a cumulative effect. As a result, this project is not discussed further in this assessment.

American River Common Features 2016 Project

The greater ARCF 2016 project is scheduled for construction from 2019 through 2024. The project would involve construction of levee improvements along the American and Sacramento River levees, as well as proposed improvements to the Natomas East Main Drainage Canal (NEMDC) east levee and Magpie Creek. The levee improvements scheduled for implementation include construction of cutoff walls, erosion protection, seepage and stability berms, relief wells, levee raises, and a small stretch of new levee. In addition, the Corps would widen the Sacramento Weir and Bypass in order to divert additional flows into the Yolo Bypass. The project would also involve construction of a number of mitigation sites in the area.

It is unlikely that construction would overlap between these two projects, unless ARCF 2016 construction is delayed, or LCCFS is authorized for construction sooner than anticipated. As a result, the only reasonably foreseeable cumulative action would be LCCFS construction occurring at the same time as long term O&M actions associated with ARCF 2016 project actions. As these O&M actions are usually site-specific and temporary actions, it is unlikely that they would produce any effects that would result in a cumulative effect. As a result, this project is not discussed further in this assessment.

Off-Channel Gravel Mining

There are currently six off-channel mining operations (Teichert Schwarzgruber, Syar Industries, Teichert Woodland, Teichert Esparto, Granite Capay, and Cemex) that are permitted along Cache Creek (Miller 2018). The gravel mining reach of the Cache Creek Basin extends approximately 14.5 miles along Cache Creek between Capay and Yolo. Facilities include sand and gravel processing plants, asphalt-concrete hot mix plants, concrete batch plants, material stockpiles, settling ponds, water wells, stationary and mobile equipment, and haul roads. Instream

mining is permitted by industry only as a flood control measure. This project began in 1996 and is expected to continue for 30 years.

East of the 95B Bridge at Teichert (Woodland) above I-5, Yolo County reclaimed its old gravel extraction site previously used for county projects. The area was reclaimed as required in the original mining and reclamation plan. Teichert Materials has requested approval of a new 30-year Mining Permit and Reclamation Plan, currently undergoing environmental review (Teichert Aggregates 2019).

The gravel mining operations upstream of the study area is an ongoing operation that is part of the baseline condition. The combination of implementation of the LCCFS in combination with the gravel mining could result in increased water quality effects in the Cache Creek Watershed. As a result, cumulative effects to water quality from these projects would be discussed below.

Guinda Bridge Replacement Project

Yolo County has completed construction of a new bridge over Cache Creek on County Road 57. Riprap was placed around the east abutment and the previous bridge was removed. Yolo County completed a Negative Declaration, as appropriate under CEQA (Yolo County, 2007). This project was successfully completed as of 2010.

Since the Guinda Bridge Replacement Project is complete, construction would not overlap between these two projects. As a result, the only reasonably foreseeable cumulative action would be LCCFS construction occurring at the same time as long term O&M actions associated with the new bridge. As these O&M actions are usually site-specific actions, it is unlikely that they would produce any effects that would result in a cumulative effect. As a result, this project is not discussed further in this assessment.

Cache Creek Area Plan Update

Yolo County adopted the Cache Creek Area Plan in 1996 for the 14.5 miles along Lower Cache Creek, generally from Capay Dam downstream to the town of Yolo. The drafted update to the rivershed management plan is proposing increases to current in-channel material removal limits, modifications to in-channel boundaries, rezoned areas for future aggregate mining, and a 50 year program extension. The Plan is comprised of two subplans, the Off-Channel Mining Plan and the Cache Creek Resource Management Plan. The draft EIR was completed on May 2019 (Yolo County, 2019).

The Cache Creek Area Plan Update is primarily a planning document and is not anticipated to involve any construction. Physical changes associated with the plan could include an increase in off-channel mining operations, however, any associated effects would be covered under that activity's assessment. As a result, this plan is not discussed further in this assessment.

2018 Water & Sewer Repair and Replacement Project

The City of Woodland created this project as part of an annual program to replace water mains over 60 years old and repair sewer deficiencies. The project consists of repairing water mains and service laterals, as well as replacing sanitary sewer mains and laterals within city limits (City of Woodland, 2019). The project began construction in September 2018 and was completed in spring 2019.

While the 2018 project described above would not overlap with construction of the LCCFS, as an annual program it is possible that future work under this program could overlap with LCCFS construction. However, due to the programmatic nature of the program, the context and duration of any cumulative effects would be speculative. However, it is reasonable to assume that some potential cumulative effects could occur, regardless of the context of the overlapping construction windows. For example, there could be a cumulative effect from increased emissions of criteria pollutants within the Sacramento Federal Nonattainment Area, and increased regional traffic impacts in the Woodland area.

North Regional Pond and Pump Station Project

North Regional Pond serves as a storm drainage mitigation feature for Spring Lake Area developments, and was formerly the site of wastewater treatment operations in the mid-1980s. The site is centrally located with Woodland's Water Pollution Control Facility to the north, and the Regional Water Treatment Facility to the south. The City of Woodland recognizes the need to repurpose the area to meet population and housing increases. The project would include increasing detention capacity within the existing pond by 1,000 acre-feet, as well as constructing an additional storm drainage pumping plant on Main Street. This project is currently in construction and is expected to be completed by fall 2020.

Since the North Regional Pond and Pump Station Project would be complete prior to the initiation of construction on the LCCFS, there would be no overlap in activities between these two projects. As a result, the only reasonably foreseeable cumulative action would be LCCFS construction occurring at the same time as long term O&M actions associated with the new bridge. However, since the North Regional Pond and Pump Station Project is improving these facilities to accommodate additional stormwater drainage, it does provide some benefits for the LCCFS for drainage and stormwater runoff. As a result, cumulative effects associated with this project would be discussed in the water quality and hydrology and hydraulics sections below.

Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership

Huff's Corner and Wallace Weir Improvement Projects are part of the short-term improvements proposed in a joint program with the Central Valley Flood Protection Board, U.S. Bureau of Reclamation (USBR), USACE, and the Department of Water Resources. Yolo Flood Improvements is incorporated into the mid-term (3-7 years) improvements plan The Cache Creek Settling Basin Multi-Objective Project is incorporated into the long-term (7+ years) improvements plan of the joint partnership. The series of multi-benefit projects in the Yolo Bypass-Cache Slough Region incorporates Sacramento, Yolo, Solano, and Sutter Counties, with the regional objectives of flood risk reduction, ecosystem restoration, agricultural sustainability, and water supply reliability. The initiation request for project review is dated July 2019 by the State of California Natural Resources Agency's Central Valley Flood Protection Board.

4.2.3 Evaluation of Cumulative Effects

This chapter discusses the cumulative effects of the LCP combined with the related past, present, and reasonably foreseeable future actions described above. A project can cause direct, indirect, and cumulative effects on the environment.

Socioeconomics and Environmental Justice

The LCP provides substantial economic benefits to the City of Woodland and the county lands south of the proposed levee, due to the potential reduction in need for flood insurance, which would result from an increase in levels of flood protection. Socioeconomic effects of this plan include temporary construction-related disturbances to residents and local business owners. Mitigation measures would reduce the impacts to insignificant. Any lands required for the LCP would be purchased at full value. Potential cumulative effects would include future projects that could potentially convert more land to non-agricultural uses, such as future development projects in the Woodland area, including the proposed homeless and low income housing complex near the study area. However, as a general rule, both the City and County place a high value on socioeconomics when considering potential projects. Cumulative socioeconomic effects on the community are less than significant.

Thirteen percent of the population in Woodland are at or below the poverty status, which is only 0.3% below the poverty status for the state of California. Woodland experiences less poverty than Yolo County. For these reasons there are no environmental justice effects to the study area based upon income. In 2018, 48.3 percent of Woodland residents were Hispanic or Latino (U.S. Census, 2018). This is largely due in part to the large agricultural economy in the area. The temporary and permanent removal of farmland from production may result in a temporary impact of migrant seasonal labor. Without a labor decrease or risk of unemployment, there would not be significant economic effects to minority populations. While there are populations in the study area that meet criteria of minority and low income populations, there would be no cumulative effects on socioeconomics and environmental justice.

The implementation of multiple flood risk reduction projects in the greater Sacramento area does have the potential to disturb and force relocation of homeless people. This regional issue is being resolved slowly. Woodland does have plans to build a new homeless shelter which should alleviate the problem within the LCP study area. However, cumulative impacts to homeless populations remains significant.

Land Use and Agriculture

Effects from implementation of the LCP include the conversion of 283 acres of agricultural lands for flood risk reduction purposes. The City of Woodland's urban limit line and Yolo County's agricultural land policy are highly protective of current land uses, including agricultural land uses, and discourage residential development in agricultural communities. There is the potential that future cumulative effects could occur if development projects, such as the city of Woodland's planned low income and homeless community, were to be planned on agricultural lands in the study area; however, due to local policy, this is unlikely to occur in large enough quantities of acreages to consider a significant effect. There would be beneficial economic impacts to lands south of the City of Woodland, due to the potential for new development. Cumulative effects on land use and agriculture remain minor due to the small percentage of lands with induced flooding resulting from the LCP. Most lands (95%) subject to induced flooding are spring/summer crops that would not be impacted by increased depth and duration during the winter months.

The Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership, Huff's Corner and Wallace Weir Improvement Projects would likely occur in the next 5-10 years. Huff's Corner is adjacent to the LCP, just a mile north near I-5. Huff's corner has been repaired during winter storm events in prior years, and likely any future construction projects would have a small footprint compared to the damage flood events cause. The Wallace Weir is

located where the Knights Landing Ridge Cut meets the Yolo Bypass, just northeast of the LCP footprint. The Wallace Weir is a temporary 450-foot long earthen berm installed to create an irrigation backwater. This berm blocks fish passage until it is compromised by flood flows each year (RD 108, 2016). Construction of a permanent weir would likely cause the loss of agricultural land in Yolo County. Adding fish passage would likely alter land use if floodwaters are diverted onto previously dry land.

There are no other major expected construction related activities located in the Woodland area within the expected timeframe of the proposed LCP construction. Additionally the high value of Prime Farmland in Yolo County and the City of Woodland discourage land use changes. Therefore, it is unlikely that additional projects would contribute significantly to increase this effect substantially.

Transportation

There would be a slight increase in traffic levels in the study area due to project-related traffic; however this would not be substantial in relation to the existing traffic load and capacity of the street system. Potential cumulative effects could occur if other construction projects take place simultaneously that also would be running haul trucks in the Woodland area. Overlapping projects that could combine with the traffic effects of the LCCFS include the North Regional Pond and Pump Station Project, and the Sewer and Water Replacement Program. The potential for combined construction-related traffic to affect roadways is further limited by the fact that the traffic increase would be temporary and would diminish as each segment of the project is completed. The Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership, Huff's Corner and Wallace Weir Improvement Projects would likely occur in the next 5-10 years. If the Huff's Corner project were constructed simultaneously with the proposed LCP, construction related traffic would cause temporary significant transportation related impacts, like increased congestion and wait times for emergency vehicles. However, detours would be made available and since the project footprints are more than a mile apart, the LCP could be scheduled for work start on the eastern side, lessening traffic related impacts. Therefore, the cumulative direct effects on transportation are considered less than significant.

The LCP would not produce a significant indirect effect on transportation. The LCP provides beneficial impacts to transportation as I-5 would no longer flood to the south of Woodland during a 1% (1/100) AEP event. During a large flood event (e.g. 1% AEP event) duration of flooding west of SR 113, near I-5 would be shorter than existing conditions, lasting only several days. The flood warning system would warn residents near Woodland of any weather conditions that may lead to flooding, and residents could access I-5 traveling south to Sacramento. While construction of the plan would result in increased depths and duration of flooding east of SR 113, the induced flooding compared to existing conditions is moderate and would result in minor impacts to local travelers and emergency responders, which would be mitigated to less than significant. There are no past, present, or foreseeable projects that have or would increase the depth and/or duration of flooding to the county roads in the project area. Therefore, no projects would contribute to a cumulative indirect effects on transportation.

Noise

The LCP results would result in temporary significant effects to sensitive noise receptors. While construction would be limited to the City of Woodland's Construction Noise Guidelines recommended work hours, this effect would be remain significant due to the proximity of some residents to the study area (less than 50 feet). To the extent that multiple projects are constructed

simultaneously within a close proximity to each other, there would be the potential for an increased number of sensitive receptors to be affected. However, due to constructability constraints, inter-agency coordination, and construction sequencing between the LCCFS, the North Regional Pond and Pump Station Project, and the Sewer and Water Replacement Program, it is unlikely that simultaneous construction of multiple projects would affect any single receptor. The West Sacramento Project would not be of a close enough proximity to create a cumulative effect; and the Corps would not construct two projects within this close a proximity in the same construction season, therefore it is unlikely for Sac Bank to contribute to a cumulative noise effect on sensitive receptors in the city of Woodland. As a result of these factors, the potential for cumulative effects on noise is considered less than significant.

The Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership, Huff's Corner and Wallace Weir Improvement Projects would likely occur in the next 5-10 years. If the Huff's Corner project were to be constructed simultaneously with the LCP, construction-related noise would cause significant impacts to landowners near both project footprints. Adverse impacts caused by noise would remain significant as a result of the LCP.

Cumulative Effects on Air Quality

Construction of the LCP would produce temporary, less than significant effects on air quality due to an increase in criteria pollutant emissions. To the extent that multiple projects are constructed simultaneously, there would be additional increases in pollutant emissions within the region and throughout the Sacramento Federal Nonattainment Area. Concurrent construction within the SFNA would likely include construction of the West Sacramento Project, any potential Sac Bank sites within the region, the North Regional Pond and Pump Station Project, and the Sewer and Water Replacement Program. Each of these projects and programs would be required to conduct their own conformity analyses to ensure that their emissions remain below Federal conformity thresholds. While construction of the LCP would not emit enough pollutants to trigger a conformity determination, the project would contribute to the existing high levels of ozone precursors. Therefore, the cumulative effects on air quality during construction would likely be considered significant. The Corps would implement BMPs, as described in the Air Quality analysis, to reduce project emissions to the maximum extent practicable.

Climate Change

It is unlikely that any single project by itself could have a significant impact on the environment with respect to GHGs. However, the cumulative effect of human activities has been linked to quantifiable changes in the composition of the atmosphere, which, in turn, have been shown to be the main cause of global climate change. Therefore, the analysis of the environmental effects of GHG emissions is inherently a cumulative impact issue.

It is expected that the primary impacts from these concurrent projects would be due to construction activities. On an individual basis, each of these projects would mitigate emissions below the general reporting threshold. If these projects are implemented concurrently, it is possible that the combined cumulative effects could be above reporting requirements for GHG emissions. However, with the implementation of mitigation measures, which would be required for each of these projects, it is possible that the effects could be reduced to less than significant.

In addition, the majority of the related projects are flood risk management projects. By implementing these projects, the action agencies would be reducing potential future emissions associated with flood fighting and future emergency actions. As a result, the related projects could

combine to reduce long-term potential GHG emissions in the greater Sacramento region. As a result, the overall cumulative GHG emissions from these projects are considered to be less than significant.

Water Quality

The RWQCB is concerned about activity in the Cache Creek watershed that could result in disturbance of mercury-contaminated sediments. There are currently seven off-channel mining operations that are permitted along Cache Creek, within the gravel mining reach of the Cache Creek Basin which extends approximately 14.5 miles along Cache Creek between Capay and Yolo. Instream mining is permitted by industry only as a flood control measure. Teichert Materials has requested approval of a new 30-year Mining Permit and Reclamation Plan, currently undergoing environmental review. Gravel mining would continue to degrade water quality within Cache Creek.

In addition to mining, the Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership, Huff's Corner and Wallace Weir Improvement Projects would likely occur in the next 5-10 years. Huff's Corner is adjacent to the LCP, just a mile north near I-5. Huff's corner has been repaired during winter storm events in prior years, and likely any future construction projects would have a small footprint compared to the damage flood events cause. However, construction to improve levees on Cache Creek would likely lead to temporary increase in water turbidity. Measures to reduce impacts to water quality would be imposed like straw wattles, silt fences, and cofferdams. Increased turbidity and sediment in the water column reduces the already low quality of fish habitat in Cache Creek.

The LCP is designed to work in conjunction with the Cache Creek Settling Basin which captures sediment from Cache Creek, which may contain mercury and other contamination. The CCSB prevents potentially-contaminated sediments from entering the Yolo Bypass and Sacramento-San Joaquin River Bay Delta.

Although ongoing and future projects within the Cache Creek watershed, such as mining, could mobilize potentially contaminated sediments and cause cumulative effects, analysis associated with the LCP shows no significant increase in the net loading of contamination into the system. Therefore, the LCP is not anticipated to contribute to a cumulative effect on mercury-contamination and would have an insignificant affect to water quality overall.

Vegetation and Wildlife

The LCP could potentially result in adverse effects to wildlife and its associated habitats. However, implementing all mitigation requirements minimizes effects to a less-than-significant level. In addition to the LCCFS, other local projects such as the West Sacramento Project and any potential Sac Bank sites would also likely result in significant effects to habitat conditions throughout the Sacramento River Watershed. However, all of these projects would be required to implement mitigative features, and none of these projects are in close enough proximity to each other that they could combine to create a substantial direct effect. The Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership, Huff's Corner and Wallace Weir Improvement Projects would likely occur in the next 5-10 years. Temporary grubbing and vegetation removal may occur in the same timeframe as the LCP. However, habitat near Cache Creek is degraded and vegetation impacts lasting one season would be restored likely to higher quality than existing, using native trees, shrubs, and forbs.

Wetland and habitat restoration, invasive weed removal, and historic mine reclamation all incrementally reduce adverse effects throughout the region. However, full restoration requires the element of time to fully compensate for degraded habitat and species destruction. Short term cumulative effects could be significant; however with time, the mitigation would fully compensate for adverse effects and the overall cumulative effect would be less than significant.

Special-Status Species

Potential cumulative impacts from the combination of these local projects to each of the listed species potentially impacted are below. During preconstruction engineering and design, the Corps designs would avoid impacts to special status species, where possible, or otherwise minimize effects to each of these species.

Palmate-Bracted Bird's Beak

Palmate-bracted bird's beak (PBBB) could be affected by projects occurring in the Woodland area within the next 10 to 15 years. Since the species is restricted to seasonally flooded, saline-alkali soils, these areas would be avoided during construction if possible. However, flood risk reduction projects like LCP, and regular O&M on existing flood control projects, may impact PBBB. There are no known future projects near the Woodland Regional Park, on the corner of CR 102 and CR 25, which has documented occurrences of PBBB in Yolo County. However, development within the City of Woodland has resulted in the fragment population that exists today. The construction of residences and businesses have displaced PBBB habitat to the outskirts of town. The existing PBBB habitat in Woodland Regional Park is protected by the Woodland 2035 General Plan, therefore the endangered plant would not be in danger of jeopardy. There would be compensation for the loss of plants or suitable habitat for each project causing impacts, therefore, there would be no significant cumulative effects to PBBB.

Valley Elderberry Longhorn Beetle

Concurrent construction of projects over the next 10 to 15 years within the greater Woodland area would likely cause mortality to beetles due to construction. Construction activities for the multiple projects would occur each year during the flight season of beetles. Since construction activities would be adjacent to known VELB locations it is likely that some mortality may occur. The exact number injured or killed is unknown but would likely be minimal due to the exceptional flight ability of the beetle to avoid construction vehicles. No designated critical habitat would be affected with the construction of any of the projects.

Shrubs within the each project footprint would be transplanted to areas in close proximately to the current locations. Additionally, compensation would be located within the vicinity of impacted shrubs. Transplanting of shrubs and planting of seedlings and natives within the project vicinity would provide connectivity for the beetle. Loss of connectivity is a primary cause of the beetle decline and an important element in the recovery and sustainability for the beetle. The transplanting of shrubs and compensation within the same area as the potential impacts would result in effects to the beetle but not result in jeopardy to the Valley Elderberry Longhorn Beetle.

Giant Garter Snake

Significant habitat loss in not expected as a result of the LCP, as land use that supports GGS habitat, like rice fields, would not be permanently impacted. Short term impacts would occur

for a single construction season along haul routes and within borrow sites. To minimize potential impacts to snakes work within GGS habitat would be conducted between May 1 and October 1 when snakes are active and can move out of the construction area. Snake mortality could occur during construction along haul routes, however, the snakes are mobile and would likely move out of the way from construction equipment.

The giant garter snake could be affected by multiple projects being constructed within the greater Woodland area over the next 10 to 15 years. There would be a permanent loss of rice fields with the expansion of the Sacramento Bypass, which would be compensated for by the American River Common Features Project. Temporary and permanent changes to drainage canals and rice field resulting from the Natomas Basin Project, would result in the loss of aquatic and upland GGS habitat. There is also potential for the West Sacramento Project to overlap with the proposed LCP construction timeline. Due to the current rice farming in the greater West Sacramento area, impacts to GGS habitat would likely occur.

The Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership, Huff's Corner and Wallace Weir Improvement Projects would likely occur in the next 5-10 years. Construction at Huff's Corner would not likely result in degradation of GGS habitat, as the work would occur near Cache Creek which is a large, shaded channel, low quality GGS habitat. The Wallace Weir is located where the Knights Landing Ridge Cut meets the Yolo Bypass, just northeast of the LCP footprint. The Wallace Weir is a temporary 450-foot long earthen berm installed to create an irrigation backwater. Construction of a permanent weir near the Ridge Cut would likely result in a loss of GGS habitat in Yolo County.

Due to high levels of anticipated federal, state and local construction projects in the greater Sacramento area, there would be significant cumulative effects to GGS within the next 10 years. While avoidance and minimization measures would reduce impacts to GGS habitat and the species itself, due to widespread habitat loss and degradation, GGS would remain at risk of becoming endangered.

Vernal Pool Tadpole Shrimp and Vernal Pool Fairy Shrimp

Concurrent construction of projects over the next 10 to 15 years within the greater Woodland area would likely cause mortality to vernal pool shrimp due to construction. Construction activities that reduce the quality or impact suitable vernal pool and ephemeral freshwater habitat would adversely impact the listed shrimp. Wetland habitat is generally avoided during construction to the greatest extend practicable. Compensation may be required if habitat is degraded.

The Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership, Huff's Corner and Wallace Weir Improvement Projects would likely occur in the next 5-10 years. Huff's Corner is adjacent to the LCP, just a mile north near I-5. Huff's corner has been repaired during winter storm events in prior years, and likely any future construction projects would have a small footprint compared to the damage flood events cause. The Wallace Weir is located where the Knights Landing Ridge Cut meets the Yolo Bypass, just northeast of the LCP footprint. The Wallace Weir is a temporary 450-foot long earthen berm installed to create an irrigation backwater. Construction of a permanent weir would likely result in a loss of vernal pool habitat in Yolo County.

There is only one wetland with hydrology capable of supporting vernal pool tadpole and fairy shrimp adjacent to the LCP footprint. Due to the agricultural nature of most of the greater

Woodland area, especially near the Knights Landin Ridge Cut, most potential wetland habitat was tilled and planted decades ago, reducing high quality habitat for listed species.

Avoidance and minimization measures would reduce impacts to listed vernal pool shrimp. Due to the high level of ground disturbance due to intensive farming over the last century in Yolo County, few pristine wetlands exist, and therefore, there would be no significant cumulative effects to vernal pool fairy shrimp or vernal pool tadpole shrimp.

Cultural Resources

Cumulative impacts to cultural resources would be primarily related to other construction projects that could occur during the same timeframe as those considered for this study and within the same vicinity as this study. At the time of this analysis there no other intensive construction projects anticipated in the City of Woodland that would result in similar impacts to cultural resource sites as the LCP. Smaller, local individual projects would implement separate mitigation measures that would address the effects caused by those projects, therefore, the overall cumulative impacts to cultural resources from the LCP would be negligible.

Aesthetic and Visual Resources

Cumulative impacts to aesthetic and visual resources are primarily related to other construction projects that could occur within the vicinity of the study area and result in loss of visual quality both during construction and after construction. If authorized and constructed the LCP would result in a new levee north of the urban limit line which would block views to the agricultural/industrial area north of the City. Several local projects like the North Regional Pond and Pump Station Project and the Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership would result in temporary construction related impacts to visual resources. While the LCP would result in significant adverse effects on aesthetic and visual resources, there would be no significant cumulative impacts resulting from anticipated projects in the Woodland area.

Utilities

The Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership has the potential to impact utilities in the Woodland area during anticipated construction of the LCP. The North Regional Pond and Pump Station Project would be expected to be complete. Cumulative impacts to utility systems could occur as a result of simultaneous construction. While impacts to local utilities would be reduced to less than significant with the implementation of avoidance and minimization measures, temporary disruptions in service resulting from multiple construction projects may cause significant cumulative impacts to the City of Woodland utility systems, primarily from the removal and relocation of utilities.

Hydrology and Hydraulics

The Yolo Bypass and Cache Slough Region Program Development and Improvement Partnership has the potential to alter the hydrology in the study area. The Huff's Corner Improvement Project has the potential to reduce hydraulic impacts associated with out-of-bank flows occurring during winter storm events. Both the LCP and the aforementioned project may be constructed within the same window; however, since both projects aim to lower flood risk to the greater Woodland area, there would be beneficial cumulative impacts related to the hydrology of the area and potential hydraulic impacts.

4.3 Growth-Inducing Effects

NEPA requires that an EIS discuss how a project, if implemented, could induce growth. This section presents an analysis of the potential growth-inducing effects of the proposed project. Direct growth inducement would result if a project involved construction of new housing. Indirect growth inducement would result, for instance, if implementing a project results in any of the following:

- Substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises);
- Substantial short-term employment opportunities (e.g., construction employment) that indirectly stimulates the need for additional housing and services to support the new temporary employment demand; and/or
- Removal of an obstacle to additional growth and development, such as removing a constraint on a required public utility or service (e.g., construction of a major sewer line with excess capacity through an undeveloped area).

Growth inducement may lead to environmental effects, such as increased demand for utilities and public services, increased traffic and noise, degradation of air or water quality, degradation or loss of plant or animal habitats, and conversion of agricultural and open space land to urban uses. Growth within a floodplain area increases the risk to people or property from flooding.

Within the project area, population growth and urban development are driven by local, regional, and national economic conditions. Local land use decisions are within the jurisdiction of the City of Woodland. The City has adopted a general plan consistent with state law that provides an overall framework for growth and development within the city of Woodland, including the study area.

The agricultural/industrial area north of the City of Woodland would remain in the floodplain and not be subject to development which is in alignment with the 2035 General Plan. With the proposed new levee as a part of the LCP, some lands south of the levee would no longer be in the floodplain and could be developed in accordance with the 2035 General Plan which accounts for industrial development, including warehouses and large businesses. The LCP allows for the least amount of development than other practicable alternatives, by constructing the new levee along the Woodland urban limit line. There have been no practicable alternatives that do not indirectly induce development in the flood plain by removing flood risk as an obstacle to growth. And the LCP strictly limits development and growth, more than improvements to existing levees and setback levees, as all or most of the undeveloped agricultural/industrial area to the north of the city would be removed from the floodplain.

The LCP does cause some growth-inducing effects including new economic growth caused by new employment opportunities. New workers would increase traffic and noise, resulting in degradation of air quality in east Woodland. Workers may increase the demand for new housing in the area. The implementation of the proposed LCP would have impacts on growth. However, since growth expected in the 2035 General Plan is similar to the amount that the LCP would allow, the impacts are negligible. Additionally, the acreage available for development after the construction of the LCP, is a small percentage of the land in the City of Woodland.

4.4 Unavoidable Adverse Effects

Unavoidable adverse effects include significant effects that can be mitigated, but not reduced to a level of insignificance. Chapter 3 provides a detailed analysis of all potentially significant environmental impacts of the proposed alternative, feasible mitigation measures that could reduce or avoid those impacts, and whether these mitigation measures would reduce impacts to less than significant levels. LCP would have significant unavoidable effects on the following 2 resources: Noise and Aesthetic and Visual Resources. The alternative plan benefits do not reduce effects to less than significant, but are considered in the analysis of the overall environmental and economic feasibility of the project. A flood risk management project would reduce damage (potential loss of property and life) associated with significant flooding.

Table 4-2. Environmental Impacts of the Recommended Plan

	Levee and Conveyance Plan
Socioeconomic Resources and Environmental Justice	
Effect	The new levee would result in localized areas of slight increase in depth north of the levee and only impact eight structures. Temporary disruption to residents alongside construction sites from traffic, noise, and dust. Acquisition of properties for construction and staging easements. No long-term environmental injustices.
Significance	Less than significant. Benefits to urban area.
Mitigation	Landowner notification of potential disruptions and real estate acquisitions. Fair market value paid for acquisitions with implementation of appropriate BMPs.
Land Use and Agriculture	
Effect	The project would require approximately 370 acres project permanent project features and temporary haul roads and staging areas. Agricultural lands compose about 283 acres of the total land needs, 235 acres of which are Prime and Unique Farmland.
Significance	Less than significant with mitigation.
Mitigation	Compliance with Relocation Assistance and Real Property Acquisition Policies Act of 1970. Compliance with Farmland Policy Protection Act. Fair market value paid for agricultural and industrial land acquisitions.
Transportation	
Effect	The project would protect important roadway infrastructure from Woodland to Sacramento during flood events that would enable residents to leave flood affected areas and for emergency responders to enter.
Significance	Minor and only occurring during construction.
Mitigation	Preparation of a Traffic Control and Road Management Plan and implementation of BMPs. Culverts under roadways to redirect floodwaters off roads.
Noise	
Effect	Local increase in noise levels during construction would occur that may exceed ambient noise thresholds. After construction concludes, noise levels would return to pre-project conditions.

Significance	Significant. Moderate to major increases in noise levels during construction to adjacent receptors (residences and businesses).
Mitigation	Coordination with local residents and compliance with City of Woodland noise ordinances. Work would occur during daylight hours.
Air Quality	
Effect	Temporary emissions of criteria pollutants from construction equipment and haul trucks.
Significance	Less than significant with mitigation.
Mitigation	Implementation of YSAQMD Basic Construction Emission Control Practices and BMPs.
Climate Change	
Effect	Increased GHG emissions from construction equipment.
Significance	Less than significant with mitigation.
Mitigation	Implementation of YSAQMD Basic Construction Emission Control Practices and BMPs.
Water Quality	
Effect	Potential impacts include increased turbidity during drainage canal construction and tie-in to existing drainage ditch. Potential for storm water runoff from exposed soils and cement, slurry or fuel spills during construction.
Significance	Less than significant with mitigation.
Mitigation	Preparation of a Stormwater Pollution Prevention Plan, Spill Prevention Control and Countermeasure Plan, and a Bentonite Slurry Spill Contingency Plan and implementation of BMPs.
Vegetation and Wildlife	
Effect	The project would result in the loss of 0.05 acres of cottonwood willow riparian, 2 acres of valley oak woodland, 10 acres of seasonal marsh/wetland, and 8 acres of orchard habitat. 83 acres of non-native annual grassland would be also be temporarily lost.
Significance	Less than significant with compensatory mitigation.
Mitigation	Mitigation credits for riparian, wetland, and oak woodlands habitat would be purchased at a mitigation bank. Annual grasslands would be planted with a native forb/grass mix. Orchards would be mitigated by planting native grasslands to improve raptor foraging habitat. Additional analysis would be required for any on-site mitigation. Lands with the CCSB may accommodate habitat creation.
Special Status Species	
Effect	The project would result in the loss of 0.85 acre of palmate-bracted bird's beak, 6 elderberry shrubs, 0.82 acres of giant garter snake, and 0.65 acre of vernal pool fairy shrimp and vernal pool tadpole shrimp habitat.
Significance	Less than significant with compensatory mitigation.
Mitigation	Mitigation credits for the impacted special status species would be purchased from a bank. Mitigation for palmate-bracted bird's beak would involve education and/or habitat enhancement at Woodland Regional

	Park. Additional analysis would be conducted to determine if on-site habitat restoration or creation could be constructed.
Cultural Resources	
Effect	Potential for adverse effects to historic properties from construction of the project.
Significance	Less than significant with mitigation.
Mitigation	Cultural resources surveys would be conducted prior to construction, to identify historic properties that would be affected by the project. Adverse effects would be mitigated through measures described in a Programmatic Agreement executed pursuant to Section 106 of the NHPA.
Aesthetic and Visual Resources	
Effect	Temporary construction related interruption of visual resources. Views obstructed by the new levee would disrupt the rural, agricultural and sparsely populated visual conditions of the study area.
Significance	Significant.
Mitigation	New levee would be reseeded to match local conditions.
Utilities	
Effect	Temporary disruptions to utility services possible, particularly during relocation of utilities that penetrate the new levee.
Significance	Less than significant.
Mitigation	Notification of potential interruptions would be provided to the appropriate agencies and landowners.
Hydrology and Hydraulics	
Effect	During a large flood event (e.g. 1% AEP event) duration of flooding west of SR 113, near I-5 would be shorter than existing conditions, lasting only several days. East of SR 113 flooding duration would be higher (near the inlet weir flooding would last about 1 month). Flood depths would be higher or lower west of SR 113. Flood depths increase gradually to a maximum of 4-6 feet near the CCSB inlet weir during flood events greater than 2% AEP events. Induced flooding would impact industrial/agricultural area north of the city limit line.
Significance	Less than significant.
Mitigation	None needed.

4.5 Relationship of Short-Term Uses and Long-term Productivity

NEPA requires that an EIS include a discussion of the relationship between short-term uses of the environment and long-term productivity. Within the context of the EIS “short-term: refers to the construction period, while “long-term” refers to the operational life of the project and beyond.

Project construction would result in short-term construction-related effects such as interference with local traffic and recreation facilities, and increased air emissions, ambient noise level, dust generation, and are not expected to alter the long-term productivity of the natural

environment. Project implementation would also result in long-term effects, including permanent loss of farmland and changes in visual resources.

Project implementation would contribute to long-term productivity of the environment by constructing a flood risk management project that protects Woodland by reducing the overall flood risk. These long-term beneficial effects of the project would outweigh its potentially significant short-term impacts to the environment.

4.6 Irreversible and Irretrievable Commitment of Resources

NEPA requires that an EIS include a discussion of the irreversible and irretrievable commitments of resources which may be involved should the project be implemented. The irreversible and irretrievable commitments of resources are the permanent loss of resources for future or alternative purposes. Irreversible and irretrievable resources are those that cannot be recovered or recycled, or those that are consumed or reduced to unrecoverable forms. Project implementation would result in the irreversible and irretrievable commitments of energy and material resources during project construction and maintenance, including the following:

- Construction materials, including such resources as soil and rocks;
- Land and water area committed to new/expanded project facilities; and
- Energy expended in the form of electricity, gasoline, diesel fuel, and oil for equipment and transportation vehicles that would be needed for project construction, operation, and maintenance.

The use of these nonrenewable resources is expected to account for only a small portion of the region's resources and would not affect the availability of these resources for other needs within the region. Construction activities would not result in inefficient use of energy or natural resources.

As described throughout this DSEIS, without implementation of the LCP, the risk of levee overtopping would remain high and there is a potential for a variety of significant environmental impacts. Levee failure and the resulting emergency and reconstruction efforts could expend more energy, overall, than construction of the LCP. Debris resulting from a flood event, such as cars, appliances, housing materials, and vegetation would all be generated with a flood and would likely have to be disposed of in a landfill. After debris removal is completed, re-building would occur and new materials would be required to construct homes, businesses, roads, and other urban infrastructure. Thus, project implementation preempts potentially substantial future consumption, and is likely to result in long-term energy and materials conservation.

4.7 Environmental Commitments

This section discusses the mitigation measures identified in Chapter 3 and their proposed implementation.

Project related effects associated with construction such as temporary effects due to transportation, noise, and air quality would be mitigated by use of BMP's implemented during construction. No long-term monitoring is needed for BMP's. Mitigation would be an authorized project feature and would be included in the cost sharing by the Corps, DWR, and the City of Woodland.

4.7.1 U.S. Fish and Wildlife Service Recommendations and Corps Responses

The following USFWS recommendations are outlined in the Draft 2019 Coordination Act Report (CAR). The Corps response follows each recommendation in italics.

1. Avoid impacts to riparian vegetation at all construction sites, staging areas, borrow sites, and haul routes by fencing them with orange construction fencing.
    - Riparian vegetation would be avoided to the greatest extent practicable. Vegetation that is located near and adjacent to construction sites, staging areas, borrow sites, and haul routes would be fenced with orange safety fencing so potential damage to vegetation could be easily avoided.
2. Minimize impacts to trees along the construction area by having all trimming performed by a qualified arborist.
    - The Corps would have a qualified arborist perform all tree trimming activities to ensure tree survival after the project.
3. Minimize impacts to ruderal grassland by reseeding all disturbed areas with appropriate native grass and forb species when construction is complete.
    - All disturbed areas would be hydroseeded with a mix of native grasses and forbs after each construction season to replace ruderal grasslands and prevent erosion.
4. Minimize impacts to pollinators by ensuring restoration plantings include species used by and beneficial for native pollinating species. The Service is available to help establish a list of species that are beneficial to native pollinators. Suitable pollinator plant references can be found online at: http://pollinator.org/guides_code.
    - The Corps would coordinate with USFWS to obtain recommended plant lists for the revegetation of construction-caused ground disturbance to benefit native pollinator species.
5. Minimize impacts to fish species by ensuring culverts placed under the haul road in the settling basin are designed to facilitate fish passage.
    - Currently the design for the haul road to the CCSB training levee is to use existing roads, including CR 102. There is no plan to fill the Lower Cache Creek channel. If the design changes, and culverts were necessary, they would be selected to allow fish passage in the channel.
6. Minimize impacts at borrow, staging, turn-arounds, and any other project disturbed areas by reseeding with native grasses and forbs.
    - All construction-related ground disturbance would be seeded with mixture of native grasses and forbs. The Corps typically uses California brome, small fescue, creeping wildrye, meadow barley and purple needle grass as primarily components in the seeding mix.
7. Compensate for the adverse effects to scrub shrub by replanting the affected area plus an additional 0.03 acre (0.31 acre total plantings).
    - Currently the design for the proposed LCP footprint does not impact scrub-shrub habitat which is located around Lower Cache Creek, as the haul road to the CCSB training levee does not require a temporary bridge and uses existing roads instead. If the project were to impact scrub shrub habitat, the Corps would mitigate as recommended by USFWS.
8. Compensate for the permanent loss of individual trees and ruderal grassland by acquiring suitable lands and developing 3.41 acres in a combination of woodland and grassland habitats (minimum of 319 native tree species).

- The Corps would mitigate for the loss of individual trees, ruderal grassland, cottonwood willow riparian, valley oak woodland, and seasonal march habitat by proposing on site mitigation if possible and purchasing credits at banks if needed.

9. Compensate for the loss of orchard habitat by planting 1.5 acre with native tree species.
    - The Corps would mitigate for the loss of orchard habitat by planting native grasses and forbs on the new levee and drainage ditch to provide higher quality habitat for migratory birds, including Swainson's hawk and other raptors. The Yolo County 2000 crop report identifies 28,385 acres of orchards and grapevines planted in the county in that year (Yolo County 2000). The 2018 crop report identifies 94,900 acres of orchards and 14,750 acres of vineyards in Yolo County (Yolo County 2018). This suggests that row crops, which have moderate-high ecological value, have been replaced by orchards and vineyards that are of low ecological value, leading to a net reduction in the quality of habitat that agricultural land is providing over the last 20 years (Woodbridge, 1998). There is increased concern that conversion of row crops to orchards and vineyards is reducing foraging habitat for Swainson's hawk in the Central Valley (Swolgaard et. al. 2008; Battistone et. al. 2019). By mitigating for the loss of low quality orchard habitat by replanting native grasslands, overall foraging habitat quality and quantity of acreages increases for special status raptor species. Swainson's hawks are State-listed as threatened.
10. Develop a monitoring and remedial action plan and an O&M Manual for the compensation site(s) developed for the project. All phases of plan development should be coordinated with the Service and CDFW.
    - The Corps would develop monitoring plans and an O&M Manual for the mitigation sites developed in the project in coordination with USFWS and CDFW. The plans would be developed in the PED phase of the project.
11. Conduct nesting surveys prior to the removal of any trees or scrub shrub or construction activities to identify active nests of migratory birds and implement measures to minimize impacts on the nests until young have fledged.
    - The Corps would conduct nest surveys prior to tree and vegetation removal, and construction activities to ensure identification of active nests. Active nests would be buffered from construction activities depending upon the bird species, until the young have fledged. Several nest surveys were conducted in spring 2019. Many nests, including raptor nests, were identified in the CCSB.
12. Determine the effects of the proposed project on federally listed species and initiate section 7 consultation with the federal agencies, as appropriate.
    - The effects of the LCP have been identified in the Biological Assessment, Appendix B. When this DSEIS is available for public and concurrent review, a copy would be sent to USFWS and other federal agencies, for their review. Section 7 consultation would be initiated at that time.
13. Coordinate with CDFW on State listed species and species of concern.
    - The Corps would coordinate with USFWS, to keep coordination at a federal to federal level. CDFW would be engaged by the state NFS to ensure compliance with all state requirements including CEQA and CESA. CDFW would be invited to regular stakeholders meetings.

4.7.2 Mitigation

Specific actions taken to implement compensatory mitigation measures are described below. Best management practices (BMPs) are listed for each resource in Chapter 3. A habitat mitigation monitoring and adaptive management plan (HMMAMP) is included in Appendix H.

Table 4-3. Compensatory Mitigation for Special Status Species and Habitat

Impact Type	Potential Impacts	Duration of Impact	Mitigation
Palmate-Bracted Bird's Beak	0.15 acres (Indirect)	Permanent	2.25 acres
	0.7 acres (Direct)		
Valley Elderberry Longhorn Beetle	6 elderberry shrubs	Permanent	6 VELB credits
Giant Garter Snake	1.04 acres (Aquatic)	Permanent	30 acres
	8.78 acres (Upland)		
Vernal Pool Fairy Shrimp	1.3 acres (Indirect)	Permanent	2.6 acres
Vernal Pool Tadpole Shrimp	1.3 acres (Indirect)		
Cottonwood Willow Riparian	0.05 acres	Permanent	0.15 acres
Oak Woodland	2 acres	Permanent	6 acres
Orchard	8 acres	Permanent	8 acres
Seasonal Marsh	10 acres	Permanent	10 acres
Grassland/ Ruderal	82 acres	Single Construction Season	67 acres

Cultural mitigation would include:

- Historic Properties Treatment Plan
- Data Recovery/Mitigation Field Work
- Laboratory Analyses for Data Recovery Fieldwork
- Data Recovery Report
- And/or other mitigation measures as determined through Section 106 consultation.

Air quality mitigation would be required for 2 tons of NO_x. Air quality mitigation would be paid to the YSAQMD once the contractor determined the equipment needed for LCP construction.

4.8 Compliance with Federal Laws, Policies and Plans

The relationship and manner of compliance of the selected plan to applicable Federal environmental requirements are outlined below. Compliance with all listed items must be achieved before the proposed alternative could be implemented.

The non-Federal sponsor would be conducting the CEQA analysis, which would include compliance with applicable state and local laws and regulations. The NEPA and CEQA authors have been in close coordination during these parallel compliance processes. Concurrent review of both documents is expected at a similar timeframe.

Major state laws applicable to the proposed project include California Endangered Species Act, Porter-Cologne Water Quality Control Act, California Clean Air Act, California Global Warming Solutions Act of 2006, Williamson Act, etc. Local plans and policies to be considered include the Yolo-Solano Air Quality Management District's plan, policies of the local Public Works and Transportation Departments, the Yolo Habitat Conservation Plan/Natural Community Conservation Plan, the Yolo County General Plan, and the City of Woodland General Plan.

4.8.1 Federal Requirements

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

This DSEIS was prepared pursuant to regulations implementing NEPA (42 U.S.C. 4321 *et seq.)*. NEPA ensures that Federal agencies consider the environmental effects of their actions. It also requires that an EIS be included in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment. This DSEIS supplements the 2003 DEIS-EIR for Potential Flood Damage Reduction Project (2003) at Lower Cache Creek and provides detailed information regarding the LCP, the proposed action. The analysis describes the environmental effects of the alternative, potential mitigation measures, and adverse environmental effects that cannot be avoided. The Final SEIS provides responses to public comments on the DSEIS. Full compliance with the Act would be achieved with the completion of the Final SEIS and a signed Record of Decision.

National Historic Preservation Act of 1966, as amended (54 USC § 300101 et seq.)

Section 106 of this Act requires Federal agencies to take into account the effects of their undertakings on historic properties. The procedures for complying with Section 106 of the NHPA are described in 36 CFR Part 800. Compliance with Section 106 for this project requires a phased approach, which would follow stipulations specified in the PA prepared for this undertaking pursuant to 36 CFR § 800.14(b)(1)(ii). To date, full archeological and built environment surveys of the APE have not been conducted. If a project is authorized for construction, an updated records search and field surveys would be completed to identify historic properties in the APE and determine the effects of the undertaking on such properties. Any adverse effects to historic properties would be resolved as stipulated in the PA.

Clean Air Act (42 U.S.C. 1857 et seq. (1990), as amended and recodified, 42 U.S.C. 7401 et seq. *SUPP II 1978)

The Federal Clean Air Act (CAA) was enacted in 1963 to protect public health by regulating the amount of pollutants in the air. The act established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants that all states must regulate and maintain. Since one or more criteria pollutants exceed the NAAQS in California, the state is required to prepare a State Implementation Plan (SIP) which determines how the state intends to meet the standards in a timely manner as detailed in the Federal CAA.

Section 3.3.6 of this DSEIS discusses the project's effects on local and regional air quality. The section discusses the issues relative to the project's compliance with YSAQMD significance criteria and U.S. EPA's adopted *de minimis* thresholds in its General Conformity Rule (40 CFR 93.153). Since the project would not exceed conformity thresholds, a conformity determination would not be required.

Clean Water Act (33 U.S.C. 1251 et seq. (1976 & Supp II 1978))

The purpose of the CWA is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" through prevention, reduction, and elimination of pollution. The project must comply with the Federal Clean Water Act, including Section 404, when project construction requires the placement of fill material into the Waters of the United States.

The project proposes to place fill within the Waters of the U.S.; therefore, a 404(b)(1) evaluation is required. This evaluation would be completed prior to construction.

Endangered Species Act (16 U.S.C. 1531 et seq.)

Section 7 of the ESA requires Federal agencies to consult with the USFWS and NMFS to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species. A list of threatened and endangered species relating to this project was obtained from USFWS on October 1, 2019. A biological assessment is being drafted for submittal to USFWS. Special-status species potentially affected by the proposed project are the following species: (1) giant garter snake (*Thamnophis gigas)*, (2) valley elderberry longhorn beetle (*Desmocerus californicus dimorphus)* (3) palmate-bracted bird's beak (*Cordylanthus palmatus)*, (4) vernal pool fairy shrimp (*Branchinecta lynchi*), (5) vernal pool tadpole shrimp (*Lepidurus packardi*), (6) western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), and (7) least Bell's vireo *(Vireo bellii pusillus*). This biological assessment would be transmitted to the USFWS concurrent with the release of the DSEIS to the public and agencies for review. Informal consultation with USFWS has been initiated. Formal consultation would be requested through the biological assessment. The Corps has determined that there would be no effect to any species under NMFS jurisdiction; therefore, consultation with NMFS is not required.

Federal Water Project Recreation Act (16 U.S.C. 460L-5, 460L-12 et seq., and 662)

This act requires Federal projects to consider features that would lead to enhancement of recreational opportunities. Existing recreational opportunities are discussed in Section 3.2.7. The City of Woodland has expressed interest in utilizing the proposed levee for passive recreation.

Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.)

The FWCA requires Federal agencies to consult with the USFWS and State fish and wildlife agencies before undertaking projects that control or modify surface water (water projects). This consultation is intended to promote the conservation of wildlife resources by preventing loss of or damage to fish and wildlife resources and to provide for the development and improvement of fish and wildlife resources in connection with water projects. The USFWS and CDFW are authorized to conduct necessary surveys and investigations to determine the possible damage to resources and to determine measures to prevent such losses. Representatives of the Corps participated in these studies. USFWS has prepared a draft Coordination Act Report, which is included in Appendix A. The results of the USFWS HEP analysis are contained within the draft Coordination Act Report.

Migratory Bird Treaty Act (16 U.S.C. 703 et seq.)

The Migratory Bird Treaty Act of 1918 is the domestic law that affirms, or implements, the U.S.'s commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protects selected species of birds that are common to both the U.S. and one or more of the countries. (They occur in both countries at some point during their annual life cycle.)

Conservation measures to aid in project compliance with the Migratory Bird Treaty Act are described in Chapter 3.

Executive Order 11988, Flood Plain Management

This Executive Order requires the Corps to provide leadership and take action to (1) avoid development in the base (1 in 100 annual event) flood plain (unless such development is the only practicable alternative); (2) reduce the hazards and risk associated with floods; (3) minimize the effect of floods on human safety, health, and welfare; and (4) restore and preserve the natural and beneficial values of the base flood plain.

To comply with this Executive Order, the policy of the Corps is to formulate projects which, to the extent possible, avoid or minimize adverse effects associated with use of the base flood plain and avoid inducing development in the base flood plain unless there is no practicable alternative. The Lower Cache Creek LCP is in compliance with this Executive Order.

The project provides various levels of flood protection to the project area. The proposed flood barrier is consistent with existing City and County policies regarding land use and flood protection. The project area would be developed in accordance with existing adopted land use designations. Current growth projections for the project area were determined to be the same for with- and without-project conditions. Therefore, the project would not induce any development in the base flood plain.

Executive Order 11990, Protection of Wetlands

This order directs the Corps to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in implementing civil works projects. Any agency considering a proposal that might affect wetlands must evaluate factors affecting wetland quality and survival. These factors should include the proposal's effects on the public health, safety, and welfare due to modifications in water supply and water quality, maintenance of natural ecosystems, and conservation of flora and fauna; and other recreational scientific and cultural uses. Jurisdictional wetlands may exist within the project area, especially within the CCSB. A wetlands delineation would be completed in the PED phase of the project prior to construction to ensure the project complies with all necessary wetland regulations

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

This order directs all Federal agencies to identify and address adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. Specifically, agencies must collect, maintain, and analyze demographic and economic information when the proposed project would have a substantial environmental, human health, or economic effect on surrounding populations. This project is in compliance with this Executive Order for several reasons.

The proposed action would have no substantial environmental justice effects on the project area. Flood control alternative plans were formulated according to Corps policies and regulations, as well as other Federal guidelines and laws, and were not designed to provide flood protection or to benefit any specific ethnic or socioeconomic group in the community.
Public involvement for this study included several meetings open to the public. All public comments via telephone, letter, e-mail, and meetings were considered in the formulation of alternative plans and evaluation of effects.

Public Involvement

- On April 15 and May 6, 1996, the Corps held public workshops in Woodland to present the study results and discuss how to complete the reconnaissance phase and initiate the feasibility phase of the study.
- The initial public scoping meeting was held by the Corps on May 30, 2000 from 7:00 p.m. to 9:00 p.m. at the Heidrick Ag History Center at 1962 Hays Lane in Woodland, California.
- A public scoping meeting was held on September 3, 2015 from 4:00 p.m. to 7:00 p.m. at the Woodland Community Center at 2001 East Street in Woodland, CA.
    - A total of 18 comments were received during the comment period from the public scoping meeting held in 2015.
    - Six comments were from agencies and tribes, three were from community or non-profit organizations, and nine were from interested individuals.
    - These public comments can be found in Appendix J Public Involvement.
- A public scoping meeting for the City of Woodland's Environmental Impact Report (EIR) was held on September 11, 2019 from 6:30 p.m. to 8:00 p.m. at Woodland City Hall at 300 1st Street in Woodland, CA.
    - Public comments would be documented in the EIR.

Farmland Protection Policy Act (7 U.S.C. 4201 et seq.)

This act requires a Federal agency to consider the effects of its action and programs on the Nation's farmlands. The act charges the U.S. Department of Agriculture with implementing programs that develop criteria for identifying the effects of Federal programs on the conversion of farmlands into nonagricultural uses. Federal agencies must consider alternative actions, as appropriate, to reduce such adverse effects and ensure that their programs, to the extent practicable, are compatible with State, local, and private programs. The act also authorizes local governments to identify farmland of local importance and exempts land already committed to urban development.

The designation of prime farmland grew out of a program by the Natural Resource Conservation Service to map the Nation's important farmlands. The Corps in collaboration with the Natural Resources Conservation Service developed a Farmland Conversion Impact Rating, which fell below the maximum recommended allowable level; thus, no alternatives must be considered based on the rating, and the project would be in compliance with the FPPA.

Executive Order 13148, The Greening of Government Through Leadership in Environmental Management

The Executive Order holds each Federal agency and Federal agency contractors responsible for ensuring that all necessary actions are taken to integrate environmental accountability into day-to-day decision making and long-term planning processes. Environmental management considerations must be fundamental in all environmental leadership programs, policies, and procedures. Each agency is responsible for complying with all environmental regulations by establishing compliance audit programs and policies that emphasize pollution prevention and reduction.

Executive Orders 13112 and 13751, Invasive Species

These Executive Orders address the prevention of the introduction of invasive species and provides for their control and minimization of the economic, ecological, and human health impacts the invasive species causes. In accordance with the EOs, Federal Agencies are required to identify actions that may affect the introduction, establishment, or spread of invasive species, and, within administrative, budgetary, and jurisdictional limits, monitor such species, to eradicate and/or control their population and prevent their introduction, establishment, or spread.

Additionally, the EOs establish the Invasive Species Council, which is responsible for the preparation and issuance of the National Invasive Species Management Plan which details and recommends performance-oriented goals and objectives and specific measures of success for Federal Agencies.

Specific avoidance and minimization measures would be developed in the PED phase of the project. Measures may include cleaning equipment and tools prior to arrival on site, using weed-free borrow material or from local sources, and restoring disturbed areas with a native mix of grasses and forbs to prevent invasive species from colonizing.

Noxious Weed Act of 1974 (7 U.S.C. 2801 et seq.)

The Noxious Weed Act was authorized to control and manage the spread of nonnative plant species that may have adverse effects on agriculture, commerce, wildlife resources, or public health. The Noxious Weed Act inhibits the transport, trade, or sales of noxious plant species in the U.S. The Noxious Weed Act gave the Secretary of Agriculture the authority to determine which plant species are noxious plant species and to establish measures to control them. As amended, the Noxious Weed Act requires all Federal agencies to establish a management plan to control the spread of noxious plant species in their jurisdiction. A management plan would be developed for the construction phase of this project and would be include in the Operations and Maintenance Manual for the project.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald or golden eagles, including their parts, nests, or eggs. In addition to immediate impacts, the Act also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment. Eagles are not known to nest near the vicinity of the proposed project area; however, there are documented occurrences of eagles in the project area. If pre-construction surveys indicate the presence of protected eagles, proper avoidance and mitigation measures would be enacted. For more information on compliance with the BGEPA, see Section 3.3.9.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.) was passed by Congress in 1976, and gave NOAA Fisheries the authority to regulate fisheries in the U.S. The area of authority covers a range of 3 nautical miles from the land edge to 200 nautical miles out to sea. This area of authority is called the Exclusive Economic Zone.

The goals of the Magnuson-Stevens Act were to phase out foreign fishing operations in the Exclusive Economic Zone, prevent overfishing, allow overfished species to recover, and protect and manage fishery resources. The project alternatives would not affect fisheries in the Exclusive Economic Zone.

The Magnuson-Stevens Act was amended in 1996 to place the focus on sustainability of fisheries resources, habitat conservation, and the standard for maximum sustainable levels for fisheries. Under the 1996 amendments, Federal agencies are mandated to consult with NMFS regarding any action authorized, funded, or undertaken that may adversely affect any essential fish habitat (EFH) designated under the Magnuson-Stevens Act. EFH for West Coast salmon is defined as those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem and includes streams, lakes, ponds, wetlands, and other currently viable water bodies, as well as most of the habitat historically accessible to salmon in Washington, Oregon, Idaho, and California.

Lower Cache Creek is considered EFH for West Coast salmon, and the LCP was determined to have no effect on EFH. See Section 3.3.9 for further discussion.

Noise Control Act of 1972, 42 U.S.C. 4909 et seq.

Congress passed the Noise Control Act on October 27, 1972, to protect the quality of human life from adverse effects from noise. The Noise Control Act requires Federal agencies' activities that may produce noise to comply with all Federal, State, and local laws and regulations that regulate noise levels. The Yolo County General Plan identifies noise emissions thresholds, which were incorporated into the significance thresholds used in the assessment of impacts resulting from the project. Construction related noise is not likely to exceed land use compatibility thresholds on agricultural lands, but could result in intermittent noise impacts to residential uses. Truck routes and detours would consider potential impacts to adjacent properties. Night-time construction would be restricted near noise sensitive land uses. All construction equipment would be properly maintained. The proposed project footprint would affect lands zoned for residential use, and additional mitigation such as the construction of temporary sound barriers or sound-proofing of homes could be required.

Table 4-4. Status of Compliance

Federal Statute	Status of Compliance
National Environmental Policy Act of 1969	Ongoing
National Historic Preservation Act of 1966	Ongoing
Clean Air Act	Ongoing
Water Resources Development Act of 1986	Ongoing
Clean Water Act	Ongoing. A 404(b)(1) evaluation has been completed.
Endangered Species Act	Informal consultation has been initiated. Formal consultation would be initiated at the release of this DSEIS for concurrent review.
Federal Water Project Recreation Act	In compliance
Fish and Wildlife Coordination Act	Ongoing. A draft CAR has been furnished by the USFWS.
Migratory Bird Treaty Act	Ongoing. Conservation measures have been identified to aid in compliance.

Federal Agriculture Improvement and Reform Act of 1996 and 1985 Food Security Act	No effect.
Executive Order 11988, Flood Plain Management	Ongoing
Executive Order 11990, Protection of Wetlands	Ongoing
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	In compliance
Farmland Protection Policy Act	In compliance
Executive Order 13148, The Greening of Government Through Leadership in Environmental Management	In compliance
Note: Ongoing – Some requirements of the regulation remain to be met by subsequent installation actions before implementation of some of the actions associated with this project. Once the statutory requirement for each action has been met, compliance would be labeled "in compliance".	

4.9 Public Involvement

This chapter summarizes public and agency involvement activities undertaken by the Corps, the City of Woodland, and DWR that have been conducted to date, are ongoing, and/or would be conducted for this project, and which satisfy NEPA requirements for public scoping and agency consultation and coordination. Native American consultation activities are described in the Cultural Resources Section 3.3.10 and in Appendix C.

4.9.1 Notice of Intent and Scoping Meetings (Public Interest)

On April 15 and May 6, 1996, the Corps held public workshops in Woodland to present the study results and discuss how to complete the reconnaissance phase and initiate the feasibility phase of the study. The initial public scoping meeting was held by the Corps on May 30, 2000 from 7:00 p.m. to 9:00 p.m. at the Heidrick Ag History Center at 1962 Hays Lane in Woodland, California. A notice of intent (NOI) to prepare the 2003 DEIS-EIR for the Proposed Flood Reduction Investigation in Yolo County, California (Vol. 65, No. 88).

A Notice of Availability (NOA) was published on March 21, 2003 for the Draft Feasibility Report and Environmental Impact Statement/Environmental Impact Report (DFR/DEIS-EIR) for the Lower Cache Creek, Yolo County, CA, City of Woodland and Vicinity, for Potential Flood Damage Reduction Project (Vol. 68, No. 55).

The Corps published the NOI to prepare the Feasibility Report/Supplemental Draft Environmental Impact Statement (DFR/SDEIS) for the Lower Cache Creek Flood Risk Management Feasibility Study on August 26, 2015 (Vol. 80, No. 165). A public scoping meeting was held on September 3, 2015 from 4:00 p.m. to 7:00 p.m. at the Woodland Community Center at 2001 East Street in Woodland, CA. An overview of the study and the NEPA process was presented, and all interested parties were afforded the opportunity to provide comments. Comments received primarily focused on flooding from Cache Creek, land subsidence, gravel mining, and effects of alternatives on the Cache Creek Settling Basin.

A total of 18 comments were received during the comment period from the public scoping meeting held in 2015. Six comments were from agencies and tribes, three were from community or non-profit organizations, and nine were from interested individuals. These public comments can be found in Appendix J Public Involvement.

A public scoping meeting for the City of Woodland's Environmental Impact Report (EIR) was held on September 11, 2019 from 6:30 p.m. to 8:00 p.m. at Woodland City Hall at 300 1st Street in Woodland, CA. Public comments from the public scoping meeting received within two weeks would be considered for the EIR. These comments would be documented in the EIR.

4.9.2 Comments on the DSEIS

A notice of availability of the DSEIS would be published in the Federal Register on December 27, 2019. The draft would be distributed for public review on December 27, 2019. A public workshop would be held during the 45-day review period to provide additional opportunities for comment on the DSEIS. All comments received by February 10, 2020 would be incorporated into the Final SEIS, as appropriate. A comments and responses appendix would be included in the Final SEIS.

Comments received during the comment period for the 2003 EIS-EIR would also be addressed in the Final SEIS.

4.8.3 Intended Uses of the DSEIS

The DSEIS is an informational document. Its purpose is to inform public agency decision makers and the general public of the significant effects of the project. The document also identifies ways to minimize significant effects and describes reasonable alternatives to the project.

The DFR/DSEIS would be circulated for review by the public and governmental agencies. It would then undergo a U.S. Army Corps of Engineers (USACE) policy review and Independent External Peer Review (IEPR) prior to submittal of the final reports to USACE Headquarters for approval. If the Feasibility Report is approved by USACE Headquarters, the Chief of Engineers would sign the Chief's Report and transmit the reports to the Assistant Secretary of the Army (Civil Works) (ASA[CW]). The ASA(CW) would review the study and determine whether or not to sign the Record of Decision (ROD), thus completing the NEPA process. Finally, the Reports would be reviewed by the Office of Management and Budget and would be transmitted to Congress for potential project authorization and funding of the Federal share of the project.

The District Engineer of the Sacramento District must decide whether or not to recommend that a plan described in this report be authorized for implementation as a Federal project, with modifications at the discretion of the Chief of Engineers. The City of Woodland must decide whether to implement the recommended plan as the non-Federal cost-sharing partner and CEQA lead agency.

5.0 LIST OF PREPARERS AND RECIPIENTS

5.1 List of Preparers

This DSEIS was prepared by the U.S. Army Corps of Engineers, Sacramento District. The following is a list of individuals who prepared sections of the DSEIS, provided significant background materials, provided project description engineering details, or participated in preparing the DSEIS.

Table 5-1. List of Preparers

Name	Title	Experience
Anne Baker	Senior Environmental Manager	13 Years
Ashley Lopez	Environmental Manager	3 Years
Cory Koger	Chemist/Toxicologist	20 Years
David Sobel	Water Resources Planner	8 Years
Keleigh Duey	Environmental Manager	4 Years
Lindsay Floyd	Biological Science Study Manager	1 Year
Nancy Bui	Environmental Manger	3 Years
Robert Chase	Senior Fisheries Biologist	16 Years
Robert Gudino	Archaeologist	18 Years
Savannah Fahning	Student	1 Year

Table 5-2. List of USACE Professionals Consulted

Name	Title	Experience
Andrea Meier	Chief Environmental Analysis Section	17 Years
Brian Haines	Lead Civil Engineer	16 Years
Bronwen Tomb	Assistant District Counsel	3 Years
Dan Artho	Chief Environmental Planning Section	24 Years
Joaquin (Kin) Quenga	Civil Engineer	17 Years
Peter Blodgett	Hydraulic Engineer	21 Years
S. Joe Griffin	Chief Cultural Resources Section	15 Years
Saba Siddiqui	Hydraulic Engineer	15 Years

Table 5-3. List of External Professionals Consulted

Name	Agency, Firm	Support
Tim Busch	City of Woodland	Engineering
Ric Reinhardt	MBK, Engineers	Engineering, Hydraulics
Ron Milligan	MBK, Engineers	Engineering
Curtis Lee	Department of Water Resources	Engineering
Sara Martin	ICF International Inc.	CEQA
Daria Snider	Madrone Ecological Consulting	Biological Assessment
Ginger Fodge	Madrone Ecological Consulting	CWA 404(b)(1)
Natalya Bente	Madrone Ecological Consulting	GIS
Cathy Johnson	USFWS	ESA/FWCA
Jennifer Hobbs	USFWS	ESA

5.2 List of Recipients

This section lists Federal, State, regional, and local public and private agencies and organizations that would either receive a copy of the DFR/DSEIS or a notification of document availability. In addition to the regulatory agencies, agencies with special expertise or interest in evaluating environmental issues related to the project are included. Private agencies, organizations, and individuals who may be affected by the project or who have expressed an interest in the project through the public involvement process since 2015 are also included.

Elected Officials

Governor of California
- Honorable Gavin Newsom

United States Senate
- Honorable Kamala Harris
- Honorable Dianne Feinstein

House of Representatives
- Honorable John Garamendi

California Senate
- Honorable Bill Dodd

California Assembly
- Honorable Cecilia M Aguiar-Curry

United States Government Departments and Agencies

Fish and Wildlife Service
U.S. Geological Survey
Bureau of Land Management
Office of Environmental Project Review
Advisory Council on Historic Preservation
Natural Resources Conservation Service
Federal Highway Administration
Council on Environmental Quality
Environmental Protection Agency (Washington D.C. and San Francisco)
Federal Emergency Management Agency
National Marine Fisheries Service

State of California Governmental Agencies

Office of Historic Preservation
Senate Committee on Natural Resources
Department of Fish and Wildlife
Department of Conservation
Department of Water Resources
- The Reclamation Board
- California Water Commission

State Water Resources Control Board
- Regional Water Quality Control Board

State Lands Commission
State Clearinghouse
Office of Transportation Planning

California Department of Transportation
California Air Resources Board
Yolo Solano Air Quality Management District
Native American Heritage Commission

Local Government

Yolo County Board of Supervisors
City of Woodland City Council
Colusa Basin Drainage District
Woodland Chamber of Commerce
Yolo County Flood Control and Water Conservation District
Yolo County Department of Public Works
City of Woodland Community Development Department
City of Woodland Public Works
Yolo County Planning Department
Woodland Library

Organizations

Cache Creek Conservancy
Cache Creek Nature Preserve
California Native Plant Society
California Northern Railroad/Rail America
California Wildlife Federation
Friends of Swainson's Hawk
Sierra Club
Yolo Audubon Society

6.0 REFERENCES

Ahl, J.S.B. 1991. "Factors affecting contributions of the tadpole shrimp, Lepidurus packardi, to its oversummering egg reserves." Hydrobiologia 137-143.

Andrews, W.F. 1970. Soil Survey of Yolo County, California. United States Department of Agriculture and University of California Agricultural Experiment Station.

Askham, L. R. 1990. Affect of artificial perches and nests in attracting raptors to orchards. In Proceedings of the 14th Vertebrate Pest Conference (L. R. Davis and R. E. Marsh, Editors). University of California, Davis, CA USA. pp. 144–148.

Battistone, C.L., Furnas, B.J., Anderson, R.L., Dinsdale, J.L., Cripe, K.M., Estep, J.A., Chun, C.S.Y., and S.G. Torres. 2019. Population and Distribution of Swainson's Hawks (Buteo swainsoni) in California's Great Valley: A Framework for Long-Term Monitoring. Journal of Raptor Research, 53(3), 253-265. https://doi.org/10.3356/JRR-18-34.

Belding, L. 1878. A partial list of the birds of central California. Proc. U.S. Nat. Mus. 1:388-449.

Belk, D. 1977. Evolution of egg size strategies in fairy shrimps. Southwestern Naturalist 22(1):99-105.

Bernacchi, L. 2018. Farms serve as natural experiment site for large-scale groundwater recharge. Dr. Helen Dahlke's research contributes to restoring California's water reserves. UCWater. Accessed 11-7-2019 from http://ucwater.org/news/onfarm-groundwater-recharge. UC Davis, CA.

Buhler, W. 2019. Using pesticides safely and correctly. NFS – Founded Center for Integrated Pest Management. Pesticide Environmental Stewardship, North Carolina State University, Raleigh, NC.

Busch, T. Personal communication. September 11, 2019. City of Woodland Public Scoping Meeting for the EIR. Woodland, CA.

CalTrans. 2017. Traffic Volumes: Route 5-6. Retrieved from https://dot.ca.gov/programs/traffic-operations/census/traffic-volumes/2017/route-5-6.

Cawley, K.M., Hohner, A.K., McKee, G.A., Borch, T., Omur-Ozbek, P., Oropeza, J., and Rosario-Ortiz, F.L. 2018. Characterization and spatial distribution of particulate and soluble carbon and nitrogen from wildfire-impacted sediments. Journal of Soils and Sediments: 18: 1314-1326. https://doi.org/10.1007/s11368-016-1604-1

(CDFG) California Department of Fish and Game. 2000. Status of rare, threatened, and endangered animals and plants of California. Sacramento, California: Habitat Conservation Planning Branch.

(CDOC) California Department of Conservation. 2014-2016. Yolo County Important Farmland. Division of Land Resource Protection, Farmland Mapping and Monitoring Program. Vector digital data. Accessed November 14, 2019 from https://www.conservation.ca.gov/dlrp/fmmp/Pages/Yolo.aspx.

City of Woodland. 2014. Average Daily Traffic Volumes 2015. Public Works Department Engineering Division. Woodland, CA.

City of Woodland. 2016. Lower Cache Creek Feasibility Study Alternatives Analysis Report. Prepared by Wood Rodgers.

City of Woodland. 2017a. General Plan Update 2035. Prepared by Dyett & Bhatia, Urban and Regional Planners. Woodland, CA.

City of Woodland. 2017b. Final 2035 Climate Action Plan. Prepared by City of Woodland Public Works Department and Community Development Department. Woodland, CA.

City of Woodland. October 2018. Public Review Draft Municipal Service Review and Sphere of Influence Study for the City of Woodland. MSR/SOI for the City of Woodland. LAFCo Project No. 049. Conducted by C. Crawford. Yolo Local Agency Formation Commission. Woodland, CA.

(CNDDB) California Natural Diversity Database. 2019. Rarefind 5. California Department of Fish and Wildlife. Dated 27 March 2019.

Cooper, J.G. 1861. New California animals. Proc. Calif. Acad. Sci. 2: 118-123.

Coats, R., M.T. Showers, and B. Pavlik. 1988. A Management Plan for the Springtown Alkali Sink Wetlands and the Endangered Plant Cordylanthus palmatus. Philip Williams & Associates, San Francisco, CA.

Cogswell, H.L. 1958. Spring Migration. Middle Pacific Coast Region. Audubon Field Notes. 12(4): 379-384.

County of Yolo. 2009. 2030 Countywide General Plan Resolution No. 09-189. Planning and Public Works Department; Woodland, CA. Received August 12, 2019 from https://www.yolocounty.org/general-government/general-government-departments/county-administrator/general-plan

County of Yolo. 2018a. Cache Creek Parkway Plan: Open Space Inventory and Baseline Improvements. Prepared by Tchudin Consulting Group and Callander Associates Landscape Architecture.

Cypher, E. 1998. Demographic Monitoring, Seed Banking, and Comprehensive Survey of Palmate bracted Bird's Beak (Cordylanthus palmatus) at Alkali Sink Ecological Reserve, Fresno County. Endangered Species Recovery Program, Bakersfield, CA.

Cypher, Ellen and Brian. 2015. Host relationships of the endangered plant palmate salty bird's beak, Chloropyron palmatum (Orobanchaceae). Paper presented at California Native Plant Society 2015 Conservation Conference.

Doll, D. 2009. Phytophthora root and crown rot of walnut and almond. The Almond Doctor. Accessed 11-7-2019 from http://thealmonddoctor.com/2009/09/28/phytophthora-root-and-crown-rot-of-walnut-and-almond.

Donald, D.B. 1983. Erratic occurrence of anostracans in a temporary pond colonization and extinction or adaptation to variations in annual weather. Can J Zool 61 1492 1498

(DWR) Department of Water Resources. 2014. Summary of Recent, Historical, and Estimated Potential for Future Land Subsidence in California.

DWR. 2018a. Cache Creek Settling Basin Trap Efficiency Study Final Report. Prepared by A. Ercan, K. Carr, T. Tu, and M.L. Kavvas. UC Davis J.A. Hydraulics Laboratory, Department of Civil and Environmental Engineering. University of California, Davis.

DWR. 2018b. 2017 GPS Survey of the Sacramento Valley Subsidence Network. Retrieved from: https://water.ca.gov/-/media/DWR-Website/Web Pages/Programs/Groundwater-Management/Data-and-Tools/Files/RegionalReports/2017_GPS_Survey_of_the_Sacramento_Valley_Subsidence_Network.pdf.

eBird. 2019. Yellow-billed cuckoo. Range Map. Checklist S47972022. Retrieved from https://ebird.org/checklist/S47972022.

EIP Associates. 1998. Letter of Findings for Palmate-Bracted Bird's-Beak (Cordylanthus palmatus var. palmatus) Rare Plant Survey for Properties to the East of the Woodland Specific Plan Area. Tschudin Consulting Group, Sacramento, CA.

Eng, L., D. Belk, and C.H. Eriksen. 1990. Californian Anostraca: distribution, habitat, and status. Journal of Crustacean Biology 10:247-277.

(FEMA). Federal Emergency Management Agency. 2012. FEMA's National Flood Hazard Layer (NFHL) Viewer. Accessed from https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html.

FEMA. (2015). Environmental Planning and Historic Preservation Program: Executive Order 12898, Environmental Justice for Low Income & Minority Populations, 1994. Retrieved from: https://www.fema.gov/executive-order-12898-environmental-justice-low-income-minority-populations-1994#0

Fitch, H.S. 1940. A biogeographical study of the ordinoides Artenkreis of garter snakes (genus Thamnophis). University of California Publications in Zoology 44:1–150.

Fremont Weir Wildlife Area. (2009). Retrieved from: https://www.wildlife.ca.gov/Lands/Places-tovisit/Fremont-Weir-WA

Fugate, M.L. 1992. Speciation in the fairy shrimp genus Branchinecta (Crustacea: Anostraca) from North America. University of California, Riverside. Riverside, California. Page 88.

(FWA). Federal Highway Administration. 1988. Visual Impact Assessment for Highway Projects. (FHWA-HI-88-054). USDOT (US Department of Transportation).

Goldwasser, S. 1978. Distribution, reproductive success and impact of nest parasitism by brown-headed cowbirds on least Bell's vireos. State of California; The Resources Agency, California Department of Fish and Game. Fed. Aid. Wildl. Rest. W-54-R-10, Nongame Wildl. Prog. Job W 1.5.1, Final Rept.

Goldwasser, S. 1981. Habitat requirements of the least Bell's vireo. California Department of Fish and Game Final Report, Job IV-38.1.

Gray, M.V. and J. Gleaves. 1981. The riparian forest as habitat for the least Bell's vireo (Vireo bellii pusillus). Paper presented at the California Riparian Systems Conference, University of California, Davis; September 1981.

Grinnell, J., and A. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna No. 27.

Hansen, G.E. and J.M. Brode. 1980. Status of the giant garter snake Thamnophis couchii gigas (Fitch): Special Publication Report Number 80-5. Inland Fisheries Endangered Species Program: California Department of Fish and Game.

Hansen, G.E. and J.M. Brode. 1993. Results of relocating canal habitat of the giant garter snake (Thamnophis gigas) during widening of State Route 99/70 in Sacramento and Sutter Counties, California. Final Report for Caltrans Interagency Agreement 03E325 (FG7550) (FY87/88-91-92). Unpublished.

Hansen, G.E. 1998. Cherokee Canal Sediment Removal Project Post-Construction Giant Garter Snake (Thamnophis gigas) Surveys. Final report for California Department of Water Resources, Contract No. B-81535.

Hughes, J.M. 1999. "Yellow-billed Cuckoo (Coccyzus americanus)." In The Birds of North America. Philadelphia, PA.

Hogan, J. n.d. Woodland Regional Park. California Native Plant Society. Accessed from https://www.sacvalleycnps.org/conservation/66-woodland-regional-park.

Jay, A. 1911. Nesting of the California cuckoo in Los Angeles County, California. Condor 13:69–73.

Kus, B.E. and K.L. Miner. 1989. The use of non-riparian habitats by least Bell's vireos (Vireo bellii pusillus). Pp 299-303 D.L. Anell, ed. California riparian systems conference: protection, management, and restoration for the 1990's; 1988 September 22-24, Davis, CA. Pacific Northwest Forest and Range Experiment Station, Berkeley, CA; USDA Forest Service Gen. Tech. Rep. PSW-110. 544 pp.

Kus, B. 2002. Least Bell's Vireo (Vireo bellii pusillus). In The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/riparian_v-2.html.

Laymon, S.A., and M.D. Halterman. 1987. "Can the western subspecies of the Yellow-billed Cuckoo be saved from extinction?" Western Birds 19-25.

Larkey, J. and S. Walters. 1987. Land of Changing Patterns. Windsor Publications, Inc.

MBK Engineers. 2019. Technical Memorandum Subject: Flood Risk to Community to Yolo. Prepared by B. Brown for J. Twitchell of GEI Consultants.

Miller, R. 2018. Summary of Mining Operations, Approved Mining Operations (West to East along Cache Creek). Prepared by R. Miller, Senior Mining Planner for the Yolo County. Retrieved from https://www.yolocounty.org/home/showdocument?id=58661.

(NOAA) National Oceanic and Atmostpheric Administration. 2019. California Nevada River Forecast Center. Accessed from https://www.cnrfc.noaa.gov/

(NRCS) Natural Resources Conservation Service. 2015. Structures for Wildlife, Raptor Perch Pole (649L). US Department of Agriculture, Natural Resources Conservation Service, CA, USA.

NRCS. Soil Survey of Yolo County, California. 2019. Retrieved from: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

O'Geen A, Saal M, Dahlke H, Doll D, Elkins R, Fulton A, Fogg G, Harter T, Hopmans J, Ingels C, Niederholzer F, Sandoval Solis S, Verdegaal P, Walkinshaw M. 2015. Soil suitability index identifies potential areas for groundwater banking on agricultural lands. Calif Agr 69(2):75-84. https://doi.org/10.3733/ca.v069n02p75.

Pennak, R.W. 1989. Fresh-water invertebrates of the United States: Protozoa and mollusca.

Potter, E.F. 1980. Notes on nesting Yellow-billed Cuckoos. Journal of Field Ornithology. 51(1), pp 17-29.

Potter, E.F. 1981. Effects of cool weather on nestling behavior and development in the yellow-billed cuckoo.The Chat. 45(1), pp 15-16.

Rayburn, A. 2016. Lower Cache Creek Invasive Species Mapping and Prioritization Project. Prepared for the Cache Creek Conservancy: Woodland, CA.

Reclamation District 108. 2016. Wallace Weir Fish Rescue Facility Notice of Intent to Adopt a Mitigated Negative Declaration and Initial Study. Grimes, CA. Accessed 11-13-2019 from http://www.rd108.org/wallaceweir. (SMAQMD). 2009. Updated 2019. Sacramento Metropolitan Air Quality Management District. Guide to Air Quality Assessment in Sacramento County. Sacramento, CA.

Regional Environmental Consultants (RECON). 1989. Comprehensive species management plan for the least Bell's vireo (Vireo bellii pusillus). Prepared for San Diego Association of Governments, San Diego.

Sacramento River Watershed Program. 2010. The Sacramento River Basin: A Roadmap to Watershed Management. Accessed from sacriver.org.

Salata, L. 1981. Least Bell’s vireo research, Camp Pendleton Marine Corps Base, San Diego County, California, 1981. Unpublished Report, Natural Res. Off., Camp Pendleton.

Salata, L. 1983. Status of the least Bell’s vireo on Camp Pendleton, California: report on research done in 1983. Unpublished Report, U.S. Fish and Wildlife Service, Laguna Niguel, CA.

Showers, M.T. 1996. Cordylanthus palmatus habitat survey, mitigation potential, and management recommendations. PAR Environmental Services, Inc., Sacramento, CA.

SMAQMD. 2018. Roadway Construction Emissions Model (version 9.0, May 2018). Retrieved from http://www.airquality.org/businesses/ceqa-land-use-planning/ceqa-guidance-tools. Sacramento, CA.

Sugnet, P. 1993. Preliminary compilation of documented distribution, fairy shrimp and tadpole shrimp proposed for listing. Sugnet and Associates, Sacramento, California. 10 pages.

Swolgaard, C. A., K. A. Reeves, and D. A. Bell (2008). Foraging by Swainson's Hawks in a vineyard-dominated landscape. Journal of Raptor Research 42:188–196.

(SYMCVC). Sacramento-Yolo Mosquito and Vector Control District. 2018. 2018 Annual Report. Retrieved from https://www.fightthebite.net/media/annual-reports.

SYMCVC. 2019. Vectors of Concern. Retrieved on November 5, 2019 from: https://www.fightthebite.net/wp-content/uploads/2018/04/symvcd-vectors-of-concern.pdf

Talley, T.S. 2003. Notes from the laboratory and field research on the valley elderberry longhorn beetle. For research conducted at the University of California, Davis, from 2002 to 2003.

Teichert Aggregates. 2019. Project Description Shifler Mining and Reclamation Project. Retrieved from https://www.yolocounty.org/general-government/general-government-departments/county-administrator/county-administrator-divisions/natural-resources/mining-projects-and-permits/teichert-shifler-application-applicant-submittal.

(TNC) The Nature Conservancy. 2013. Land and Water Stories - Invasive Species: What You Can Do.

University of Michigan. 2018. Center for Sustainable Systems, "Municipal Solid Waste Factsheet." Pub. No. CSS04-15. Ann Arbor, MI.

(USACE). U.S. Army Corps of Engineers. 1961. Unit No.126 Cache Creek Levees and Settling Basin Yolo Bypass to High Ground. Supplement to Standard Operation and Maintenance Manual; Sacramento River Flood Control Project. Sacramento, CA.

USACE. 2000. Environmental Site Assessment, Lower Cache Creek, Yolo County, Woodland Area. USACE: Sacramento District, Sacramento, CA.

USACE. 2003. Draft Environmental Impact Statement/Environmental Impact Report for Potential Flood Damage Reduction Project: Lower Cache Creek, Yolo County, CA, City of Woodland and Vicinity. Sacramento, CA.

USACE. 2007. Operation and Maintenance Manual. Cache Creek Basin, California: Cache Creek Settling Basin Enlargement. USACE, Sacramento District: Sacramento, CA.

USACE. 2014a. Environmental Site Assessment, Lower Cache Creek, Phase 1. Sacramento District, Sacramento, CA.

USACE. 2014b. USACE Climate Preparedness and Resilience Policy Statement. Climate Change Adaptation Plan. Prepared by USACE Climate Preparedness and Resilience Steering Committee. Washington, D.C.

USACE. 2015. Value Engineering Study Summary Report for Lower Cache Creek Feasibility Study, Yolo County, California P2#105216. Control No. 15-017. Sponsored by USACE,

Sacramento District, City of Woodland, California, and the Central Valley Flood Protection Board. USACE, Sacramento, CA.

USACE and West Sacramento Area Flood Control Agency (WSAFCA). 2015. West Sacramento Project General Reevaluation Report: Final Environmental Impact Statement/Environmental Impact Report. Sacramento, CA.

USACE. 2017. Guidance for Detection of Nonstationarities in Annual Maximum Discharges. ETL 1100-2-3. CECW-CE. Washington, D.C.

U.S. Census. (2010, 2017, 2018). QuickFacts. Yolo County, California. Retrieved from: https://www.census.gov/quickfacts/fact/table/yolocountycalifornia,CA/PST045218

U.S. Census. (2019). Poverty Thresholds. Poverty Thresholds for 2018 by Size of Family and Number of Related Children Under 18 Years. Accessed September 17, 2019 from https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html.

UC-Davis. 2016. "Amendment to the Cache Creek Settling Basin Trap Efficiency Study for the City of Woodland's Urban Flood Risk Reduction (UFRR) Study and Preliminary Design."

(USDA) United States Department of Agriculture, National Agricultural Statistics Service (NASS), Research and Development Division (RDD), Geospatial Information Branch (GIB), Spatial Analysis Research Section (SARS). 2019. 2018 California Cropland Data Layer. raster digital data. USDA, NASS Marketing and Information Services Office, Washington, D.C.

Investigations Reports, FFS # 1130 1F22, DEC ID # 199710005. Sacramento Fish and Wildlife Office, Environmental Contaminants Division, Sacramento, CA.

(USFWS) U.S. Fish and Wildlife Service. 1980. Listing the valley elderberry longhorn beetle as a threatened species with critical habitat. Federal Register 45:52803-52807.

USFWS. 1984. Recovery plan for the valley elderberry longhorn beetle. U.S. Fish and Wildlife Service, Endangered Species Program; Portland, Oregon.

USFWS. 1997. Programmatic formal consultation for U.S. Army Corps of Engineers 404 permitted projects with relatively small effects on the giant garter snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo counties, CA. File number 1-1-F-97-149. Sacramento, California.

USFWS. 1998a. Recovery Plan for the Upland Species of San Joaquin Valley, California. U.S. Fish and Wildlife Service; Portland, Oregon.

USFWS. 1998b. Draft Recovery Plan for the Least Bell's Vireo. U.S. Fish and Wildlife Service; Portland, Oregon.

USFWS. 1999a. Conservation Guidelines for the Valley Elderberry Longhorn beetle. U.S. Fish and Wildlife Service; Sacramento, California. Published 9 July 1999.

USFWS. 1999b. Recovery Plan: Draft Recovery Plan for the Giant Garter Snake (Thamnophis gigas). U.S. Fish and Wildlife Service; Portland, Oregon.

USFWS. 2001. Cache Creek Mercury Investigation USFWS Final Report, FFS #1130 1F22. Report Prepared by S. Schwarzbach, L. Thompson, and T. Adelsbach. Sacramento Fish and Wildlife Office, Environmental Contaminants Division. Sacramento, CA.

USFWS. 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. U.S. Fish and Wildlife Service; Portland, Oregon. Published 15 December 2005.

USFWS. 2012. Giant garter snake (Thamnophis gigas) 5-year review: Summary and evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California. 62 pp.

USFWS. 2014. "Endangered and threatened wildlife and plants; Designation of critical habitat for the western Distinct Population Segment of the Yellow-Billed Cuckoo; Proposed rule." Federal Register. 79(158), pp 48548-48652.

USFWS. 2017a. Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus). U.S. Fish and Wildlife Service; Sacramento, California. 28 pp. Published May 2017.

USFWS. 2017b. Recovery Plan for the Giant Garter Snake (Thamnophis gigas). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. Vii + 71pp. Published 28 September 2017.

USFWS. 2019. IPaC Trust Resource Report for the Study Area. Generated from http://ecos.fws.gov/ipac/ on 21 March 2019.

Velocity Island Park. 2015. Retrieved from: https://www.velocityislandpark.com.

Walters, S. 1995. Woodland: City of Trees, a History. Yolo County Historical Society. Woodland, CA

Whisler, E. 2013. Least Bell's vireo 2010-2012 surveys results, Putah Creek Sinks, Yolo Bypass Wildlife Area, Yolo County, California. Unpublished report. Prepared for Jeff Stoddard, Wildlife Area Manager, Yolo Bypass Wildlife Area, California Department of Fish and Wildlife, Davis, CA.

Whisler, E. 2015. Least Bell's vireo 2013 surveys results, Putah Creek Sinks, Yolo Bypass Wildlife Area, Yolo County, California. Unpublished report. Prepared for Jeff Stoddard, Wildlife Area Manager, Yolo Bypass Wildlife Area, California Department of Fish and Wildlife, Davis, CA.

Wirth, G.F., A.I.A. & Associates/Architects, Inc. 1982. Woodland Historical Resource Inventory Final Report 1981-82. City of Woodland.

Wong, E., and S. Kross. 2018. Effects of perch location on wintering raptor use of artificial perches in a California vineyard. Journal of Raptor Research, 52(2): 250-256. Accessed from https://doi.org/10.3356/JRR-17-46.1

Woodbridge, B. 1998. Swainson's Hawk (*Buteo swainsoni*). *In* The Riparian Bird Conservation Plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/riparian_v-2.html

(WHO) World Health Organization. 2003. Boron in Drinking-water: Background document for development of WHO Guidelines for Drinking-water Quality. Geneva.

Wylie, G.D., M.L. Casazza, C.J. Gregory, and B.J. Halstead. 2010. Abundance and sexual size dimorphism of the giant garter snake (Thamnophis gigas) in the Sacramento Valley of California. Journal of Herpetology. 44(1), pp 94-104.

Yolo County: Department of Agriculture and Weights & Measures. 2000. Agricultural Crop Report. Woodland, CA. Retrieved from: https://www.yolocounty.org/home/showdocument?id=4812

Yolo County. 2007a. Guinda Bridge Replacement Project on County Road 57 (Bridge 22C-0074) over Cache Creek. Negative Declaration. Yolo County Planning and Public Works Department. Woodland, Ca.

Yolo County. 2007b. Oak Woodland Conservation and Enhancement Plan. Prepared by Yolo County Parks and Natural Resources Management Division and Planning, Resources, and Public Works Department. Woodland, CA.

Yolo County. 2013. County of Yolo Bicycle Transportation Plan: Bicycle Routes and Priorities. Prepared by Yolo County Transportation Advisory Committee.

Yolo County: Department of Agriculture and Weights & Measures. 2017. Agricultural Crop Report. Woodland, CA. Retrieved from: https://www.yolocounty.org/home/showdocument?id=55675

Yolo County: Department of Agriculture and Weights & Measures. 2018. Agricultural Crop Report. Woodland, CA. Retrieved from: https://www.yolocounty.org/home/showdocument?id=59219

Yolo County. 2018b. Draft Revised Cache Creek Resources Management Plan (CCRMP) for Lower Cache Creek. Accessed September 14, 2019 from https://www.yolocounty.org/home/showdocument?id=54404.

Yolo Habitat Conservancy. 2018. "Yolo Habitat Conservation Plan/Natural Community Conservation Plan Volume 1."

Yolo County, 2019a. Cache Creek Parkway Plan: Open Space Inventory and Baseline Improvements, Financial Feasibility Study. Prepared by Bae Urban Economics.

Yolo County. 2019b. GIS Open Data – Administration. General Plan Land Use from the 2030 General Plan. Vector digital data. Retrieved from https://yodata-yolo.opendata.arcgis.com/datasets.

(YSAQMD). Yolo-Solano Air Quality Management District. 2007. Handbook for Assessing and Mitigating Air Quality Impacts. Davis, California.

7.0 INDEX